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BOEM 2020-057

South Fork Wind Farm and South Fork Export Cable Project

Final Environmental Impact Statement

August 2021

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Bureau of Ocean Energy Management

Office of Renewable Energy Programs

Published by:

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ENVIRONMENTAL IMPACT STATEMENT
SOUTH FORK WIND FARM AND SOUTH FORK EXPORT CABLE PROJECT

Draft ( ) Final (X)

Lead Agency:

U.S. Department of the Interior, Bureau of Ocean Energy Management (BOEM)

Cooperating Federal Agencies:

U.S. Department of Commerce, National Oceanic and Atmospheric Administration

National Marine Fisheries Service

U.S. Department of Defense, U.S. Army Corps of Engineers

U.S. Department of Homeland Security, U.S. Coast Guard

U.S. Department of the Interior, Bureau of Safety and Environmental Enforcement

U.S. Environmental Protection Agency

Cooperating Tribal Nation:

None

Area:

Lease Area OCS-A 0517

Cooperating State and Local Agencies:

Commonwealth of Massachusetts Office of Coastal Zone Management

State of Rhode Island Coastal Resources Management Council

State of Rhode Island Department of Environmental Management

Town of East Hampton

Trustees of the Freeholders and Commonalty of the Town of East Hampton

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Abstract:

The *South Fork Wind Farm and South Fork Export Cable Project Final Environmental Impact Statement* (final EIS) assesses the reasonably foreseeable impacts to physical, biological, socioeconomic, and cultural resources that could result from the construction and installation, operations and maintenance, and conceptual decommissioning of a commercial-scale wind energy project, the South Fork Wind Farm and South Fork Export Cable Project (the Project), located in the area covered by BOEM Renewable Energy Lease Number OCS-A 0517, approximately 19 miles southeast of Block Island, Rhode Island, and 35 miles east of Montauk Point, New York.

South Fork Wind, LLC, is proposing the Project, which is designed to contribute to New York's renewable energy requirements, particularly, the state's goal of generating 9,000 megawatts of offshore wind energy by 2030. BOEM has prepared the EIS following the requirements of the National Environmental Policy Act (42 USC 4321–4370f) and implementing regulations. This final EIS will inform BOEM in deciding whether to approve, approve with modifications, or disapprove the Project. Cooperating agencies will rely on the final EIS to support their decision making and to determine if the analysis is sufficient to support their decision. BOEM's action furthers United States policy to make the Outer Continental Shelf energy resources available for development in an expeditious and orderly manner, subject to environmental safeguards (43 USC 1332(3)), including consideration of natural resources and existing ocean uses.

EXECUTIVE SUMMARY

The *South Fork Wind Farm and South Fork Export Cable Project Final Environmental Impact Statement* (final EIS) assesses the reasonably foreseeable impacts to physical, biological, socioeconomic, and cultural resources that could result from the construction and installation, operations and maintenance (O&M), and conceptual decommissioning of a commercial-scale offshore wind energy facility and transmission cable to shore known as the South Fork Wind Farm (SFWF) and South Fork Export Cable (SFEC) Project (Project). The Bureau of Ocean Energy Management (BOEM) has prepared the final EIS under the National Environmental Policy Act (NEPA) (42 USC 4321–4370f).

Council on Environmental Quality (CEQ) NEPA regulations from 1978 were revised on July 26, 2020, and took effect on September 14, 2020. Because work on the EIS began before September 14, 2020, BOEM has followed the 1978 CEQ NEPA regulations. All following citations to CEQ NEPA regulations refer to the regulations before they were revised on July 26, 2020 (see 40 CFR 1506.13 of the revised regulations). The final EIS will inform BOEM's decision on whether to approve, approve with modifications, or disapprove the Project's construction and operations plan (COP).

Cooperating agencies may rely on this final EIS to support their decision-making. In conjunction with submitting its COP, SFW applied to the National Marine Fisheries Service (NMFS) for an incidental take authorization (ITA) under the Marine Mammal Protection Act (MMPA) of 1972, as amended (16 USC 1361 et seq.), for incidental take of marine mammals during Project construction. NMFS is required to review applications and, if appropriate, issue an ITA under the MMPA. In addition, NMFS has an independent responsibility to comply with NEPA and will rely on the information and analyses in BOEM's final EIS after independent review to fulfill its NEPA obligations. NMFS intends to adopt the final EIS and sign the record of decision (ROD), if appropriate. The U.S. Army Corps of Engineers (USACE) similarly intends to adopt the final EIS and sign the joint ROD in respect to its responsibilities under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.

Purpose of and Need for the Proposed Action

Through a competitive leasing process under 30 CFR 585.211, Deepwater Wind New England, LLC was awarded Commercial Lease OCS-A 0486 covering an area offshore Rhode Island. This lease was later assigned to South Fork Wind, LLC (SFW) and segregated to Commercial Lease OCS-A 0517 (the Lease). SFW has the exclusive right to submit a COP for activities within the area of the Lease (the Lease Area), and it has submitted a COP to BOEM proposing the construction and installation, O&M, and conceptual decommissioning of the Project.

The purpose of the Project is to develop a commercial-scale offshore wind energy facility in the Lease Area with wind turbine generators (WTGs), an offshore substation, and one transmission cable making landfall in Suffolk County, New York. The Project would contribute to New York's renewable energy requirements, particularly the state's goal of 9,000 MW of offshore wind energy generation by 2030. In addition, SFW's goal is to fulfill its contractual commitments to Long Island Power Authority (LIPA) pursuant to a power purchase agreement executed in 2017 resulting from LIPA's technology-neutral competitive bidding process.

The purpose of BOEM's action is to respond to and determine whether to approve, approve with modifications, or disapprove the COP to construct and install, operate and maintain, and decommission a commercial-scale offshore wind energy facility within the Lease Area. BOEM's action is needed to further the United States' policy to make Outer Continental Shelf (OCS) energy resources available for expeditious and orderly development, subject to environmental safeguards (43 USC 1332(3)), including consideration of natural resources and existing ocean uses. In addition, other federal agencies may consider requests for authorizations related to the Project under applicable laws and regulations not administered by BOEM. These considerations differ from BOEM's consideration of the Proposed Action but they are related and constitute connected actions under 40 CFR 1508.25, with discrete purposes and needs based on their respective statutory and regulatory obligations. The purpose and need of other federal agencies' action is to evaluate the applicant's request pursuant to specific requirements of the statutes and implementing regulations administered by those agencies, considering impacts of the applicant's activities on relevant resources, and if appropriate, issue the permit or authorization.

Public Involvement

Before the preparation of the EIS, BOEM conducted a 30-day public comment period and held three public scoping meetings near the Lease Area to solicit feedback and identify issues and potential alternatives for consideration. BOEM considered all scoping comments while preparing the EIS; the topics most referenced in the comments include commercial fisheries and for-hire recreational fishing; finfish, invertebrates, and essential fish habitat; the NEPA process; socioeconomics; and alternatives. Additional public input occurred during the Project's planning and leasing phases between 2010 and 2018. Publication of the draft EIS initiated a 45-day comment period open to all, after which BOEM assessed and considered all the comments received in preparation of the final EIS. See Appendix A for additional information on public involvement.

Alternatives

The final EIS analyzes in detail a No Action alternative and three action alternatives, as briefly described below. Chapter 2 provides detailed descriptions of the analyzed alternatives.

- <u>No Action alternative</u>: Under this alternative, BOEM would not approve the COP, and Project construction and installation, O&M, and conceptual decommissioning activities would not occur. Any potential environmental and socioeconomic impacts, including benefits, associated with the Project as described under the Proposed Action would not occur.
- <u>Proposed Action</u>: Under this alternative, the construction and installation, O&M, and conceptual decommissioning of up to 15 wind turbine generators (WTGs) in the 6- to 12-MW range and an offshore substation (OSS) within the Lease Area (including the expanded area) and associated export cables would occur within the range of design parameters outlined in the COP, subject to applicable mitigation measures. SFW would space WTGs in a uniform east–west and north–south grid with 1 × 1–nautical-mile (nm) spacing between WTGs and diagonal transit lanes at least 0.6 nm wide. This configuration would still allow micrositing of WTGs to avoid sensitive cultural resources and marine habitats.
- <u>Vessel Transit Lane alternative (Transit alternative)</u>: Under this alternative, BOEM evaluated a 4-nm-wide vessel transit lane[1] through the Lease Area where no surface occupancy would occur. BOEM developed this alternative in response to the January 3, 2020, Responsible Offshore Development Association (RODA) layout proposal (RODA 2020). The RODA proposal includes designated transit lanes, each at least 4 nm wide. Although the proposal includes six total transit lanes, only one lane intersects the Lease Area. The vessel transit lane is unique to this alternative and could facilitate transit of vessels through the Lease Area from southern New England and eastern Long Island ports to fishing areas in the region. WTGs located within the transit lane would be eliminated under this alternative. SFW would develop the remaining WTGs with a 12-

[1] BOEM also evaluated a 2-nm and 3-nm transit lane alternative. However, these smaller lanes would result in the same impacts as the Proposed Action because the lane would not overlap any proposed WTGs or the OSS. Therefore, a smaller lane width was dismissed from further evaluation.

MW turbine capacity and would move the offshore substation north of the currently proposed location and install it in one of the remaining WTG locations. The Transit alternative is within the proposed design envelope of up to 15 turbines in the 6- to 12-MW range. This alternative would disclose the effect a transit lane could have on the expected effects from the other action alternatives analyzed in the final EIS.

- Fisheries Habitat Impact Minimization alternative (Habitat alternative): Under this alternative, the construction and installation, O&M, and conceptual decommissioning of WTGs and an OSS within the Lease Area and associated inter-array and export cables would occur within the range of design parameters outlined in the COP, subject to applicable mitigation measures. However, to reduce impacts to complex fisheries habitats as compared to the Proposed Action, BOEM would require SFW to exclude certain WTGs and associated cable locations, if micrositing is not possible to maintain a uniform east–west and north–south grid of 1 × 1–nm spacing between WTGs with diagonal transit lanes of at least 0.6 nm wide. Under the Habitat alternative, BOEM may approve fewer WTG locations than proposed by SFW. Two options for layout of this alternative are considered in this EIS: Habitat alternative layout (a) Conservation Recommendations from the National Oceanic and Atmospheric Administration (NOAA) (June 7, 2021) and Habitat alternative layout (b) SFW Technical Memorandum (June 14, 2021). These options are described in Section 2.1.3. BOEM considers Habitat alternative layout (a) to be the preferred alternative.

Environmental Impacts

The final EIS uses four levels of classification to characterize the potential adverse or beneficial impacts as negligible, minor, moderate, or major. Chapter 2, Section 2.3 provides a detailed comparison of impacts by alternative, whereas Table ES-1 provides a summary of key findings for the Proposed Action. Impacts include both Project-specific impacts and incremental impacts of the Project when combined with other current and reasonably foreseeable projects (i.e., cumulative impacts). Where directionality (e.g., adverse or beneficial) is not specifically noted, the reader should assume the impact is adverse.

Impacts associated with the other action alternatives are generally similar to those described for the Proposed Action. See Section 3.1 for additional information on impact levels, and Sections 3.3 through 3.5 for detailed descriptions of the impacts for each resource under each alternative. CEQ NEPA implementing regulations (40 CFR 1502.16) require that an EIS evaluate the potential for unavoidable adverse impacts associated with a proposed action. The same regulations also require that an EIS review the potential impacts on irreversible or irretrievable commitments of resources resulting from implementation of a proposed action. Chapter 4 of the final EIS provides these disclosures.

Table ES-1. Key Environmental Impact Statement Findings for the Proposed Action

Resource	Proposed Action
Air quality	Minor to moderate temporary adverse impacts to air quality in the region due to construction and installation, O&M, and conceptual decommissioning, as well as minor beneficial, long-term air quality and reduced health event impacts. The overall cumulative impacts to air quality would be minor adverse and minor beneficial.
Water quality	Negligible to moderate temporary impacts to onshore surface water and groundwater quality and offshore water quality from erosion, sediment resuspension and deposition and scouring, discharges, and inadvertent spills. Onshore and offshore, overall cumulative impacts to water quality would be minor.
Bats	Negligible to minor adverse temporary to long-term impacts on bats and suitable habitat from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor.

Resource	Proposed Action
Benthic habitat, essential fish habitat (EFH), invertebrates, and finfish	Negligible to moderate impacts on benthic habitat, EFH, invertebrates, and finfish from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative impacts to benthic habitat, EFH, invertebrates, and finfish would be moderate.
Birds	Negligible to minor impacts on birds and suitable habitat from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative impacts would be minor.
Marine mammals	Negligible to moderate impacts, as well as minor beneficial impacts from construction and installation, O&M, and conceptual decommissioning activities, varying by species. Overall cumulative adverse impacts would be moderate adverse and minor to moderate beneficial.
Terrestrial and coastal habitats and fauna	Negligible to minor impacts to terrestrial and coastal habitats and fauna from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor.
Sea turtles	Negligible to minor impacts from elevated underwater noise from construction, vessel traffic, and accidental discharges of spills or trash. Overall cumulative impacts would be minor adverse and minor beneficial.
Wetlands and other waters of the United States (WOTUS)	Short- to long-term negligible to minor adverse impacts to wetlands and WOTUS from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor.
Commercial fisheries and for-hire recreation fishing	Negligible to major adverse construction and installation, O&M, and conceptual decommissioning impacts to commercial fisheries and for-hire recreational fishing due to increased port congestion; changes to fishing access, primarily through reduced fishing opportunity when construction activities are occurring; damage to or loss of fishing gear; and impacts on the catch due to changes in target species abundance or availability during construction activities. The “reef effect” of WTG foundations and associated scour protection would have minor beneficial impacts to for-hire recreational fisheries, depending on the extent to which the foundations enhance fishing opportunities. Overall cumulative adverse impacts would be major.
Cultural resources	Negligible to major adverse impacts to marine and terrestrial archaeological resources and to historic visual resources from Project construction and installation, O&M, and conceptual decommissioning activities. Overall cumulative adverse impacts would be negligible to major across marine, terrestrial and viewshed resources.
Demographics, employment, and economics	Negligible to minor adverse and minor to moderate beneficial impacts to the socioeconomic analysis area in terms of employment, federal revenue, and income. Overall cumulative impacts would be minor adverse and minor beneficial.
Environmental justice	Negligible to moderate adverse impacts to minority or low-income populations and tribes from the Project construction and installation, O&M, and conceptual decommissioning activities. Overall cumulative adverse impacts would be minor to moderate adverse and minor beneficial.
Land use and coastal infrastructure	Minor beneficial impacts to land use due to increased compatible uses at ports, whereas construction or conceptual decommissioning of onshore components would have negligible to moderate, temporary adverse impacts due to disturbance associated with onshore construction, including traffic delays and re-routing. Overall cumulative impacts would be minor adverse and minor beneficial.
Navigation and vessel traffic	Negligible to minor impacts on navigation and vessel traffic in the region from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be moderate.
Other marine uses	Negligible to major impacts to mineral extraction, military use, air traffic, land-based radar services, cables and pipelines, and scientific surveys. Overall cumulative adverse impacts would be minor for most uses. However, the overall impact would be moderate adverse for some military uses and radar and major adverse for scientific research and protected species surveys.
Recreation and tourism	Negligible to minor impacts to recreation and tourism due to Project construction and conceptual decommissioning activities. O&M and conceptual decommissioning of offshore Project activities could elicit both beneficial and adverse impacts to recreational use of resources within the viewshed of the WTGs. Overall cumulative impacts would be minor adverse and minor beneficial.
Visual resources	Negligible to major, adverse impacts on non-historic visual resources from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor to moderate, as the viewshed would return to previous condition after conceptual decommissioning.

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ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
μPa	micropascal
AC	alternating current
ADLS	Aircraft Detection Lighting System
AIS	automatic identification system
APE	area of potential effects
ASMFC	Atlantic States Marine Fisheries Commission
AVERT	AVoided Emissions and geneRation Tool
BA	biological assessment
BIWF	Block Island Wind Farm
BOEM	Bureau of Ocean Energy Management
CAA	Clean Air Act
CapEx	capital expenditures
CFR	Code of Federal Regulations
CH_4	methane
CMECS	Coastal and Marine Ecological Classification Standard
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COBRA	CO-Benefits Risk Assessment
COP	construction and operations plan
CRMC	Coastal Resources Management Council
CT	Connecticut
CTV	crew transport vessel
dB	decibel
dBA	A-weighted decibels
dB_{PEAK}	peak decibels
dB_{RMS}	root mean square decibels
dB_{SEL}	cumulative sound exposure level in decibels
DC	direct current
DMA	Dynamic Management Area
DO	dissolved oxygen
DoD	U.S. Department of Defense
draft EIS	draft environmental impact statement
ECNYS	Ecological Communities of New York State
EFH	essential fish habitat
EIS	environmental impact statement
EMF	electromagnetic field

EPA	U.S. Environmental Protection Agency
EPMs	environmental protection measures
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FIMP Project	Fire Island Montauk Point Project
final EIS	final environmental impact statement
FMP	fishery management plan
FTE	full-time equivalent
GDP	gross domestic product
GHGs	greenhouse gases
HAPCs	habitat areas of particular concern
HDD	horizontal directional drilling
hp	horsepower
HRG	high resolution geophysical
HUC	Hydrologic Unit Code
HVAC	high-voltage alternating current
HVDC	high-voltage direct current
Hz	hertz
IEC	International Electrotechnical Commission
IPaC	Information for Planning and Conservation
IPF	impact-producing factors
ITA	incidental take authorization
kHz	kilohertz
km	kilometer
kV	kilovolt
L	liter
Lease	BOEM Renewable Energy Lease Number OCS-A 0517
Lease Area	Area of BOEM Renewable Energy Lease Number OCS-A 0517
LIPA	Long Island Power Authority
LIRR	Long Island Railroad
m	meter
MA	Massachusetts
MAFMC	Mid-Atlantic Fishery Management Council
MARCO	Mid-Atlantic Regional Council on the Ocean
MBTA	Migratory Bird Treaty Act of 1918
mG	milligauss
mg	milligram
mg/L	milligrams per liter
MHWL	mean high-water level
MLLW	mean lower low water
mm	millimeters

MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MOA	memorandum of agreement
MOU	memorandum of understanding
mT	millitesla
mV/m	millivolts per meter
MW	megawatts
MWA	maximum work area
N/A	not applicable
N_2O	nitrogen oxide
NAAQS	National Ambient Air Quality Standards
NARW	North Atlantic right whale
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLCD	U.S. Geological Survey National Land Cover Database
nm	nautical miles
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide (also written as NO_x)
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
NSF	National Science Foundation
NY	New York
NYISO	New York Independent System Operator
NYMRC	New York Marine Rescue Center
NYNHP	New York Natural Heritage Program
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
O&M	operations and maintenance
O_3	ozone
OCM	Office for Coastal Management
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act, 43 USC 1331 et seq.
OpEx	operating expenditures
OSS	offshore substation
PAM	passive acoustic monitoring
PM_{10}	particulate matter smaller than 10 microns
$PM_{2.5}$	particulate matter smaller than 2.5 microns
ppb	parts per billion
Project	South Fork Wind Farm and South Fork Export Cable Project

PSO	protected species observer
PTS	permanent threshold shift
RI	Rhode Island
RI/MA WEA	Rhode Island/Massachusetts Wind Energy Area
RMS	root mean square
ROD	record of decision
ROW	right-of-way
RSZ	rotor swept zone
SAR	Office of Search and Rescue
SAV	submerged aquatic vegetation
SEFSC	Southeast Fisheries Science Center
SEL	sound exposure level
SFEC	South Fork Export Cable
SFW	South Fork Wind, LLC
SFWF	South Fork Wind Farm
SIP	state implementation plan
SO_2	sulfur dioxide
SPCC	spill prevention control and countermeasures
SPL	sound pressure level
SRHP	State Register of Historic Places
STSSN	Sea Turtle Stranding and Salvage Network
SWPP	storm water pollution prevention plan
TCP	Traditional Cultural Property
tpy	tons per year
TSS	total suspended solids
TTS	temporary threshold shift
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VMS	vessel monitoring system
VOC	volatile organic compounds
VTR	Vessel Trip Report
WDA	wind development area
WEA	wind energy area
WOTUS	waters of the United States
WTGs	wind turbine generators

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CHAPTER 1. INTRODUCTION

1.1 BACKGROUND

This chapter introduces a proposed offshore wind energy project, the South Fork Wind Farm and South Fork Export Cable Project (the Project). On June 29, 2018, South Fork Wind, LLC (SFW)[2] submitted a Project construction and operations plan (COP) to BOEM. After addressing BOEM's comments on this initial COP, SFW resubmitted an updated COP on May 24, 2019. SFW submitted a second updated COP for the Project in February 2020, a third updated COP in July 2020, and a fourth updated COP in May 2021 (Jacobs 2021)[3]. Information regarding the planning and leasing process that occurred before the development of the initial COP is available on BOEM's website and in Section 2 of the COP.

The Project would be located in the area of BOEM's Renewable Energy Lease Number OCS-A 0517 (Lease Area) approximately 19 miles southeast of Block Island, Rhode Island, and 35 miles east of Montauk Point, New York (Figure 1.2-1) in the Atlantic Ocean. In this document, distances in miles are in statute miles (miles used in the traditional sense) or nautical miles (miles used specifically for marine navigation). Statute miles are more commonly used and are referred to simply as *miles*, whereas nautical miles are referred to by name or by their abbreviation *nm*.

The COP describes the construction and installation, operations and maintenance (O&M), and conceptual decommissioning of the Project, which consists of the following components (see Project Operational Concept [Figure 1.1-1] in the COP):

- SFWF: This would include up to 15 wind turbine generators (WTGs or turbines), submarine cables between the WTGs (inter-array cables), and an offshore substation (OSS). The SFWF would also include an onshore O&M facility.
- SFEC: This would include an alternating current (AC) electric cable and an interconnection facility that connects the SFWF to the existing mainland electric grid in East Hampton, New York, and delivers power to the South Fork of Suffolk County, Long Island.

BOEM has prepared this final environmental impact statement (final EIS) in accordance with the National Environmental Policy Act (NEPA) to consider and disclose potential environmental impacts associated with the construction and installation, O&M, and conceptual decommissioning of the Project. This final EIS will inform BOEM in deciding whether to approve, approve with modifications, or disapprove the COP. Publication of the draft EIS initiated a 45-day comment period. BOEM assessed and considered the comments received during the comment period in the preparation of this final EIS. The final EIS has 10 appendices. Appendix A describes required environmental permits and consultations; Appendix B provides a list of preparers and reviewers, references cited, and glossary; Appendix C provides additional figures; Appendix D describes the Project design envelope (PDE) and maximum-case scenario; Appendix E describes the cumulative activities scenario; Appendix F provides supplemental information to the final EIS; Appendix G describes environmental protection measures, mitigation, and monitoring; Appendix H provides an assessment of resources with negligible to minor impacts from implementation of the Proposed Action and other considered alternatives; Appendix I provides BOEM's response to all comments received during the draft EIS 45-day comment period; and Appendix J provides a summary of any incomplete or unavailable information identified during preparation of the final EIS.

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[2] On November 7, 2018, Orsted completed an acquisition of all of the equity of Deepwater Wind. A new company, Orsted US Offshore Wind, combines the personnel and assets of the two North American offshore wind developers. Orsted also subsequently renamed the subsidiary as SFW. However, Deepwater Wind New England, LLC submitted their COP prior to this ownership and name change. Therefore, the EIS refers to SFW throughout.

[3] The most recent COP—*South Fork Wind Farm and South Fork Export Cable Construction and Operations Plan*—is referred to frequently throughout the EIS, and therefore the author-date citation is provided here at first mention only.

1.2 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

Through a competitive leasing process under 30 CFR 585.211, Deepwater Wind New England, LLC was awarded Commercial Lease OCS-A 0486 covering an area offshore Rhode Island. This lease area was later assigned to SFW and segregated to Commercial Lease OCS-A 0517 (Lease). SFW has the exclusive right to submit a COP for activities within the area of the Lease (Lease Area), and it has submitted a COP to BOEM proposing the construction and installation, O&M, and conceptual decommissioning of the Project.

The purpose of the Project is to develop a commercial-scale offshore wind energy facility in the Lease Area with WTGs, an offshore substation, and one transmission cable making landfall in Suffolk County, New York. The Project would contribute to New York's renewable energy requirements, particularly the state's goal of developing 9,000 MW of offshore wind energy generation by 2030. In addition, SFW's goal is to fulfill its contractual commitments to Long Island Power Authority (LIPA) pursuant to a power purchase agreement executed in 2017 resulting from LIPA's technology-neutral competitive bidding process.

The purpose of BOEM's action is to respond to and determine whether to approve, approve with modifications, or disapprove the COP to construct and install, operate and maintain, and decommission a commercial-scale offshore wind energy facility within the Lease Area. BOEM's action is needed to further the United States' policy to make Outer Continental Shelf (OCS) energy resources available for expeditious and orderly development, subject to environmental safeguards (43 USC 1332(3)), including consideration of natural resources and existing ocean uses. In addition, other federal agencies may consider requests for authorizations related to the Project under applicable laws and regulations not administered by BOEM. These considerations differ from BOEM's consideration of the Proposed Action but they are related and constitute connected actions under 40 CFR 1508.25, with discrete purposes and needs based on their respective statutory and regulatory obligations. The purpose and need of other federal agencies' action is to evaluate the applicant's request pursuant to specific requirements of the statutes and implementing regulations administered by those agencies, considering impacts of the applicant's activities on relevant resources, and if appropriate, issue the permit or authorization.

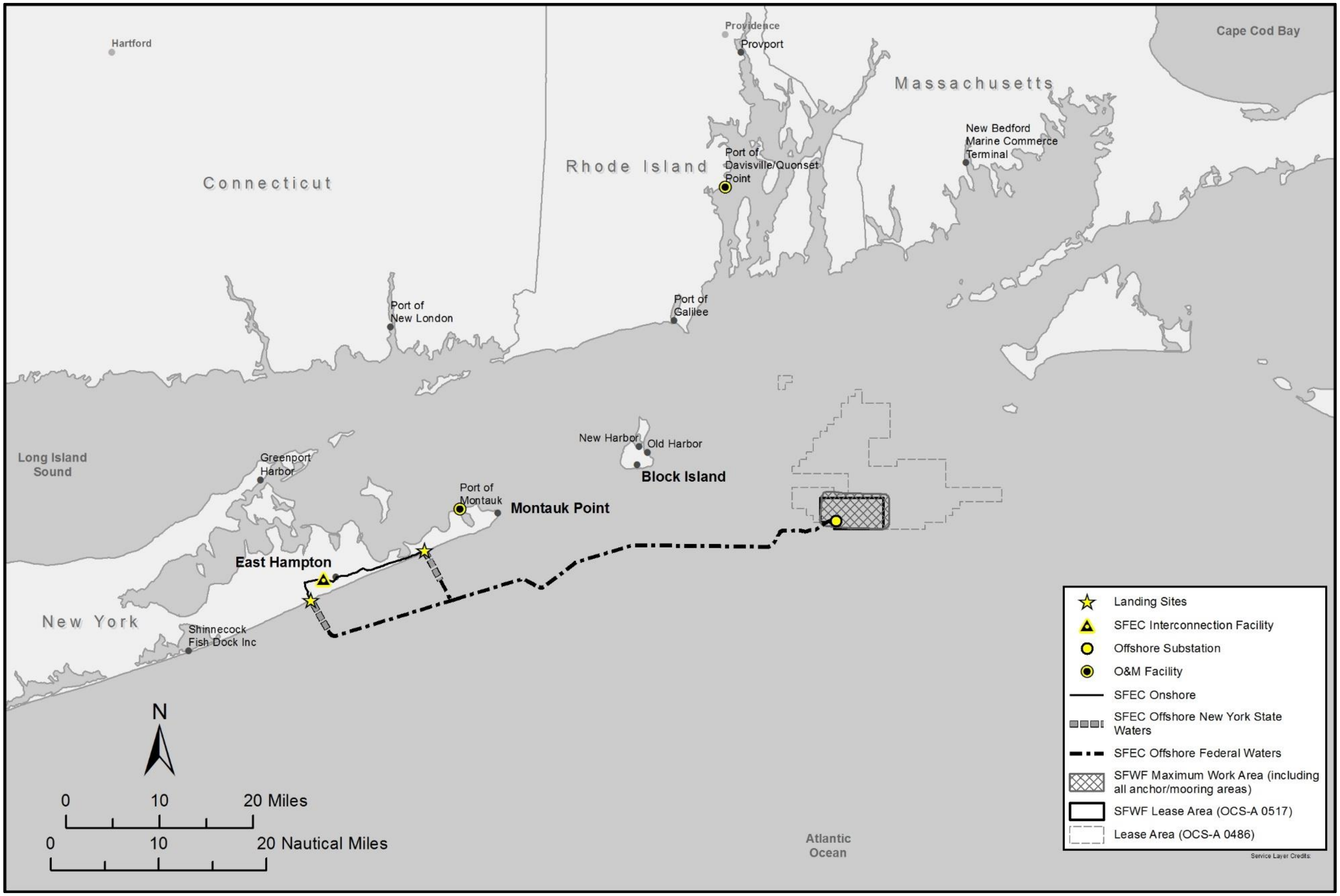

Figure 1.2-1. Project location

1.3 REGULATORY FRAMEWORK

The Energy Policy Act of 2005 (Public Law No. 109-58) added Section 8(p)(1)(C) to the Outer Continental Shelf Lands Act (OCSLA; 43 USC 1331 et seq.), which authorized the Secretary of the Interior to issue leases, easements, or rights-of-way (ROWs) on the OCS for wind energy development (see 43 USC 1337(p)(1)(C)). The Secretary of the Interior delegated this authority to the former Minerals Management Service (MMS), now BOEM. Final regulations implementing this authority at 30 CFR part 585 were promulgated on April 22, 2009.

Under the renewable energy regulations, BOEM's issuance of leases and subsequent approval of wind energy development on the OCS are part of a staged decision-making process (BOEM 2017). In that process, the action here is the fourth phase: evaluation of a COP. BOEM may approve, approve with modifications, or disapprove a lessee's COP (see 30 CFR 585.620–585.638). If BOEM approves—or approves with modifications—a COP, the lessee must submit a facility design report and a fabrication and installation report. If BOEM does not object to the facility design report and/or fabrication and installation report, or once any objections are resolved, the lessee may construct and operate the Project for 25 years from the date of COP approval (plus up to an additional 2 years for conceptual decommissioning). BOEM will periodically review the activities conducted under an approved COP. The frequency and extent of the review will be based on the significance of any changes in available information and on onshore or offshore conditions affecting, or affected by, the activities conducted under the COP. If the review indicates that the COP should be revised to meet the requirement of BOEM's renewable energy regulations, the lessee will be required to submit the needed revisions (30 CFR 585.634(b)).

Cooperating agencies may rely on this final EIS to support their decision-making. In conjunction with submitting its COP, SFW applied to the National Marine Fisheries Service (NMFS) for an incidental take authorization (ITA) under the Marine Mammal Protection Act (MMPA) of 1972, as amended (16 USC 1361 et seq.), for incidental take of marine mammals during Project construction. NMFS is required to review applications and, if appropriate, issue an ITA under the MMPA. In addition, NMFS has an independent responsibility to comply with NEPA and intends, after independent review, to rely on the information and analyses in BOEM's final EIS to fulfill its NEPA obligations. NMFS intends to adopt the final EIS and sign the record of decision (ROD), if appropriate. The U.S. Army Corps of Engineers (USACE) similarly intends to adopt the final EIS and sign the joint ROD in respect to its responsibilities under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Appendix A provides a description of BOEM's consultation efforts in the development of the final EIS. SFW would be required to construct and install, operate and maintain, and decommission the Project in compliance with the terms and conditions of all required permits and approvals.

On July 16, 2020, the Council on Environmental Quality (CEQ), which is responsible for federal agency implementation of NEPA, revised the regulations for implementing the procedural provisions of NEPA (85 CFR 43304–43376). The revised regulations went in effect on September 14, 2020. Because BOEM's NEPA review of the Project and publication of the Project's notice of intent began prior to this effective date, the EIS was prepared under the previous version of the regulations (1978, as amended in 1986 and 2005).

The final EIS evaluates various alternatives to meet the need to execute BOEM's duty to approve, approve with modifications, or disapprove the COP. This was done in furtherance of BOEM's responsibility to make OCS energy resources available for development in an expeditious and orderly manner, subject to environmental safeguards (43 USC 1332(3)), including consideration of natural resources and existing ocean uses. This responsibility balances different goals and does not hold one as controlling all others, which is consistent with the opinion recently issued by the Solicitor, M-37067, "Secretary's Duties under Subsection 8(p)(4) of the Outer Continental Shelf Lands Act When Authorizing Activities on the Outer Continental Shelf" (U.S. Department of the Interior Office of the Solicitor 2021). M-37067 provides that "subsection 8(p)(4) of OCSLA and similar statutes require only that the Secretary strike a rational balance between Congress's enumerated goals, i.e., a variety of uses. In making this determination, the Secretary retains wide discretion to weigh those goals as an application of her technical expertise and policy judgment" (U.S. Department of the Interior Office of the Solicitor 2021:2).

1.4 RELEVANT EXISTING NATIONAL ENVIRONMENTAL POLICY ACT AND CONSULTING DOCUMENTS

BOEM has conducted several other environmental analyses that were used to inform the EIS. Consistent with the CEQ directive "Incorporation by reference" (40 CFR 1502.21), the incorporated material is cited and briefly described in the final EIS.

1.5 INCOMPLETE AND UNAVAILABLE INFORMATION

Under 40 CFR 1502.22, BOEM is required to identify any incomplete or unavailable information that is relevant to the evaluation of potential Project impacts. Appendix J identifies incomplete or unavailable information that is essential to a reasoned choice among alternatives.

1.6 METHODOLOGY FOR ASSESSING THE DESIGN ENVELOPE

The Project is being developed based on an envelope approach, consistent with BOEM's *Draft Guidance Regarding the Use of a Project Design Envelope in a Construction and Operations Plan* (BOEM 2018). This approach is intended to provide flexibility for lessees and minimize the need for subsequent NEPA reviews as the Project design is refined.

The final EIS assesses the impacts of a range of characteristics and locations for components that would be considered as part of the Proposed Action and other action alternatives using a "maximum-case scenario" process. Through the maximum-case scenario process, BOEM analyzes the aspects of each design parameter or combination of parameters that would result in the greatest impact for each physical, biological, socioeconomic, and cultural resource (see Appendix D for list of parameter specifications). Through consultation with its own engineers and outside industry experts, BOEM verified that the maximum-case scenario analyzed in the final EIS could reasonably occur.

1.7 METHODOLOGY FOR ASSESSING CUMULATIVE IMPACTS

Cumulative impacts are the incremental effects of the Proposed Action on the environment when added to other past, present, and reasonably foreseeable future actions, regardless of which agency or person undertakes the actions (see 40 CFR 1508.7). Appendix E provides a description of the resource-specific geographic analysis areas and analyzes the impacts of the types of actions (including the future action of approving wind farm development activities other than the Project) that BOEM has identified as potentially contributing to cumulative impacts when combined with impacts from the Proposed Action and other alternatives over the geography and time scale identified.

In 2019, BOEM released a study of impact-producing factors (IPFs) from renewable energy projects on the North Atlantic OCS (BOEM 2019). As noted, in addition to the general cumulative analysis associated with onshore and offshore non-wind activities, the EIS specifically discloses the cumulative impacts of relevant IPFs from offshore wind by resource. Where possible, BOEM provides a quantitative estimate of these offshore wind impacts. However, readers of the final EIS should not consider these results as absolute values or predictions of actual future conditions. Although BOEM estimates represent the best tool currently available to inform the impact analysis in the final EIS, it is not possible to precisely predict future conditions. Correspondingly, estimates are based on past experience and trends and represent reasonable assumptions about future behaviors.

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CHAPTER 2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 ALTERNATIVES

This chapter describes in detail three action alternatives and a No Action alternative for the Project. Chapter 2, Section 2.1.5 provides a discussion of the alternative development process and alternatives not carried forward for analysis, whereas Chapter 2, Section 2.3 provides a summary and comparison of impacts by alternative.

2.1.1 Proposed Action Alternative

The SFWF and SFEC are the two primary components of the Project (see Figure 1.2-1). The Project uses a design envelope approach, consistent with BOEM's *Draft Guidance Regarding the Use of a Project Design Envelope in a Construction and Operations Plan* (BOEM 2018). This approach results in a range of characteristics and locations for some components of the Proposed Action. Chapter 1, Section 1.6 and Appendix D provide additional information on the PDE approach. The SFWF maximum work area (MWA) used during construction and installation would encompass the Lease Area as well as a buffer of approximately 2,070 feet around the outer edge of the proposed WTG layout (for increased temporary workspace, as described in Section 3.1.1 of the COP). However, only a small portion of the Lease Area would be permanently developed and occupied by Project components (see Table 2.1.1-1).

2.1.1.1 South Fork Wind Farm Component

SFWF would be located within federal waters (Atlantic Ocean) on the OCS, specifically in the Lease Area, approximately 16.6 nm (19 miles) southeast of Block Island, Rhode Island, and 30.4 nm (35 miles) east of Montauk Point, New York. Table 2.1.1-1 summarizes the SFWF components. The sections that follow Table 2.1.1-1, Section 3.1 of the COP, and Appendix D provide additional details. A detailed map showing the location of all proposed WTGs, inter-array cables, and the offshore substation is provided in Figure 3.1-1 in the COP

Table 2.1.1-1. South Fork Wind Farm Components and Footprint

Project Component	Location	Project Envelope Characteristic	Construction and Installation Footprint (temporary)	Operation Footprint (permanent)
WTGs	Offshore	Up to 15 WTGs; 6 to 12 MW each; sited in a grid with a spacing of approximately 1.0 nm (1.9 km, 1.15 miles) × 1.0 nm (1.9 km, 1.15 miles) that aligns with other proposed adjacent offshore wind projects in the Rhode Island/Massachusetts Wind Energy Area	17,202 acres (MWA)	840 feet, measured from mean lower water level to the tip of the blade
Foundations	Offshore	Monopile with piles up to 11 meters in diameter	14.8 acres	14.6 acres
		Foundation cable protection	Not applicable (N/A)	7.5 acres

Project Component	Location	Project Envelope Characteristic	Construction and Installation Footprint (temporary)	Operation Footprint (permanent)
Inter-array cable	Offshore	34.5-kilovolt (kV) or 66-kV cable	340 acres	2.5 acres
		Cable protection	N/A	10.2 acres
OSS	Offshore	Mounted on a dedicated framework or co-located with a WTG	Same as foundations (see above)	If on dedicated framework: 150 to 200 feet, measured from mean sea level to the top of the substation. If collocated with a WTG: total maximum height of the OSS plus WTG would not exceed the height of other WTGs.
Vessel anchoring / mooring	Offshore	Six vessels used during anchoring/mooring	821 acres	N/A
O&M facility	Onshore	Located in Montauk, New York, or Quonset Point, Rhode Island	Montauk: dredge footprint of up to 37,350 square feet	7,600 to 12,000 square feet of office and storage space (all locations) 37.250 square feet of annual maintenance dredging
Port facilities	Onshore	Located in New York, Rhode Island, Massachusetts, Connecticut, New Jersey, Maryland, or Virginia	N/A (the SFWF would use existing facilities only.)	N/A (the SFWF would use existing facilities only.)

Source: Jacobs (2021).

Note: Table 3.1-1 in the COP provides a detailed description of assumptions used to develop the footprint estimates.

2.1.1.1.1 WIND TURBINE GENERATORS

The SFWF would consist of up to 15 WTGs. SFW has committed to an indicative layout with WTGs sited in a grid with a spacing of approximately 1.0 nm (1.9 kilometers [km], 1.15 miles) × 1.0 nm (1.9 km, 1.15 miles) that aligns with other proposed adjacent offshore wind projects in the Rhode Island/Massachusetts Wind Energy Areas (RI-MA WEAs). Each WTG would comprise the following major components: a tower, nacelle (a cover housing the generator, gear box, drive train, and brake assembly), and rotor that includes the blades. Figure 3.1-3 in the COP provides typical dimensions for different WTG size classes that could be used for the Project. Control, lighting, marking, and safety systems would be installed on each WTG. Each WTG would also contain small amounts of lubrication, grease, oil and cooling fluids, as well as heating, ventilation, and air conditioning for climate control. If needed, a small, temporary diesel generator could also be placed at each WTG on the work deck of the foundation, with a maximum power of 200 horsepower (hp) and up to a 50-gallon diesel tank with secondary containment. Each WTG would also have helicopter access by means of winching personnel onto and/or from a landing area. Fugro (2018), SFWF (2017, 2016a, 2016b), and Jacobs (2021) provide additional design details.

2.1.1.1.2 FOUNDATIONS

Each WTG would be supported by one steel monopile foundation installed into the seabed, as shown in COP Figure 3.1-2. Fugro (2018), SFWF (2017, 2016a, 2016b), and Jacobs (2021) provide additional design details.

2.1.1.1.3 INTER-ARRAY CABLES

Inter-array cables would connect individual WTGs and transfer power between the WTGs and the OSS. The inter-array cables would either be a 34.5-kilovolt (kV) or a 66-kV three-phase, AC, 6- to 12-inch-diameter cables. The cables would contain three conductors, screens, insulators, fillers, sheathing, armor, and fiber optic cables; they would not contain lubricants, liquids, oils, or insulating fluids. The cables would be buried in a seabed trench to a target depth of 4 to 6 feet, for a total estimated maximum distance of 21.4 miles long. Where the inter-array cable emerges from the trench and is attached to the foundation, cable protection (rock or engineered concrete mattresses) would be used. Similarly, additional cable protection would be used to protect portions of the inter-array cable that did not achieve the target burial depth (see Table 3.1-4 in the COP and Fugro [2021] for details).

Fugro (2018), SFWF (2017, 2019a, 2019b), and Jacobs (2021) provide additional inter-array cable design details.

2.1.1.1.4 OFFSHORE SUBSTATION

The OSS would collect electric energy generated by the WTGs through the inter-array cables. The OSS would also house the supervisory control and data acquisition system that serves as the means for wind farm monitoring and control between the WTGs, substation, and onshore O&M facility. The OSS would consist of a high and secondary medium-voltage power transformer, a reactor, and switchgears along with utility equipment and a small permanent diesel generator. The OSS could also include boat landing and helicopter access (i.e., helideck) for emergency transport and limited maintenance activities, including transport of crew and supplies. The OSS would be either 1) located above water on a platform supported by a foundation similar to those used for the WTGs and would be in line with the WTG's east–west and north–south grid of 1 × 1–nm spacing, or 2) collocated on a foundation with a WTG (see Figure 3.1-4 in the COP).

2.1.1.1.5 OPERATIONS AND MAINTENANCE FACILITY

The O&M facility would include the potential construction of a building, installation of a stationary land-based crane, and installation of one floating pontoon dock (floating dock) for crew transfer vessels so that O&M staff could prepare and mobilize for offshore maintenance activities. The O&M facility would be located in Montauk, New York, or Quonset Point, Rhode Island. The O&M facility would also include office and storage space for spare parts and other equipment.

In-water work would not be required at the Quonset Point location. If the Lake Montauk location is selected, modifications would be required for the in-water portions of the site, which currently functions as a marina (BOEM 2021). To allow for suitable depths for navigation and berthing of crew transfer vessels, dredging would be required; approximately 2,500 cubic yards of sediment would be dredged within a dredge footprint of up to 1,500 square feet to a depth of 12.4 feet below the plane of mean low water, including a 1-foot overdredge. Maintenance dredging of up to 40,500 cubic feet of sediment would be required annually over a 10-year period. Dredged materials would be loaded into scows that, once full, would be transported to the adjacent beach west of the Montauk Harbor entrance, where sediment would be pumped to shore and used as nourishment material. This beach was identified by the Town of East Hampton as requiring beach nourishment. The total volume of dredged material proposed to be placed below the plane of spring high water is 1,070 cubic yards and the total area of beach to be occupied by the dredged material is 51,000 square feet. The total area of beach below the plane of spring high water to be occupied by the dredged material is 21,900 square feet. Dredging would require one dredge barge, three disposal scows, tugboats to aid in the positioning of equipment, and small vessels for transporting crews and materials to and from the shore.

Other potential in-water work at the Lake Montauk location would include maintenance repairs to the existing bulkhead (i.e., new water and tie rods). One 100 × 16–foot floating dock would also be installed to support berthing a single crew transfer vessel that would be used to move staff and equipment between the O&M facility and offshore portions of the Project. To accommodate the pontoon dock, the piles and docks associated with the existing marina would be removed, and five 2-foot-diameter steel pipe piles would be installed to anchor the pontoon floating dock. One additional 2-foot-diameter steel pipe pile would be installed at the eastern end of the pontoon dock to provide safe berthing conditions (i.e., mooring dolphin). Piles would be driven to the engineered penetration depth and cut at a +15 foot North American Vertical Datum top of pipe elevation. One 4 × 28–foot aluminum gangway would be installed to provide access to the floating dock. Installation of the floating dock would require the use of a deck barge with a crane, small work boats, and a tugboat.

2.1.1.1.6 PORT FACILITIES

The Project would use existing port facilities located in New York, Rhode Island, Massachusetts, Connecticut, New Jersey, Maryland, Virginia, or Nova Scotia for offshore construction, staging and fabrication, crew transfer, and logistics support. Modifications of these ports specifically for the Project are not anticipated. Final port selection has not been determined at this time; Table 3.1-5 in the COP provides a summary of potential ports that could be used to support the Project.

2.1.1.2 South Fork Export Cable Component

The SFEC is an AC electric cable and interconnection facility that would connect the SFWF to the existing mainland electric grid in East Hampton, New York, and deliver power to the South Fork of Suffolk County, Long Island. The SFEC would be located offshore, in both federal waters and New York state waters, and onshore in East Hampton, New York (see COP Figure 1.1-2). Table 2.1.1-2 summarizes the distances for each segment of the SFEC by landing site. Additional details on these segments and the SFEC components follow the table.

Table 2.1.1-2. Distances for Each Segment of the South Fork Export Cable by Landing Site

SFEC Segment	Landing Site	
	Beach Lane (miles)	Hither Hills (miles)
Offshore federal waters	58.3	46.0
Offshore New York State waters	3.5	3.5
Onshore	4.1	11.5

2.1.1.2.1 OFFSHORE SEGMENTS

The SFEC would extend westward through federal waters from the OSS, pass south of Block Island, and cross into state waters 3 nm offshore New York State. The SFEC would consist of a buried 138-kV submarine power cable, with one segment of single three-core conductor and fiber optic cable for communication and control. The SFEC would be approximately 8 to 12 inches in diameter and installed to a target burial depth of 4 to 6 feet. Additional cable protection or armoring would be installed in locations where the target burial depth is not achieved (see Tables 3.2-2 and 3.2-3 in the COP for details).

2.1.1.2.2 ONSHORE SEGMENT

The onshore SFEC would begin at the transition vault located at the landing site and end at the interconnection facility. The onshore SFEC would consist of a 138-kV underground power cable installed within a new underground electrical duct bank. The duct bank would comprise a conduit surrounded by concrete through which the SFEC would be run, and it would be located underground within public

ROWs and alongside the tracks within the Long Island Railroad (LIRR) ROW. No overhead lines would be constructed. The specific configuration of the duct bank is not yet determined; however, the ducts would be placed within a 4 × 8–foot trench along the onshore route.

SFW initially considered five landing sites for the SFEC (see Section 2.2.2 in the COP for details). Of these five initial sites, BOEM carried two potential cable landing sites forward for analysis (see COP Figure 3.2-3): Beach Lane and Hither Hills.[4] The Beach Lane onshore SFEC route would primarily follow the Town of East Hampton Road and LIRR ROWs. The route would travel northwest along Beach Lane to Wainscott Main Street, then northeast on Wainscott Main Street, and then northwest onto Sayre's Path. The route would continue north onto Wainscott Stone Road and then northwest on Wainscott Northwest Road, crossing Montauk Highway/State Route 27 (state-owned), to get to the LIRR where it would route along the LIRR to the interconnection facility. The Hither Hills onshore SFEC route would transition from the Hither Hills State Park parking lot to the Old Montauk Highway, which it would follow southwesterly to its intersection with the Montauk Highway. The SFEC would then follow the Montauk Highway westward to Main Street and then Buell Lane, which it would follow until its intersection with the LIRR. The route would follow the LIRR westward to the interconnection facility.

2.1.1.2.3 SEA-TO-SHORE TRANSITION

The sea-to-shore transition is the point at which the offshore and onshore cables are spliced together. Using horizontal directional drilling (HDD), the offshore cable would be installed at least 30 feet below the current beach profile. The cable would connect to a new onshore underground transition vault, constructed approximately 650 to 800 feet from the mean high-water level (MHWL). Pedestrian and vehicle access would be maintained throughout installation. If a temporary offshore cofferdam is required, it would be installed using a sheet pile or gravity cell. Once construction is complete the cofferdam would be removed; excavated sediments would be placed on a barge for potential reuse as backfill during the same construction season. Alternatively, to support HDD activities, temporary casing pipes could be installed at the currently proposed exit pit location. The casing pipe would be driven into the seafloor at the approach angle of the HDD. The casing pipe would extend from the seafloor up through the water column to the sea surface, where a work vessel would be able to access the open end of the pipe. The casing pipe may require that temporary support piles be installed to ensure pipe stability. These support piles are anticipated to consist of steel sheet piles temporarily driven into the seafloor. It is anticipated that up to 8 sheet piles would need to be driven to support the casing pipe. Once the HDD operation has been completed, the casing pipe and support would be removed using a similar methodology to those used for installation.

It is anticipated that the casing pipe would consists of a steel pipe pile, approximately 48 to 60 inches in diameter, and approximately 300 feet in length. Casing pipe installation is anticipated to be accomplished using a small pneumatic impact hammer (e.g., Grundoram Taurus or similar) to drive the pipe in the seafloor. It is estimated that the hammer operates at up to 18.6 kilojoules, and the pile driving would take approximately 2 hours to complete.[5] See COP Figure 3.2-2 and COP Section 3.2.2.2 for additional details.

[4] Although SFW's COP proposes both these alternative landing sites, in the period since the draft EIS was published, SFW has secured approvals from the state and local agencies for the Beach Lane site and not the Hither Hills site. In part, because both routes are part of the envelope in the COP and partly because the offshore cable routes are largely overlapping, this final EIS still considers the impacts associated with both routes.

[5] Use of casing and pipes would result in a smaller disturbance footprint and reduced sound levels as compared to the cofferdam. Since BOEM analyzes the aspects of each design parameter or combination of parameters that would result in the greatest impact for each physical, biological, socioeconomic, and cultural resource, this alternative construction approach is not carried forward for analysis in the EIS. All impacts associated with this alternative would be captured by the cofferdam.

2.1.1.2.4 INTERCONNECTION FACILITY

SFW would construct the interconnection facility to connect the SFEC with the existing 69-kV LIPA substation, located off Cove Hollow Road in East Hampton, New York. SFW would locate the facility adjacent to the existing LIPA substation (see COP Figure 3.2-4) and would include all equipment necessary to safely connect to the New York Independent System Operator (NYISO) transmission system.

Table 2.1.1-3 provides a summary of SFEC components and the Project footprint. Additional information is provided in Appendix D.

Table 2.1.1-3. South Fork Export Cable Components and Footprint

Project Component	Location	Project Envelope Characteristic	Construction and Installation Footprint (temporary)	Operation Footprint (permanent)
SFEC	Offshore	138 kV; target burial depth of 4 to 6 feet	573.3 acres	7.4 acres
		Cable protection	Not applicable (N/A)	7.9 acres
SFEC	Onshore	Onshore duct bank within existing paved road and railroad ROWs, target burial of 8 feet	2.6 to 6.3 acres (depending on route)	2.4 acres
Sea-to-shore transition	Offshore–onshore	Landing site at either Beach Lane or Hither Hills Installed using HDD between onshore underground cable transition vault and the offshore HDD exit location Offshore sheet pile cofferdam*, gravity cell cofferdam, or no cofferdam at the HDD exit location	850 square yards (cofferdam)	N/A
Interconnection facility	Onshore	Newly constructed, air-insulated facility adjacent to the East Hampton substation	2.7-acre parcel	Approximately 71,000 square feet with maximum equipment height of approximately 43 feet
Port facilities	Onshore	Located in New York, Rhode Island, Massachusetts, Connecticut, New Jersey, Maryland, or Virginia	N/A (the SFWF would use existing facilities only.)	N/A (the SFWF would use existing facilities only.)

Source: Jacobs (2021).

Note: For a detailed description of assumptions used to develop the footprint estimates, see Tables 3.2-2 and 3.2-3 in the COP.

* A cofferdam is a watertight enclosure pumped dry to permit construction work below the waterline.

2.1.1.3 Construction and Installation

Construction and installation of the SFWF and SFEC are scheduled to take place over 2 years within applicable seasonal work windows and within a uniform east–west and north–south grid with 1 × 1–nm spacing between WTGs. Construction and installation would include transportation and installation of foundations, installation of cable systems, installation of WTGs, and installation of the OSS. Table 1.5-1 in the COP provides a construction and installation schedule for all Project components.

2.1.1.3.1 TRANSPORTATION AND INSTALLATION OF FOUNDATIONS

SFW would transport WTGs and other components to area ports for staging prior to installation. During installation, transportation barges and material barges would transport components and equipment to the Lease Area (as described in Section 3.1.3.1 of the COP). Foundation installation steps would include preparing the seafloor (if necessary); installing foundations and commissioning the platform, which includes installation of marking and lighting for Private Aids to Navigation required by the U.S. Coast Guard (USCG); and conducting inspection and quality control checks. Section 3.1.3.2 of the COP provides details on foundation installation.

To allow for site-specific micrositing, SFW would install each foundation within a 1,000-foot radius of the proposed locations (in accordance with 30 CFR 585.634) shown on COP Figures 3.1-1 and 3.1-2 (Jacobs 2021) while maintaining the 0.6-nm-wide northwest–southeast transit lanes as recommended by the USCG. The COP assumes that each monopile foundation would require a total of 2 to 4 days for construction but would be driven into the seabed in a single day. Board and lodging for the construction crew and other personnel would be provided on large vessels; crew transfers would be provided via crew transport vessels (CTVs) or during port visits for provisioning and material transport.

2.1.1.3.2 INSTALLATION OF CABLE SYSTEMS

South Fork Wind Farm: Inter-Array Cables

Prior to installation, SFW would ensure all possible obstructions and debris are removed from the cable route. Inter-array cables would then be installed using a mechanical cutter, mechanical plow, or jet-plow to a target burial depth of 4 to 6 feet (see Section 3.1.3.3 of the COP for construction details). Cable installation would occur out to approximately 300 feet from each WTG foundation, at which point the cable would be laid out and cut. At that point, a pulling head would be put on the cable end to allow the cable to be pulled into the foundation. After cable installation, scour protection would be installed, as applicable.

If seabed conditions do not permit cable burial, SFW would employ other methods of cable protection (fronded mattresses, rock bags, rock, or engineered concrete mattresses) (see Table 3.1-1 in the COP for details). A cable inspection program would be developed to confirm the cable burial depth along the route and to identify any further remedial burial activities or secondary cable protection.

South Fork Export Cable: Offshore

Construction staging and installation for the offshore SFEC would generally be as described for the inter-array cables. Cable lay and burial would be conducted for the entire SFEC route, up to approximately 300 feet from the OSS. At that point, the cable would be attached to the OSS in the same process as described for connecting inter-array cables to WTGs. If seabed conditions do not permit cable burial, remedial burial could occur using a controlled flow excavator or other methods of cable protection (e.g., rock or engineered concrete mattresses) would be employed. SFW would cross other existing telecommunication cables using industry standards, including cable protection and clearing of inactive cables from the burial route, where applicable (see Tables 3.2-2 and 3.2-3 in the COP for details regarding cable protection at crossings).

South Fork Export Cable: Sea-to-Shore Transition

SFW would locate the work area and drill entry point for installation of the sea-to-shore transition onshore at least 650 feet from the MHWL and would end offshore at least 1,750 feet from the MHWL. If necessary, a temporary 75 × 25–foot cofferdam would be installed at the offshore end of the HDD to contain drilling returns. The cofferdam would be constructed using either sheet pile or gravity cell construction (see Section 3.2.3.4 of the COP for details) and would be clearly marked to indicate presence to vessels. A drill and drilling fluid would be used to construct a 32-inch-diameter borehole under the beach and intertidal zone. A 24-inch-diameter conduit (high-density polyethylene pipe) would be inserted through the entire length of the borehole, through which the cable would be installed. After installation, a transition vault would be installed onshore around the drill pit; the offshore and onshore cables would be spliced together; and the transition vault would then be sealed, covered, and repaved with manhole covers at the surface. The cofferdam would be removed; excavated sediments would be placed on a barge for potential reuse as backfill during the same construction season.

HDD installation is estimated to take 10 to 16 weeks, including equipment mobilization and breakdown. Work would typically be completed outside the summer season using 12-hour work windows in residential areas, barring any extenuating circumstances.

South Fork Export Cable: Onshore

SFW would install the onshore SFEC cable in an underground duct bank consisting of concrete-encased conduits within the ROW of existing roads or within the LIRR ROW. Existing pavement, gravel, or dirt would be removed, along with vegetation clearing as needed, and a trench of up to 4 feet wide and 8 feet deep would be excavated. As needed, SFW could also use HDD to cross under existing infrastructure. The conduits would be assembled and then lowered. The area around the conduits would be filled with concrete. Once the conduit is installed, the trench would be backfilled with compacted soil. Temporary pavement would be applied followed by full pavement of the affected lane or the road, as appropriate. After duct bank installation is complete, the onshore SFEC would be installed by pulling the cable from manhole to manhole, with cables spliced at each manhole.

Construction of the interconnection facility would include site preparation, excavation, and grading; construction of foundations for control building, transformer, reactors, and switchgear; construction of electrical grounding, duct banks, and underground conduits; installation of drainage systems and station service; and installation of aboveground structures. Any temporary staging areas required during construction would be located within, or adjacent to, the proposed facility. Onshore construction is estimated to take 9 to 12 months; however, the construction schedule would be designed to minimize impacts during the summer tourist season (see Section 4.6.1.3 of the COP).

2.1.1.3.3 INSTALLATION OF WIND TURBINE GENERATORS

After installation of the foundation and the inter-array cables, SFW would transport WTGs from onshore staging facilities by barge or other vessel to the offshore installation site. A jack-up vessel would be located next to each foundation and would individually lift and set the tower, either in sections or as a single piece (see COP Figure 3.1-6). The nacelle would then be lifted and connected to the tower, followed by installation of each blade to the hub. Once the components are installed, workers would finalize securing each WTG component. Installation of each WTG would require up to 3 days, assuming a 24-hour work window and no delays due to weather, sea conditions, or other circumstances.

2.1.1.3.4 INSTALLATION OF OFFSHORE SUBSTATION

The installation process for the OSS would be similar to that described for WTGs. The substation would be brought to a foundation on a transportation barge and lifted into place by a jack-up lift barge or a derrick barge.

2.1.1.4 Operations and Maintenance

SFW would provide O&M for the duration of the Project. The SFWF would operate at maximum capacity while complying with all electric grid requirements from LIPA and NYISO. The SFWF and SFEC would be monitored 24 hours a day and 365 days a year from a remote facility. The anticipated vessels and support vehicles to be used during operations are described in Section 3.1.3.1 and Table 3.1-6 in the COP. WTGs and the OSS would be maintained and equipped with safety devices and Federal Aviation Administration (FAA) and USCG-recommended marking and lighting. The OSS and interconnection facility would also contain a utility generator in the case of emergency events. For planned maintenance activities, personnel access would be provided using crew transfer vessels during low wind periods. SFW would also conduct routine foundation inspections. Unscheduled maintenance, including major repairs, could require the use of jack-up or crane barges if repairs to equipment such as power transformers, reactors, or switchgear are necessary.

Inter-array cables and the SFEC are not expected to require planned maintenance; however, SFW would develop a cable inspection program prior to Project commissioning; regular monitoring and inspections would be based on manufacturer-suggested methods. Cable monitoring would include assessment of cable location, burial depths, state of the cable, and site conditions. Inspection methods would include conducting high resolution geophysical (HRG) surveys (using equipment such as a multi-beam bathymetric survey equipment) and identifying seabed features, natural and human-made hazards, and site conditions along federal sections of the cable routing.

2.1.1.5 Conceptual Decommissioning

Pursuant to 30 CFR 585 and other BOEM requirements, SFW would be required to remove or decommission all installations and clear the seabed of all obstructions created by the Project. In accordance with applicable regulations and a BOEM-approved conceptual decommissioning plan, SFW would have up to 2 years to decommission the Project after the 25-year lease ends (approximately 2052), unless the lease is extended, which would return the area to pre-construction conditions, as feasible. WTG components and the OSS would be disconnected and would be removed using a jack-up lift vessel or a derrick barge. Cables would be removed, in accordance with BOEM regulations (30 CFR 585, subpart I). A material barge would transport components to a recycling yard where the components would be disassembled and prepared for re-use and/or recycling for scrap metal and other materials. The foundations would be cut by an internal abrasive water jet cutting tool at 15 feet below the seabed and returned to shore for recycling in the same manner described for the WTG components and the OSS. SFW would clear the area after all components have been decommissioned to ensure that no unauthorized debris remains on the seabed. Onshore conceptual decommissioning requirements would be subject to state and local authorizations and permits. SFW would be required to complete conceptual decommissioning within 2 years of the termination of its lease.

SFW would need to obtain separate and subsequent approval from BOEM to retire any portion of the Project in place. SFW would submit a conceptual decommissioning application prior to any conceptual decommissioning activities. BOEM would conduct a NEPA review at that time, which could result in the preparation of a NEPA document. If the COP is approved or approved with modifications, SFW would have to submit a bond that would be held by the United States government to cover the cost of conceptually decommissioning the entire facility.

Conceptual decommissioning may not occur for all Project components. However, for the purposes of the final EIS, all analyses assume that conceptual decommissioning would occur as described in this section.

2.1.1.6 Environmental Protection Measures and Additional Authorizations

SFW has committed to environmental protection measures (EPMs) as part of its Project to avoid or minimize impacts to physical, biological, socioeconomic, and cultural resources. These measures are described in Table G-1 in Appendix G and are incorporated as part of the Proposed Action in the final EIS. During the development of the final EIS, BOEM considered potential additional mitigation measures that could further avoid, minimize, or mitigate impacts on the physical, biological, socioeconomic, and cultural resources assessed in this final EIS. Table G-2 in Appendix G describes these potential additional mitigation measures, and the subsequent Chapter 3 sections analyze them separately by resource. As noted in Section 1.3, SFW would also obtain all other necessary state and federal permits and authorizations under applicable statutes prior to Project construction. These other permits and authorizations could include additional measures.

2.1.1.7 Monitoring Surveys

As part of the Proposed Action, SFW has committed to conducting pre-, during, and post- construction surveys and monitoring (Table 2.1.1-4). SFW is voluntarily conducting the surveys under existing permits, prior to approval of the COP. These surveys are included in Table G-2 in Appendix G and may be required by BOEM in the ROD.

Table 2.1.1-4. South Fork Wind Monitoring and Surveys

Survey Gear	Location	Status/Time Frame	Duration	General Notes
Beam Trawl Survey	SFWF and control areas	Started October 2020	2 years of pre-construction monitoring, monitoring will continue during construction, and at least 2 years of post-construction monitoring will occur.	Small beam trawl towed on bottom behind vessel.
Ventless Trap Survey	SFWF and control areas	Started May 3, 2021	2 years of pre-construction monitoring, monitoring will continue during construction, and at least 2 years of post-construction monitoring will occur.	Using weak-link buoy lines (< 1,700-pound breaking strength) that are recommended by NMFS with sinking groundline between pots. Other mitigating measures associated with protected resources are detailed in the SFW fisheries monitoring plan.
Gillnet Survey	SFWF and control areas	Pre-construction: Started in May 2021	2 years of pre-construction monitoring, monitoring will continue during construction, and at least 2 years of post-construction monitoring will occur.	Using weak-link buoy lines (< 1,700-pound breaking strength) that are recommended by NMFS. The survey will not result in more gear in the water than what is already permitted to the fishery. Other mitigating measures associated with protected resources are detailed in the SFW fisheries monitoring plan.
Fish Pot Survey	SFWF	Pre-construction: Started in June 2021	2 years of pre-construction monitoring, monitoring will continue during construction, and at least 2 years of post-construction monitoring will occur.	Survey is using sinking groundline between pots and using weak-link end lines (< 1,700-pound breaking strength) that are recommended by NMFS. Other mitigating measures associated with protected resources are detailed in the SFW fisheries monitoring plan.
Acoustic Telemetry - NYS waters	SFEC-NYS	Pre-construction: Started in May 2021	June 2021 through December 2025	Researchers will use VR2AR acoustic release receivers; no vertical lines in the water for the acoustic receivers to mitigate entanglement risk. Receivers will have a low vertical profile (< 6 feet) off the bottom.
Trawl Survey - NYS waters	SFEC-NYS	Pre-construction: Started in June 2021	July 2021 through November 2025	Northeast Area Monitoring and Assessment Program bottom otter trawl survey protocols. Magnuson-Stevens Act Letter of Acknowledgment received from NOAA May 2021.
Moored archival recorders, or mobile platforms, or moored surface buoys; no line	SFWF/SFEC-OCS	Pre-construction, during construction, post-construction	Tentative: start Q1–Q3 2022, possible 2–3 year deployment (2025?)	Requirement of the COP for all projects.
PAM – Sound field verification: temporary moorings with surface buoy and line	All piles; 1–7 locations. Lease area and HDD cofferdam installation (if sheet pile cofferdam is used)	Construction	Offshore: May–December 2023 (maximum deployment) Nearshore: Short duration–only days, winter–spring months 2022–2023	Required of COP and Incidental Harassment Authorization (IHA) Mitigation: Could be moored with acoustic release.
PAM – Temporary mooring with line; single hydrophones or hydrophone arrays	SFWF	Construction	Offshore: May–December 2023 (maximum deployment)	Required of COP and IHA. Mitigation: Equipment not determined; will have surface component.

2.1.2 Vessel Transit Lane Alternative

Under the Vessel Transit Lane alternative (hereafter the Transit alternative), BOEM evaluated a 4-nm-wide vessel transit lane[6] through the Lease Area where no surface occupancy would occur. BOEM developed this alternative in response to the January 3, 2020, Responsible Offshore Development Association (RODA) layout proposal (RODA 2020). The RODA proposal includes designated transit lanes, each at least 4 nm wide. Although the proposal includes six total transit lanes, only one lane intersects the Lease Area. The vessel transit lane is unique to this alternative and could facilitate transit of vessels through the Lease Area from southern New England and eastern Long Island ports to fishing areas in the region (Figure 2.1.3-1).

WTGs located within the transit lane would be eliminated under this alternative. SFW would develop the remaining WTGs with a 12-MW turbine capacity and would move the offshore substation north of the currently proposed location and install it in one of the remaining WTG locations. The Transit alternative is within the proposed design envelope of up to 15 turbines in the 6- to 12-MW range.

All other Project components and construction and installation, O&M, and conceptual decommissioning would be identical to the Proposed Action. The Transit alternative discloses the effect a vessel transit lane could have on resources analyzed in the final EIS. The final EIS also considers the five other transit lanes that could intersect the other reasonably foreseeable projects to the extent that the impacts of those additional lanes would contribute to cumulative impacts in the analysis area considered for each resource area (see Figure 2.1.3-1).

2.1.3 Fisheries Habitat Impact Minimization Alternative (Preferred Alternative)

Under the Fisheries Habitat Impact Minimization alternative (hereafter the Habitat alternative), the construction and installation, O&M, and conceptual decommissioning of WTGs and an OSS within the Lease Area and associated inter-array and export cables would occur within the range of design parameters outlined in the COP, subject to applicable mitigation measures. However, to reduce impacts to complex fisheries habitats as compared to the Proposed Action, BOEM would require SFW to exclude certain WTGs and associated cable locations within complex fisheries habitats if micrositing to avoid complex habitat is not possible while maintaining a uniform east–west and north–south grid of 1 × 1–nm spacing between WTGs with diagonal transit lanes of at least 0.6 nm wide.

Under this alternative, BOEM may approve up to four fewer WTG locations than proposed by SFW to reduce impacts to complex habitat (Figure 2.1.3-2). Additionally, other WTGs would be microsited, subject to engineering and spacing constraints, to further reduce impacts. However, this alternative is still within the proposed design envelope of up to 15 turbines and the 6- to 12-MW range. All other Project components and construction and installation, O&M, and conceptual decommissioning would be identical to the Proposed Action.

Two options for layout of the Habitat alternative are considered in this EIS.

On June 7, 2021, NOAA provided their conservation recommendations to BOEM for which specific turbine locations BOEM should eliminate and microsite under this alternative. NOAA recommended that proposed wind turbine locations WTG 1, WTG 5, WTG 15, WTG 16A, and WTG 17A (Figure 2.1.3-2a)

[6] BOEM also evaluated a 2-nm and 3-nm-wide transit lane alternative. However, these smaller lanes would result in the same impacts as the Proposed Action because the lane would not overlap any proposed WTGs or the OSS. Therefore, a smaller lane width was dismissed from further evaluation.

be removed from consideration because they would result in substantial adverse impacts to complex habitats. NOAA also recommended that turbine locations WTG 2, WTG 4, WTG 6, WTG 8, WTG 9, WTG 10, WTG 12, WTG 13, and WTG 14, the OSS, and the associated inter-array cables be microsited into low multibeam backscatter return areas and that restrictions on seafloor disturbance (e.g., anchoring) during construction be required to avoid impacts to higher multibeam backscatter return areas. BOEM considers this layout to be the preferred alternative.

However, SFW has expressed concerns about the particular locations NOAA suggested for removal. On June 14, 2021, SFW provided BOEM with a proposed layout in response to the consistency determination of Rhode Island Coastal Resources Management Council (CRMC), which requires a reduction in the number of wind turbines by three. The proposed layout removes wind turbine locations WTG 5, WTG 6, WTG 9, WTG 16A, and WTG 17A (Figure 2.1.3-2b). Other wind turbine locations would be microsited, including WTG1 and WTG15, to reduce impacts to complex habitat. The proposed layout takes into consideration the optimization of the cable length, which reduces transmission loss. WTG 15 is located within proximity to the OSS to limit electrical losses. If WTG 15 was not utilized, as NOAA recommends, SFW has expressed that it would require redesign of the inter-array cable layout and cable specifications. In contrast, WTG 06 is the farthest location from the OSS, which means that using that location would increase electrical losses, require an increase in inter-array cable length and a re-assessment and potential redesign of the cable specifications. In addition, installation feasibility is challenging at WTG 06 as load pressure assessments indicate an increased risk of punch-through of jack-up vessel legs due to soft soil conditions. These soft soil conditions result in an elevated risk for installation feasibility and safety. SFW also proposed to eliminate WTG 09 because it is surrounded by a dense boulder field which would yield increased installation risk and environmental impacts from boulder relocation. There is also a potential munition and explosive of concern target at WTG 03 which would make connecting WTG 03 to WTG 09 technically challenging. Therefore, WTG 09 would require an increase in inter-array cable length, resulting in increased electrical losses.

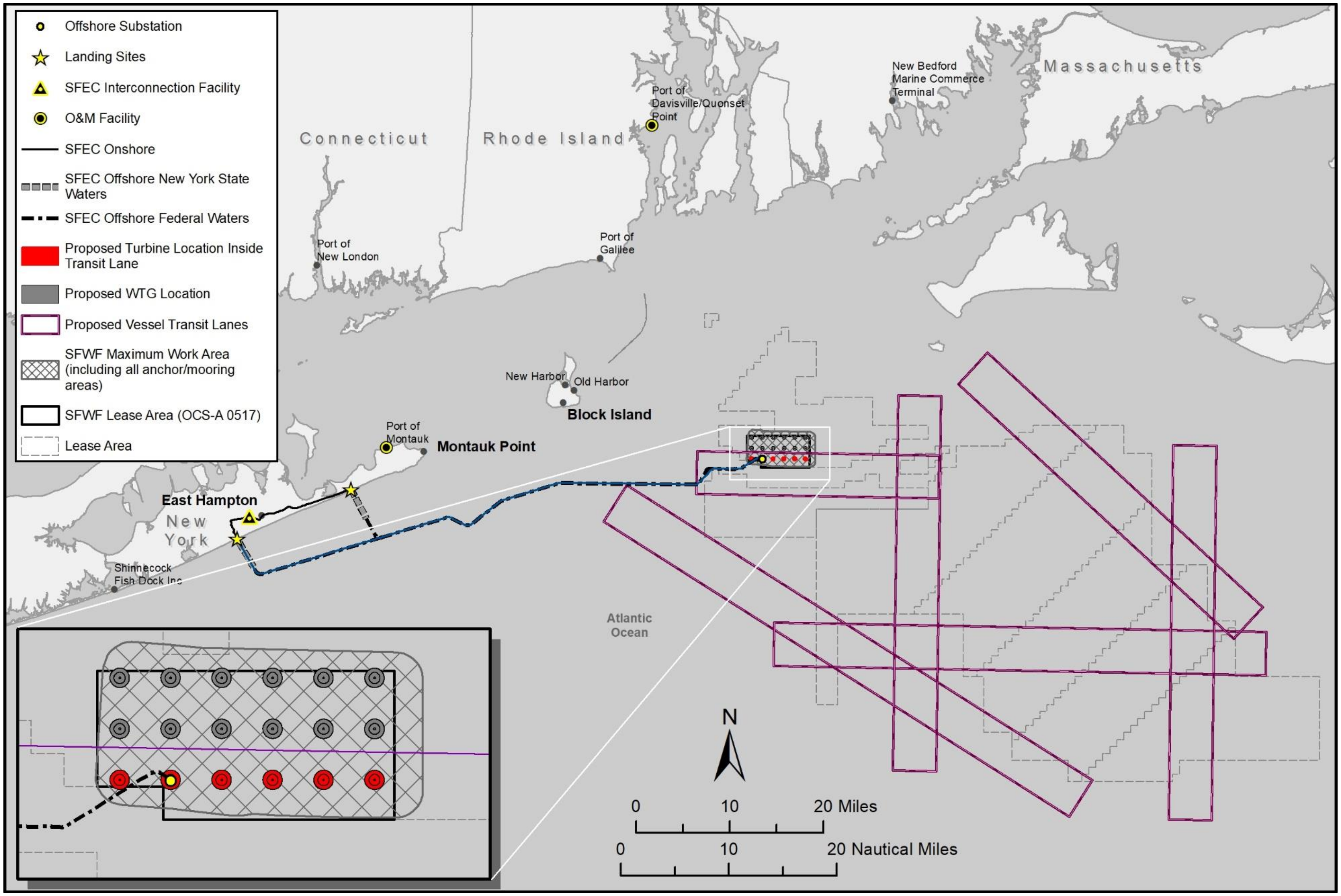

Figure 2.1.3-1. Transit alternative layout.

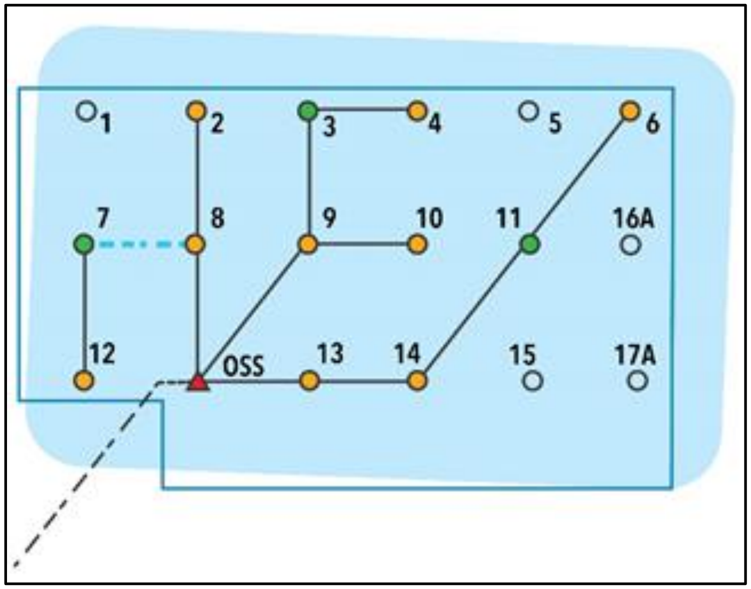

Figure 2.1.3-2a. Habitat alternative layout (a) Conservation Recommendations from NOAA (June 7, 2021)). Orange avoids complex fisheries habitat with micrositing. Green avoids complex fisheries habitat without micrositing.

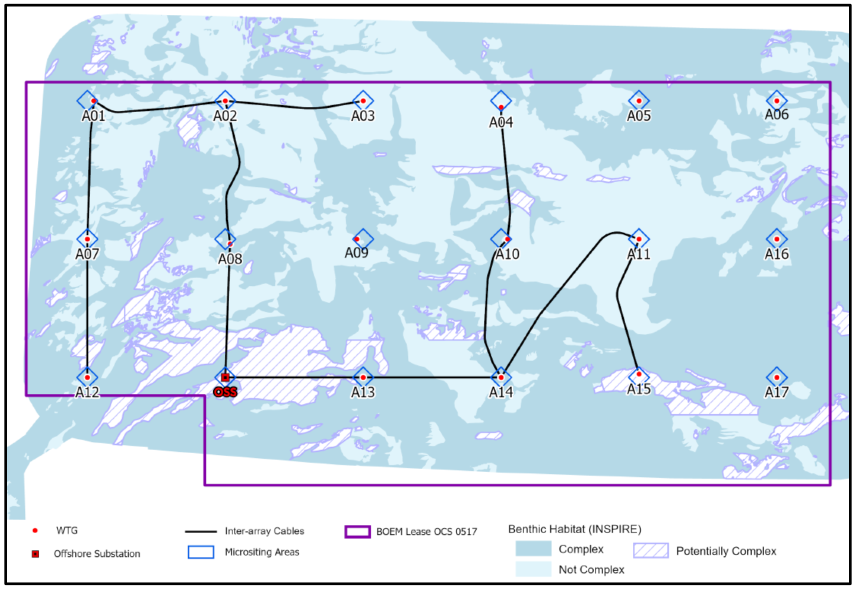

Figure 2.1.3-2b. Habitat alternative layout (b) SFW Technical Memorandum (June 14, 2021).

2.1.4 No Action Alternative

Under the No Action alternative, BOEM would not approve the COP, and the Project construction and installation, O&M, and conceptual decommissioning activities would not occur.[7] Likewise, no additional permits or authorizations would be required. Any potential environmental and socioeconomic impacts, including benefits, associated with the Project as described under the Proposed Action would not occur. However, all other existing or other reasonably foreseeable future impact-producing activities would persist in the Lease Area. Table 2.3.1-1 includes an impact assessment of the No Action alternative for each resource, including an assessment for cumulative effects. The No Action alternative cumulative effects assessment provides an assessment for impacts with and without approval of additional wind farms in BOEM lease areas. Through these assessments, the No Action alternative provides a baseline against which all action alternatives are evaluated.

2.1.5 Alternatives Considered but Dismissed from Detailed Analysis

BOEM considered a range of alternatives during the EIS development process that emerged from scoping, interagency coordination, and internal BOEM deliberations. To be carried forward for analysis, all considered alternatives were required to meet the following screening criteria: 1) meet the purpose of and need for the Proposed Action; 2) be operationally, technically, and economically feasible and implementable; 3) be consistent with other local, state, or federal plans, permits, and regulations; 4) further reduce or avoid impacts as compared to the Proposed Action; and 5) not be substantially the same as another alternative. Table 2.1.5-1 summarizes the alternatives considered but dismissed from detailed analysis along with detailed rationale for elimination.

[7] Under the No Action alternative, NMFS would not issue the requested authorization under the MMPA to the applicant. NMFS's action alternative is to issue the requested Incidental Harassment Authorization to the applicant to authorize incidental take for the activities specified in its application and which are being analyzed by BOEM in the reasonable range of alternatives described here.

Table 2.1.5-1. Alternatives Considered but Dismissed from Detailed Analysis

Alternative	Objective	Rationale for Dismissal
Minimizing the number of turbines/maximizing power output of individual turbines	Reduce impacts to benthic and marine species	The design envelope considered under the other action alternatives includes a range of turbine and WTG power outputs, including options to reduce the number of turbines and increase power outage. The Proposed Action considers one of the highest potential WTG power outputs currently available in the market. Therefore, this alternative was not carried forward for separate analysis but is addressed within the final EIS analysis of the Proposed Action and other action alternatives.
Alternative location in the Lease Area 0486	Reduce impacts to Cox Ledge resources	On January 16, 2020, Deepwater Wind New England, LLC requested that a portion of Lease OCS-A 0486, which corresponds to the defined geographic area identified in the COP, be assigned to a different entity, SFW. Under BOEM's regulations, an assignment request can only be denied if the applicants fail to comply with the regulatory requirements applicable to assignments. Essentially, those requirements are limited to the technical, financial, and legal qualifications and capabilities of the assignee to comply with the obligations under the lease being assigned. Absent any deficiency in the technical, financial, and legal qualifications and capabilities of the assignee, BOEM is required to approve the assignment because denial or delay in approving the assignment for reasons other than those contemplated in the regulations cannot be legally justified. BOEM reviewed the assignment application submitted by SFW and determined that it complied with the technical, financial, and legal requirements for approval under BOEM's regulations. The assignment was approved by BOEM on March 23, 2020, and had the effect of segregating the area assigned from Lease OCS-A 0486 and created a new lease (i.e., OCS-A 0517). The assignment also had the effect of rendering the "Alternate Location within the Lease Area Alternative" no longer viable because its selection would mean that BOEM would be requiring the lessee to develop the Project in a lease held by a different legal entity and for which another proposal is currently under evaluation by BOEM (i.e., the Revolution Wind Project proposed by DWW Rev I, LLC). The Revolution Wind Project is intended to satisfy energy demands agreed to under power purchase agreements executed with the States of Connecticut and Rhode Island. BOEM selecting an alternative that would approve the Project in a lease held by another legal entity, and for which there is a project proposal intended to satisfy contractual commitments different than those intended to be satisfied by the SFWF, is the equivalent of choosing the No Action alternative because it is not a viable alternative that can be implemented by SFW. Analysis and selection of the "Alternate Location within the Lease Area Alternative" would not result in developing the Project in that other location. Instead, it would result in deciding not to develop the Project in the defined geographic area where it was proposed because developing the Project in another location would have been preferable. The No Action alternative and the action alternatives currently being analyzed in detail allow the Secretary to understand the impacts that would be avoided or caused if the Project is developed or not in the defined geographic area where it is proposed. The alternatives being analyzed in detail would also allow the Secretary to determine whether the activities proposed in Lease OCS-A-0517 would, among others, cause "undue harm or damage to natural resources; life (including human and wildlife); property; the marine, coastal, or human environment; or sites, structures, or objects of historical or archaeological significance" 30 CFR 585.621(d). Based on the above, BOEM finds that the selection and implementation of the "Alternate Location within the Lease Area Alternative" is no longer viable and analyzing such alternative in detail would not contribute to the Secretary's determination on whether the Project should be denied in the location where it is currently proposed. Said differently, the Secretary does not need to analyze the impacts the Project would have in other locations to determine whether the activities proposed in the defined geographic area would, among others, cause "undue harm or damage to natural resources; life (including human and wildlife); property; the marine, coastal, or human environment; or sites, structures, or objects of historical or archaeological significance." 30 CFR 585.621(d). This alternative emerged because of concerns related to Cox Ledge; these concerns are addressed through the Habitat alternative, which avoids sensitive habitat in that area.

Alternative	Objective	Rationale for Dismissal
Using a 1 × 1–nm wind turbine layout	Reduce impacts to fisheries and navigation	SFW has committed to an indicative layout with WTGs sited in a grid with a spacing of approximately 1.0 nm (1.9 km, 1.15 miles) × 1.0 nm (1.9 km, 1.15 miles) that aligns with other proposed adjacent offshore wind projects in the RI-MA WEAs. Therefore, this alternative is already considered under the Proposed Action and was dismissed from further consideration.
Reducing the permitted operating life of the facility	Reduce impacts to all resources	The lease allows for 25 years of operations (plus up to an additional 2 years for conceptual decommissioning). Reducing the permitted operating life would violate the lease.
Using the LIPA 138-kV land-based transmission cable project or the East End – Battery large-scale facility to meet energy demand.	Reduce impacts to all marine resources	Not responsive to the purpose and need. May be considered as the No Action alternative, where power generation would come from alternate sources.
Alternatives for cable construction methods and protection (e.g., natural materials vs. artificial materials), including using smaller cable, burying the cable deeper, alternatives to side-casting spoils, route alternatives that allow for full cable burial, and using better shielding materials	Reduce impacts to benthic and marine resources	No cable construction alternatives were identified during Project development that would further reduce or avoid marine impacts (see New York Article VII submitted by SFW and Section 2.3.2 of the COP). Project impacts associated with cable construction methods and protection are disclosed in Chapter 3 of the final EIS for relevant affected resources. As applicable, BOEM could also choose to implement additional mitigation measures to further reduce or avoid impacts. The Habitat alternative evaluated in the final EIS also considers ways to minimize certain habitat impacts. Therefore, this alternative was not carried forward for separate analysis because it would not provide a substantially different analysis than that provided with the analysis of the Proposed Action and other action alternatives, and because of the mitigation measures identified and considered in the final EIS.
Alternatives to cable routes that minimized impacts to sensitive biotic/benthic habitats	Reduce impacts to benthic resources	SFW identified an alternative SFEC cable route that ran southwest from the SFWF, passing north of Montauk Point and into Napeague Bay on the north shore of the South Fork in the town of Easthampton, New York. However, this route was rejected because of commercial fishing concerns expressed by stakeholders. No other feasible route alternatives were identified during Project development or scoping that would allow SFW to meet its power purchase agreement. Therefore, this alternative was not carried forward for analysis.
Alternatives to cofferdam excavation	Reduce impacts to water quality and marine resources	The final EIS considers scenarios where cofferdam excavation may or may not be needed as part of the PDE. A cofferdam would only be used if needed to contain HDD drilling returns. Alternatives to cofferdam excavation, such as inflatable dams, would not provide a substantially different analysis than that provided with the analysis of the Proposed Action. As applicable, BOEM could also choose to implement additional mitigation measures to further reduce or avoid impacts. Therefore, this alternative was not carried forward as a separate alternative.
Alternatives to cable decommissioning that remove all cables, etc. rather than burying cables in place	Reduce impacts to benthic and marine resources	BOEM regulations (30 CFR 585, Subpart I) currently require the removal of the cables, and the Proposed Action addresses the removal of cables.

Alternative	**Objective**	**Rationale for Dismissal**
Alternative renewable energy technology such as solar or wave devices rather than wind	Reduce impacts to all resources	Alternative technologies such as offshore solar facilities and wave devices that would meet renewable energy goals, including time frames, are not technologically and commercially feasible at this time. Additionally, this alternative is not responsive to the purpose and need to respond to the Project COP and determine whether to approve, approve with modifications, or disapprove the COP to construct, operate, and conceptually decommission a commercial-scale wind energy facility within Lease Area OCS-A 0517.
Alternate locations for turbines including an upland site near East Hampton that would involve no discharge of dredged or fill material in wetlands and other waters of the United States	Reduce impacts to all resources	Evaluating an alternate location outside of Lease Area OCS-A 486 would constitute a new Proposed Action and would not meet BOEM's purpose and need to respond to the Project COP and determine whether to approve, approve with modifications, or disapprove the COP to construct, operate, and conceptually decommission a commercial-scale wind energy facility within Lease Area OCS-A 0517. BOEM's regulations require BOEM to analyze SFW's proposal to build a commercial wind energy facility on Lease OCS-A 0517. BOEM would consider proposals on other existing leases through a separate regulatory process. Other potential lease areas may be considered at a later date, either through a competitive lease sale process if multiple companies wish to bid, or through a non-competitive process if no competitive interest exists. This alternative would therefore not meet the purpose and need of the Project, and would effectively be the same as selecting the No Action alternative.
Alternate location closer to shore or within state waters		
Alternate location for the wind energy facility outside of Lease Area OCS-A 0486		
Alternative wind turbine foundations	Reduce impacts to benthic and marine resources	BOEM received comments suggesting the use of alternative foundation types, including suction bucket foundations and floating wind turbine foundation types to reduce impacts on marine mammals, sea turtles, and fish from pile driving associated with monopile and jacket foundations. These foundation types are not feasible within the Lease Area because of the following: The dense soils beneath an upper loose surficial layer of sand may prevent the full penetration required for stability of suction bucket foundations. The loose upper layer of sandy sediment also presents a settlement risk for gravity-based foundations. The water depths are too shallow in portions of the Lease Area for floating foundations, which is a technology that is unproven for a project the size of what is proposed by SFW. Although these foundation types would not require pile driving, the larger footprint of suction bucket foundations would increase seabed disturbance; additionally, all alternate foundation types would create less room for fishing activities between turbines when compared to monopile foundations. The cables associated with floating wind turbines would also increase the risk of entanglement for marine mammals. Overall, these alternative foundation types are not feasible in the Lease Area and may increase long-term environmental impacts to some resources over those from monopile foundations within the Lease Area.
Alternatives to cable landing site options	Reduce socioeconomic and human health impacts	SFW evaluated a total of five landing sites. Two of these sites were located in Napeague Bay, which required a cable route that was eliminated because of commercial fishing concerns. Of the three remaining sites, only Beach Lane and Hither Hills were considered feasible from an engineering and environmental perspective, as discussed in the COP, Section 2.2.2. No other cable landing site alternatives were identified during Project development or scoping that would further reduce or avoid social or environmental impacts (see New York Article VII submitted by SFW). For these reasons, and because the final EIS already considers an alternative cable landing location as part of the PDE, there is no need to consider it as a separate alternative.

Alternative	Objective	Rationale for Dismissal
Eliminating Beach Lane landing site	Reduce socioeconomic impacts	The final EIS evaluates and discloses the impacts of both the Beach Lane and Hither Hills landing site as part of the PDE. Therefore, this alternative was not carried forward. BOEM would use the information disclosed in the final EIS to evaluate landing sites and may choose to identify a specific landing site as part of their preferred alternative.
Transit lane alternative with widths greater than 4 nm	Reduce navigation impacts	BOEM's subject matter experts believe that an analysis of additional transit lane widths would not provide the U.S. Secretary of the Interior significantly different information regarding impacts on affected resources when compared to the 4-nm alternative analyzed in the final EIS. Although BOEM is aware of a desire for vessel transit lanes with widths in excess of 4 nm, BOEM is unaware of any studies justifying that width. The closest metric that BOEM has seen (from U.K. Maritime Guidance MGN 543) is that routes should be wide enough to allow for a 20 degree course variation in rough conditions. For the 15-nm-long diagonal transit lane through the RI and MA Lease Areas, a 20-degree course variation would require a lane of 5.5 nm. However, MGN 543 indicates that this metric is intended for larger commercial vessels with less responsive steering and that are more heavily impacted by wind, such as the vessels moving through New York Harbor that are in excess of 800 feet. Conversely, the fishing vessels transiting the RI and MA Lease Areas are much smaller, with the largest licensed fishing vessel in the area being 138 feet (42.1 meters). Nearby lanes intended for deep-draft traffic include the Traffic Separation Schemes for Narragansett Bay (11.5 nm long and 4 nm wide) and Boston (127.5 nm long and 4 nm wide). These Traffic Separation Schemes see both a larger traffic volume and larger individual vessel size than the entirety of the RI and MA Lease Areas, and include a separation zone of 1 to 2 nm in the middle of the lane. Additionally, BOEM expects that transit lanes greater than 4 nm wide would be equivalent to the No Action alternative because additional WTGs would be removed, and remaining WTGs would be insufficient to meet SFW's power purchase agreement and therefore this would not meet the purpose and need.
Atlantic Avenue landing site	Reduce socioeconomic and human health impacts	SFW considered the Atlantic Avenue landing site during initial screening but did not include the site in permitting documents because it was determined, based on discussions with local government, that securing property rights for routing of the cable was not possible.

2.2 NON-ROUTINE ACTIVITIES AND LOW-PROBABILITY EVENTS

Non-routine activities and low-probability events associated with the Project could occur during construction and installation, O&M, or conceptual decommissioning. Although these activities or events are impossible to predict with certainty, examples of such activities and events and potential for Project impacts are briefly summarized below.

- Corrective maintenance activities: These activities could be required as a result of other low-probability events, or as a result of unanticipated equipment wear or malfunctions. SFW would stock spare parts and have sufficient workforce available to conduct corrective maintenance activities, if required.
- Collisions and allisions: These activities could result in spills (described below) or injuries or fatalities to humans or wildlife (addressed in Chapter 3). Collisions and allisions would be minimized through USCG's requirement for lighting on vessels, temporary safety zones anticipated to be implemented by SFW during construction, the implementation of National Oceanic and Atmospheric Administration (NOAA) vessel-strike guidance, proposed spacing between WTGs and other facility components, and inclusion of Project components on nautical charts.
- Cable displacement or damage by vessel anchors or fishing gear: This could result in safety concerns and economic damages to vessel operators. However, such incidents would be minimized by inclusion of Project components on nautical charts and the cable burial or other protection measures.
- Chemical spills or releases: For offshore activities, these would include inadvertent releases from refueling vessels, spills from routine maintenance activities, and any more significant spills as a result of a catastrophic event. SFW would comply with USCG and Bureau of Safety and Environmental Enforcement regulations relating to prevention and control of oil spills. Onshore, releases could occur from construction equipment or HDD activities. SFW would prepare a construction spill prevention, control, and countermeasure plan in accordance with applicable requirements, and would outline spill prevention plans and measures to take to contain and clean up spills that may occur.
- Severe weather (e.g., hurricanes) and natural events: The design parameters for the WTGs are sufficient based upon historical data, site-specific measurements, and engineering design practices. There have been three Category 3 hurricanes (tropical cyclones) in the historical record in the area, and no Category 4 or 5 hurricanes. The South Fork Wind project will be designed in accordance with the International Electrotechnical Commission (IEC) 61400-1 and 61400-3 standards. These standards require designs to withstand forces based on site-specific conditions for a 50-year return interval (2% chance occurrence in a single year) for the WTGs, which corresponds to a Category 3 hurricane in this area. This means that the WTGs are designed not merely for average conditions but for the higher end event that is reasonably likely to occur. The newly revised IEC standard now also recommends a robustness load case for extreme metocean conditions, where the WTG support structures are checked for a 500-year event (0.2% chance occurrence in a single year), which corresponds to wind gusts at the strength of a Category 5 hurricane, to ensure that the appropriate level of safety is maintained in case of a less likely event. The Project will be constructed using a certified verification agent to ensure that all design specifications are met. It is possible that severe weather could cause blades to fail, but because of the construction design, it is highly unlikely that the towers would topple. However, severe flooding or coastal erosion could require repairs during construction and installation activities of onshore project components. Although highly unlikely, structural failure of a WTG (i.e., loss of a blade or tower collapse) would result in temporary hazards to navigation for all vessels.

- Terrorist attacks: Impacts from terrorist attacks could greatly vary in magnitude and extent and, therefore, their analysis would be highly speculative. BOEM also considers terrorist attacks unlikely and therefore does not analyze them further in the final EIS.

2.3 SUMMARY AND COMPARISON OF IMPACTS BY ALTERNATIVE

2.3.1 Comparison of Impacts by Alternative

Table 2.3.1-1 summarizes and compares the impacts from Chapter 3 by environmental resource and alternative. Where directionality (e.g., adverse or beneficial) is not specifically noted, the reader should assume the impact is adverse.

Table 2.3.1-1. Comparison of Impacts by Alternative

Resource	No Action	Proposed Action	Vessel Transit Lane Alternative	Fisheries Habitat Impact Minimization Alternative (both layout options)
Air quality	Continuation of existing air quality trends and sources of air pollution. Minor to moderate adverse effects if no other wind farms are authorized and negligible to moderate adverse and moderate beneficial effects if they are authorized.	Minor to moderate temporary adverse impacts to air quality in the region due to vessel activity during construction and installation, O&M, and conceptual decommissioning, as well as minor beneficial long-term air quality and reduced health event impacts. The overall cumulative impacts to air quality would be minor adverse and minor beneficial long-term air quality and reduced health event impacts.	Minor to moderate temporary adverse impacts to air quality in the region due to construction and installation, O&M, and conceptual decommissioning, as well as minor beneficial long-term air quality and reduced health event impacts. The overall cumulative impacts to air quality would be minor adverse and minor beneficial. When compared to the Proposed Action, air quality impacts could slightly decrease depending on final design.	Minor to moderate temporary adverse impacts to air quality in the region due to construction and installation, O&M, and conceptual decommissioning, as well as minor beneficial, long-term air quality and reduced health event impacts. The overall cumulative impacts to air quality would be minor adverse and minor beneficial. When compared to the Proposed Action, air quality impacts could slightly decrease depending on final design.
Water quality	Continuation of existing water quality trends. Minor to moderate adverse effects if no other wind farms are authorized and minor to moderate adverse effects and minor beneficial effects if they are authorized.	Negligible to moderate impacts on onshore surface water and offshore water quality from erosion, sediment resuspension and deposition and scouring, discharges, and inadvertent spills or releases. Onshore and offshore, overall cumulative impacts to water quality would be minor.	Negligible to moderate impacts on onshore surface water and offshore water quality from erosion, sediment resuspension and deposition and scouring, discharges, and inadvertent spills or releases. Onshore and offshore, overall cumulative impacts to water quality would be minor. When compared to the Proposed Action, offshore water quality impacts could slightly decrease depending on final design.	Negligible to moderate impacts on onshore surface water and offshore water quality from erosion, sediment resuspension and deposition and scouring, discharges, and inadvertent spills or releases. Onshore and offshore, overall cumulative impacts to water quality would be minor. When compared to the Proposed Action, offshore water quality impacts could slightly decrease depending on final design.
Bats	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. Minor adverse effects if no other wind farms are authorized and minor adverse effects if they are authorized.	Negligible to minor adverse impacts on bats and suitable habitat from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor.	Negligible to minor adverse impacts on bats and suitable habitat from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor. When compared to the Proposed Action, collision risk could slightly decrease depending on final design.	Negligible to minor adverse impacts on bats and suitable habitat from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor. When compared to the Proposed Action, collision risk could slightly decrease depending on final design.
Benthic habitat, essential fish habitat (EFH), invertebrates, and finfish	Continuation of population trends. Continuation of effects to species from natural and human-caused stressors. Minor to moderate adverse effects if no other wind farms are authorized and minor to moderate adverse effects if they are authorized. Moderate beneficial from artificial reef effects.	Negligible to moderate impacts on benthic habitat, EFH, invertebrates, and finfish from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative impacts to benthic habitat, EFH, invertebrates, and finfish would be moderate.	Negligible to moderate impacts on benthic habitat, EFH, invertebrates, and finfish from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative impacts to benthic habitat, EFH, invertebrates, and finfish would be moderate. When compared to the Proposed Action, reduced WTG and cable installation could slightly decrease impacts depending on final design.	Negligible to moderate impacts on benthic habitat, EFH, invertebrates, and finfish from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative impacts to benthic habitat, EFH, invertebrates, and finfish would be moderate. When compared to the Proposed Action, impacts to complex habitat would be reduced. Reduced WTG and cable installation, as well as micrositing of these components, could slightly decrease other Project-related impacts depending on final design.
Birds	Continuation of population trends. Continuation of effects to species from natural and human-caused stressors. Minor adverse effects if no other wind farms are authorized and negligible to moderate adverse and moderate beneficial effects if they are authorized.	Negligible to minor temporary adverse impacts on birds and suitable habitat from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative impacts would be minor.	Negligible to minor impacts on birds and suitable habitat from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative impacts would be minor. When compared to the Proposed Action, collision risk could slightly decrease depending on final design.	Negligible to minor impacts on birds and suitable habitat from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative impacts would be minor. When compared to the Proposed Action, collision risk could slightly decrease depending on final design.
Marine mammals	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. Moderate adverse effects if no other wind farms are authorized and Moderate effects if they are authorized.	Negligible to moderate impacts from construction and installation, O&M, and conceptual decommissioning activities, varying by species. Overall cumulative adverse impacts would be moderate adverse and minor to moderate beneficial.	Negligible to moderate impacts from construction and installation, O&M, and conceptual decommissioning activities, varying by species. Overall cumulative adverse impacts would be moderate adverse and minor to moderate beneficial. When compared to the Proposed Action, reduced WTG and cable installation could slightly decrease noise, turbidity, and collision impacts depending on final design.	Negligible to moderate impacts from construction and installation, O&M, and conceptual decommissioning activities, varying by species. Overall cumulative adverse impacts would be moderate adverse and minor to moderate beneficial. When compared to the Proposed Action, reduced WTG and cable installation could slightly decrease noise, turbidity, and collision impacts depending on final design.
Other terrestrial and coastal habitats and fauna	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. Minor adverse effects if no other wind farms are authorized and negligible to minor adverse effects if they are authorized.	Negligible to minor impacts to terrestrial and coastal habitats and fauna from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor.	Negligible to minor impacts to terrestrial and coastal habitats and fauna from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor.	Negligible to minor impacts to terrestrial and coastal habitats and fauna from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor.
Sea turtles	Continuation of population trends and continuation of effects to species from natural and human-caused stressors. Minor adverse effects if no other wind farms are authorized and minor adverse effects if they are authorized.	Negligible to minor impacts from elevated underwater noise from construction, vessel traffic, and accidental discharges of spills or trash. Overall cumulative impacts would be minor adverse and minor beneficial.	Negligible to minor impacts from elevated underwater noise from construction, vessel traffic, and accidental discharges of spills or trash. Overall cumulative impacts would be minor adverse and minor beneficial. When compared to the Proposed Action, reduced WTG and cable installation could slightly decrease noise, turbidity, and collision impacts depending on final design.	Negligible to minor impacts from elevated underwater noise from construction, vessel traffic, and accidental discharges of spills or trash. Overall cumulative impacts would be minor adverse and minor beneficial. When compared to the Proposed Action, reduced WTG and cable installation could slightly decrease noise, turbidity, and collision impacts depending on final design.

Resource	No Action	Proposed Action	Vessel Transit Lane Alternative	Fisheries Habitat Impact Minimization Alternative (both layout options)
Wetlands and WOTUS	Continuation of existing trends/issues for wetland resources. Minor adverse effects if no other wind farms are authorized and minor adverse effects if they are authorized.	Short- to long-term, negligible to minor adverse impacts to wetlands and WOTUS from Project construction and installation, and conceptual decommissioning. No O&M impacts are anticipated. Overall cumulative adverse impacts would be minor.	Short- to long-term, negligible to minor adverse impacts to wetlands and WOTUS from Project construction and installation, and conceptual decommissioning. No O&M impacts are anticipated. Overall cumulative adverse impacts would be minor.	Short- to long-term, negligible to minor adverse impacts to wetlands and WOTUS from Project construction and installation, and conceptual decommissioning. No O&M impacts are anticipated. Overall cumulative adverse impacts would be minor.
Commercial fisheries and for-hire recreation fishing	Continuation of current trends. Negligible to moderate adverse effects if no other wind farms are authorized and negligible to moderate effects if they are authorized.	Negligible to major adverse construction and installation, O&M, and conceptual decommissioning impacts to commercial fisheries and for-hire recreational fishing due to increased port congestion; changes to fishing access, primarily through reduced fishing opportunity when construction activities are occurring; damage to or loss of fishing gear; and impacts on the catch due to changes in target species abundance or availability during construction activities. The reef effect of WTG foundations and associated scour protection is expected to have negligible to minor beneficial impacts to for-hire recreational fisheries, depending on the extent to which the foundations enhance fishing opportunities. Overall cumulative adverse impacts would be major.	Negligible to major adverse construction and installation, O&M, and conceptual decommissioning impacts to commercial fisheries and for-hire recreational fishing due to increased port congestion; changes to fishing access, primarily through reduced fishing opportunity when construction activities are occurring; damage to or loss of fishing gear; and impacts on the catch due to changes in target species abundance or availability during construction activities. The reef effect of WTG foundations and associated scour protection is expected to have negligible to minor beneficial impacts to for-hire recreational fisheries, depending on the extent to which the foundations enhance fishing opportunities. Overall cumulative adverse impacts would be major. When compared to the Proposed Action, the transit corridor could facilitate or hinder vessel transit, depending on the type of vessel. The transit corridor could increase the potential for allision, collision, and other navigation conflicts as compared to the Proposed Action.	Negligible to major adverse construction and installation, O&M, and conceptual decommissioning impacts to commercial fisheries and for-hire recreational fishing due to increased port congestion; changes to fishing access, primarily through reduced fishing opportunity when construction activities are occurring; damage to or loss of fishing gear; and impacts on the catch due to changes in target species abundance or availability during construction activities. The reef effect of WTG foundations and associated scour protection is expected to have negligible to minor beneficial impacts to for-hire recreational fisheries, depending on the extent to which the foundations enhance fishing opportunities. Overall cumulative adverse impacts would be major.
Cultural resources	Continuation of existing trends/issues. Negligible to major adverse effects if no other wind farms are authorized and negligible to major effects if they are authorized.	Negligible to major adverse impacts to marine and terrestrial archaeological resources and to historic visual resources from Project construction and installation, O&M, and conceptual decommissioning activities. Overall cumulative adverse impacts would be negligible to major across marine, terrestrial, and viewshed resources.	Negligible to major adverse impacts to marine and terrestrial archaeological resources and to historic visual resources from Project construction and installation, O&M, and conceptual decommissioning activities. Overall cumulative adverse impacts would be negligible to major across marine, terrestrial, and viewshed resources. When compared to the Proposed Action, could decrease viewshed impacts and the risk of marine resource damage or destruction to unknown submerged cultural resources based on final design.	Negligible to major adverse impacts to marine and terrestrial archaeological resources and to historic visual resources from Project construction and installation, O&M, and conceptual decommissioning activities. Overall cumulative adverse impacts would be negligible to major across marine, terrestrial, and viewshed resources. When compared to the Proposed Action, could decrease viewshed impacts and the risk of marine resource damage or destruction to unknown submerged cultural resources based on final design.
Demographics, employment, and economics	Continuation of existing trends for population and employment. Minor adverse to minor beneficial effects if no other wind farms are authorized and negligible to minor adverse and minor beneficial effects if they are authorized.	Negligible to minor adverse and minor to moderate beneficial impacts to the socioeconomic analysis area in terms of employment, federal revenue, and income from construction and installation, O&M, and conceptual decommissioning. Overall cumulative impacts would be minor adverse and minor beneficial.	Negligible to minor adverse and minor to moderate beneficial impacts to the socioeconomic analysis area in terms of employment, federal revenue, and income from construction and installation, O&M, and conceptual decommissioning. Overall cumulative impacts would be minor adverse and minor beneficial. When compared to the Proposed Action, slightly reduced, beneficial and adverse economic impact.	Negligible to minor adverse and minor to moderate beneficial impacts to the socioeconomic analysis area in terms of employment, federal revenue, and income from construction and installation, O&M, and conceptual decommissioning. Overall cumulative impacts would be minor adverse and minor beneficial. When compared to the Proposed Action, slightly reduced, beneficial and adverse economic impact.
Environmental justice	Continuation of current demographic trends. Minor to moderate adverse effects if other wind farms are not authorized and negligible to moderate effects if they are authorized.	Negligible to moderate adverse impacts to minority or low-income populations and tribes from Project construction and installation, O&M, and conceptual decommissioning activities. Overall cumulative adverse impacts would be minor to moderate adverse and minor beneficial.	Negligible to moderate adverse impacts to minority or low-income populations and tribes from the Project construction and installation, O&M, and conceptual decommissioning activities. Overall cumulative adverse impacts would be minor to moderate adverse and minor beneficial. When compared to the Proposed Action, air, water quality, and commercial fishing impacts could slightly decrease depending on final design.	Negligible to moderate adverse impacts to minority or low-income populations and tribes from the Project construction and installation, O&M, and conceptual decommissioning activities. Overall cumulative adverse impacts would be minor to moderate adverse and minor beneficial. When compared to the Proposed Action, air, water quality, and commercial fishing impacts could slightly decrease depending on final design.
Land use and coastal infrastructure	Continued activity in accordance with established land use patterns and regulations. Minor adverse effects if other wind farms are not authorized and negligible to minor effects if they are authorized.	Minor, beneficial impacts to land use due to increased compatible uses at ports, whereas construction or conceptual decommissioning of onshore components would have negligible to moderate, temporary adverse impacts due to disturbance associated with onshore construction, including traffic delays and re-routing. Overall cumulative impacts would be minor adverse and minor beneficial.	Minor, beneficial impacts to land use due to increased compatible uses at ports, whereas construction or conceptual decommissioning of onshore components would have negligible to moderate, temporary adverse impacts due to disturbance associated with onshore construction, including traffic delays and re-routing. Overall cumulative impacts would be minor adverse and minor beneficial.	Minor, beneficial impacts to land use due to increased compatible uses at ports, whereas construction or conceptual decommissioning of onshore components would have negligible to moderate, temporary adverse impacts due to disturbance associated with onshore construction, including traffic delays and re-routing. Overall cumulative impacts would be minor adverse and minor beneficial.
Navigation and vessel traffic	Current navigation trends would continue. Minor to moderate adverse effects if other wind farms are not authorized and minor to moderate adverse effects if they are authorized.	Negligible to minor impacts on navigation and vessel traffic in the region from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be moderate.	Negligible to minor impacts on navigation and vessel traffic in the region from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be moderate. When compared to the Proposed Action, navigation impacts could slightly increase or decrease depending on final design.	Negligible to minor impacts on navigation and vessel traffic in the region from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be moderate. When compared to the Proposed Action, navigation impacts could slightly decrease depending on final design.

Resource	No Action	Proposed Action	Vessel Transit Lane Alternative	Fisheries Habitat Impact Minimization Alternative (both layout options)
Other marine uses	No new impacts to marine uses and continuation of existing uses. Negligible to minor adverse effects if no other wind farms are authorized and negligible to minor (most uses) to moderate (military uses) to major (scientific research surveys) effects if they are authorized.	Negligible to major impacts to mineral extraction, military use, air traffic, land-based radar services, cables and pipelines, and scientific surveys. Overall cumulative adverse impacts would be minor for most uses. However, the overall impact would be moderate adverse for some military uses and radar and major adverse for scientific research and protected species surveys.	Negligible to major impacts to mineral extraction, military use, air traffic, land-based radar services, cables and pipelines, and scientific surveys. Overall cumulative adverse impacts would be minor for most uses. However, the overall impact would be moderate adverse for some military uses and radar and major adverse for scientific research and protected species surveys.	Negligible to major impacts to mineral extraction, military use, air traffic, land-based radar services, cables and pipelines, and scientific surveys from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor for most uses. However, the overall effect would be moderate adverse for military uses and major adverse for scientific research and protected species surveys.
Recreation and tourism	Continuation of existing trends and no beneficial impacts from Proposed Action. Minor to moderate adverse effects if no other wind farms are authorized and minor to moderate adverse and minor beneficial effects if they are authorized.	Negligible to minor short- to long-term impacts to recreation and tourism due to Project construction and conceptual decommissioning activities. O&M of offshore Project activities could elicit both beneficial and adverse impacts to recreational use of resources within the viewshed of the WTGs. Overall cumulative adverse impacts would be minor adverse and minor beneficial.	Negligible to minor short- to long-term impacts to recreation and tourism due to Project construction and conceptual decommissioning activities. O&M of offshore Project activities could elicit both beneficial and adverse impacts to recreational use of resources within the viewshed of the WTGs. Overall cumulative adverse impacts would be minor adverse and minor beneficial. When compared to the Proposed Action, recreation impacts could slightly increase or decrease depending on final design.	Negligible to minor short- to long-term impacts to recreation and tourism due to Project construction and conceptual decommissioning activities. O&M of offshore Project activities could elicit both beneficial and adverse impacts to recreational use of resources within the viewshed of the WTGs. Overall cumulative adverse impacts would be minor adverse and minor beneficial. When compared to the Proposed Action, recreation impacts could slightly increase or decrease depending on final design.
Visual resources	Continuation of impacts to viewshed from past and current activities. Minor to major adverse effects if no other wind farms are authorized and negligible to major adverse effects if they are authorized.	Negligible to major short- to long-term impacts on non-historic visual resources from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor to moderate, as the viewshed would return to previous condition after conceptual decommissioning.	Negligible to major short- to long-term impacts on non-historic visual resources from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor to moderate, as the viewshed would return to previous condition after conceptual decommissioning. When compared to the Proposed Action, visual impacts from nighttime lighting and structures could slightly decrease depending on final design.	Negligible to major short- to long-term impacts on non-historic visual resources from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be minor to moderate, as the viewshed would return to previous condition after conceptual decommissioning. When compared to the Proposed Action, visual impacts from nighttime lighting and structures could slightly decrease depending on final design.

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CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 ANALYSIS APPROACH

Based on previous environmental reviews, subject-matter expert input, consultation efforts, and public involvement to date, BOEM identified the resources addressed in Section 3.3 Physical Resources, 3.4 Biological Resources, and 3.5 Socioeconomic and Cultural Resources as potentially affected by the Project. Each resource section identifies a unique geographic analysis area. Geographic analysis area descriptions and maps are provided in Appendix E.

With regard to temporal extent, the final EIS assumes that potential construction effects generally diminish once construction ends; however, ongoing O&M activities could result in additional impacts for the 25-year life of the Project. Additionally, SFW would have up to an additional 2 years to complete conceptual decommissioning activities. Therefore, the final EIS considers the time frame beginning with construction and ending when the Project's conceptual decommissioning is complete, unless otherwise noted. Final EIS figures called out in Chapter 3 are available in Appendix C (Figures C-1 through C-33), Appendix E (Figures E-1 through E-17), and Appendix F (Figures F-1 through F-7) unless otherwise noted.

The final EIS uses the following duration terms:

- Long-term effects: Effects that last for a long period of time (e.g., decades or longer). An example would be the loss of habitat where a foundation has been installed.
- Short-term effects: Effects that extend beyond construction, potentially lasting for several months, but not for several years or longer. An example would be clearing of onshore shrubland vegetation during construction; the area would be revegetated when construction is complete, and once revegetation is successful, this effect would end.
- Temporary effects: Effects that end as soon as the activity ceases. An example would be road closures or traffic delays during onshore cable installation. Once construction is complete, the effect would end.

In accordance with previous 1978 NEPA regulations (40 CFR 1508.27), the EIS evaluates Project impacts based on the criteria of context and intensity. Impact levels described in BOEM's 2007 *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf* (MMS 2007) were used as the initial basis for establishing adverse impacts specific to each resource. These resource-specific adverse impact levels were then further refined based on scientific literature and best professional judgment and are presented by resource in Sections 3.3 to 3.5.

When evaluating beneficial impacts and assigning an overall impact level to each resource, BOEM used a more general impact definition. Table 3.1.1-1 and Table 3.1.1-2 provide the definitions of potential adverse impact levels and potential beneficial impact levels, respectively, that are used for overall determinations across all resources in the final EIS. Where directionality (e.g., adverse or beneficial) is not specifically noted, the reader should assume the impact is adverse. These overall determinations consider the combined effects of the individual impact level for each IPF for each resource. Furthermore, BOEM has focused the main body of the final EIS on the impacts for resources of most concern and moved the analysis of other resources, including all resources consisting of only negligible to minor Proposed Action impacts, to Appendix H.

3.1.1 Definitions of Potential Adverse and Beneficial Impact Levels

Table 3.1.1-1. Definitions of Potential Adverse Impact Levels

Impact Level	Physical, Biological, and Cultural Resources	Socioeconomic Resources
Negligible	Either no effect or no measurable impacts	Either no effect or no measurable impacts
Minor	Most adverse impacts on the following affected resource(s) could be avoided; OR impacts that could occur would be small and the affected resource would recover completely without remedial or mitigating action, including the following: Local ecosystem health The extent and quality of local habitat for both special-status species and species common to the Lease Area The richness or abundance of local species common to the Lease Area Air or water quality Cultural resources	Most adverse impacts on the affected activity or community could be avoided; impacts would not disrupt the normal or routine functions of the affected activity or community; or the affected activity or community would return to a condition with no measurable effects without remedial or mitigating action.
Moderate	A notable and measurable adverse impact on the following affected resource(s) could occur, some of which may be irreversible; OR the affected resource would recover completely when remedial or mitigating action is taken, including the following: Local ecosystem health The extent and quality of local habitat for both special-status species and species common to the Lease Area The richness or abundance of local species common to the Lease Area Air or water quality Cultural resources	Mitigation would reduce adverse impacts substantially during the life of the Project, including conceptual decommissioning; the affected activity or community would have to adjust somewhat to account for disruptions due to notable and measurable adverse impacts of the Project; or once the impacting agent is gone, the affected activity or community would return to a condition with no measurable effects, when remedial or mitigating action is taken.
Major	A regional or population-level impact on the affected following resource(s) could occur; AND the affected resource would not fully recover, even after the impacting agent is gone and remedial or mitigating action is taken, including the following: Ecosystem health The extent and quality of habitat for both special-status species and species common to the Lease Area Species common to the Lease Area Air or water quality Cultural resources	Mitigation would reduce adverse impacts somewhat during the life of the Project, including conceptual decommissioning; the affected activity or community would have to adjust to significant disruptions due to large local or notable regional adverse impacts of the Project; and the affected activity or community may retain measurable effects indefinitely, even after the impacting agent is gone and remedial action is taken.

Table 3.1.1-2. Definitions of Potential Beneficial Impact Levels

Impact Level	Biological, Cultural, and other Physical Resources	Socioeconomic Resources
Negligible	Either no effect or no measurable impacts	Either no effect or no measurable impacts
Minor	Small and measurable effects that would comprise one of the following: Improvement in ecosystem health Increase in the extent and quality of habitat for both special-status species and species common to the Lease Area Increase in populations of species common to the Lease Area Improvement in air or water quality Limited aerial extent or short-term temporal duration of improved protection of cultural resources	Small and measurable effects that would comprise one of the following: Improvement in human health Benefits for employment Improvement to infrastructure/facilities and community services Economic improvement Benefit for tourism or cultural resources
Moderate	Notable and measurable effects comprising one of the following: Improvement in local ecosystem health Increase in the extent and quality of local habitat for both special-status species and species common to the Lease Area Increase in individuals or populations of species common to the Lease Area Improvement in air or water quality Extensive/complete aerial extent, or long-term temporal duration of, improved protection of cultural resources	Notable and measurable effects comprising one of the following: Improvement in human health Benefits for employment Improvements to facilities/infrastructure and community services Economic improvement Benefit for tourism or cultural resources
Major	Regional or population-level effects comprising one of the following: Improvement in the health of ecosystems Increase in the extent and quality of habitat for both special status and commonly occurring species Improvement in air or water quality Permanent protection of cultural resources	Large local, or notable regional effects comprising one of the following: Improvement in human health Benefits for employment Improvements to facilities and community services Economic improvement Benefit to tourism or cultural resources

3.2 MITIGATION IDENTIFIED FOR ANALYSIS IN THE ENVIRONMENTAL IMPACT STATEMENT

During the development of the EIS, BOEM considered potential additional mitigation measures that could further avoid, minimize, or mitigate impacts on the physical, biological, socioeconomic, and cultural resources assessed in this document. Table G-2 in Appendix G describes these potential additional mitigation measures and the subsequent Chapter 3 sections analyze them separately by resource. BOEM may choose to incorporate one or more additional mitigation measures in the ROD. As discussed previously, all SFW-committed measures are part of the Proposed Action (see Section 2.1.1.6 for details).

3.3 PHYSICAL RESOURCES

3.3.1 Air Quality

The reader is referred to Table 2.3.1-1 and Appendix H for a discussion of current conditions and potential impacts to air quality from implementation of the Proposed Action and other considered alternatives.

3.3.2 Water Quality

The reader is referred to Table 2.3.1-1 and Appendix H for a discussion of current conditions and potential impacts to water quality from implementation of the Proposed Action and other considered alternatives.

3.4 BIOLOGICAL RESOURCES

3.4.1 Bats

The reader is referred to Table 2.3.1-1 and Appendix H for a discussion of current conditions and potential impacts to bats from implementation of the Proposed Action and other considered alternatives.

3.4.2 Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish

3.4.2.1 Affected Environment

The SFWF and SFEC would be developed in regional waters off the coasts of Rhode Island, Massachusetts, and Long Island, New York. The affected environment is a transitional zone separating Narragansett Bay and Long Island Sound from the OCS (BOEM 2013) and forms the approximate boundary between the Mid-Atlantic and New England oceanic ecoregions. These waters support a diverse and abundant assemblage of fishes and invertebrates, including many commercially and recreationally important species.

Two geographic analysis areas (see Table E-4 in Appendix E for descriptions) are used in the analysis of impacts for this resource group: one for benthic resources (Figure E-4a in Appendix E) and the other for EFH, invertebrates, and finfish (Figure E-4b in Appendix E). The benthic analysis area includes a 10-mile radius around the Lease Area and a 330-foot buffer on either side of the SFEC. The EFH, invertebrates, and finfish analysis area encompasses the Scotian Shelf, Northeast Shelf, and Southeast Shelf Large Marine Ecosystems, which captures most of the movement range within U.S. waters for most species in this group. Since the EFH, invertebrates, and finfish geographic analysis area encompasses the Gulf of Maine down to Cape Hatteras, North Carolina, for the purposes of Project-specific analysis in this final EIS, the focus is on EFH, invertebrates, and finfish that would be likely to have regular or common occurrences in the SFWF and SFEC and could be impacted by Project activities (Figure C-3 in Appendix C).

All of the evaluated analysis areas overlap Cox Ledge, an area of concern for fishery managers because it provides important habitat for several commercially and recreationally important species—notably, spawning habitat for Atlantic cod (*Gadus morhua*). A portion of Cox Ledge was designated by the New England Fishery Management Council (NEFMC) as a habitat management area to protect EFH for a number of managed fish species. NOAA acknowledged the importance of Cox Ledge but disapproved the designation because they concluded the proposed gear restrictions approved by the NEFMC would likely be ineffective at minimizing impacts on habitat function (NEFMC 2018; NOAA 2017a). BOEM is currently funding a 3-year study (AT-19-08) examining movement patterns of Atlantic cod, black sea bass, and other species in the southern New England region, including the SFWF Lease Area. The study is being conducted by NMFS and a team comprising a state resource agency, a university, and a nonprofit organization (BOEM 2019). Given the level of concern raised about potential impacts on Cox Ledge and Atlantic cod, the discussion of potential effects presented in the following sections places emphasis on this and other species of particular concern.

The affected environment for benthic habitat, EFH, invertebrates, and finfish is described below. Additional details on baseline conditions are provided in technical reports developed by SFW (Inspire Environmental 2020; Stantec 2020), which are available on BOEM's public Project website. The information presented here summarizes a refined characterization of benthic habitat conditions developed by BOEM and SFW working in collaboration with NMFS to support the EFH consultation (BOEM 2021a).

3.4.2.1.1 BENTHIC HABITAT

The Mid-Atlantic Regional Council on the Ocean (MARCO 2019), BOEM (Guida et al. 2017), NYSDEC (Nelson, Pope & Voorhis, LLC 2014), and SFW (Fugro 2019, 2021; Stantec 2020) have conducted large-scale general benthic habitat mapping within the SFWF and along the SFEC corridor. Inspire Environmental (2020) characterized site-specific benthic habitat conditions by combining photographic surveys with extensive side-scan sonar and backscatter data collected by Fugro (2018, 2019) to support the EFH analysis. Inspire Environmental (2020) identified four substrate classes: 1) glacial moraine, 2) coarse sediment, 3) sand and muddy sand, and 4) mud and sandy mud. Inspire Environmental (2019a, 2019b, 2020) provides photographic examples of these substrate classes.

For the purposes of analysis, these four substrate classes are consolidated into three habitat groups: 1) complex habitat, 2) potentially complex habitat, and 3) soft-bottom habitat (Figure 3.4.21 and Figure 3.4.2-2). Groups were based on substrate sizes and composition and by their use by marine organisms. Complex habitat includes glacial moraine and coarse sediment because boulders, cobbles, and pebbles dominate the sea floor in these areas, along with finer material (e.g., pebbles in a sand matrix), thus providing a heterogeneous variety of hard surfaces and fine material that provide habitat for many different species. Potentially complex habitat includes areas with mixed backscatter returns that may contain a substantial portion of boulders, cobbles, and pebbles but are lacking sufficient ground truthing images. Inspire Environmental (2019a, 2019b, 2020) provides photographic examples of these habitat types.

Soft-bottom benthic habitat is composed of sand and muddy sand and mud and sandy mud areas and does not include a substantial portion of coarse-grained sediment, although there may be scattered patches of gravels and small cobbles that constitute complex habitat. The mobile sediments that comprise soft-bottom habitat, such as sand and silt, are continually reshaped by bottom currents (Butman and Moody 1983; Daylander et al. 2012) and biological activity, forming features like sand waves and depressions that are used by many different fish species (Langton et al. 1995). Natural depressions and associated biological structures like amphipod tubes are components of designated EFH for some species, such as red and silver hake.

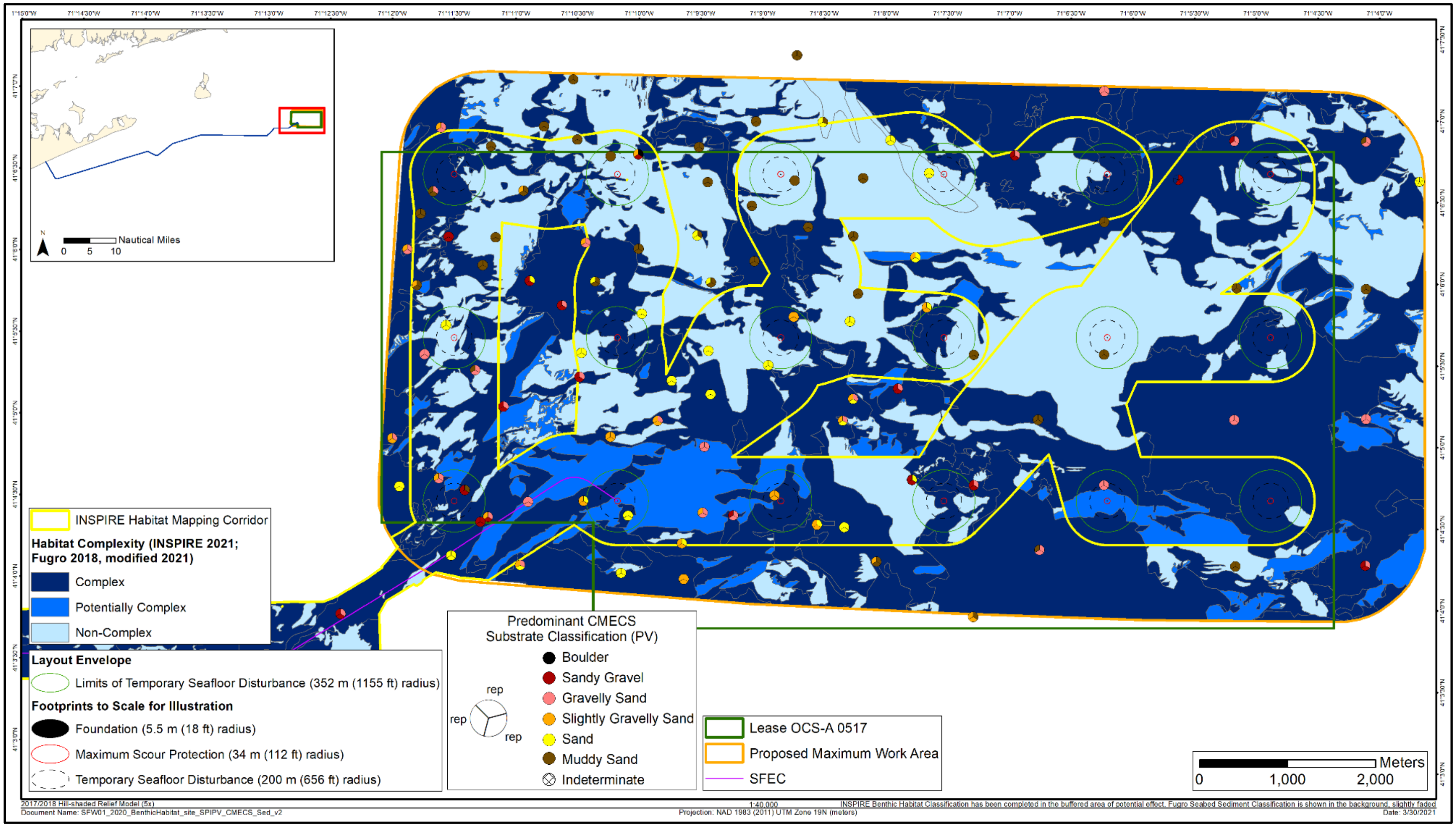


Figure 3.4.2-1. Distribution of complex, potentially complex, and soft-bottom benthic habitats and CMECS substrate classifications within the proposed MWA for SFWF construction, including alternate foundation locations.

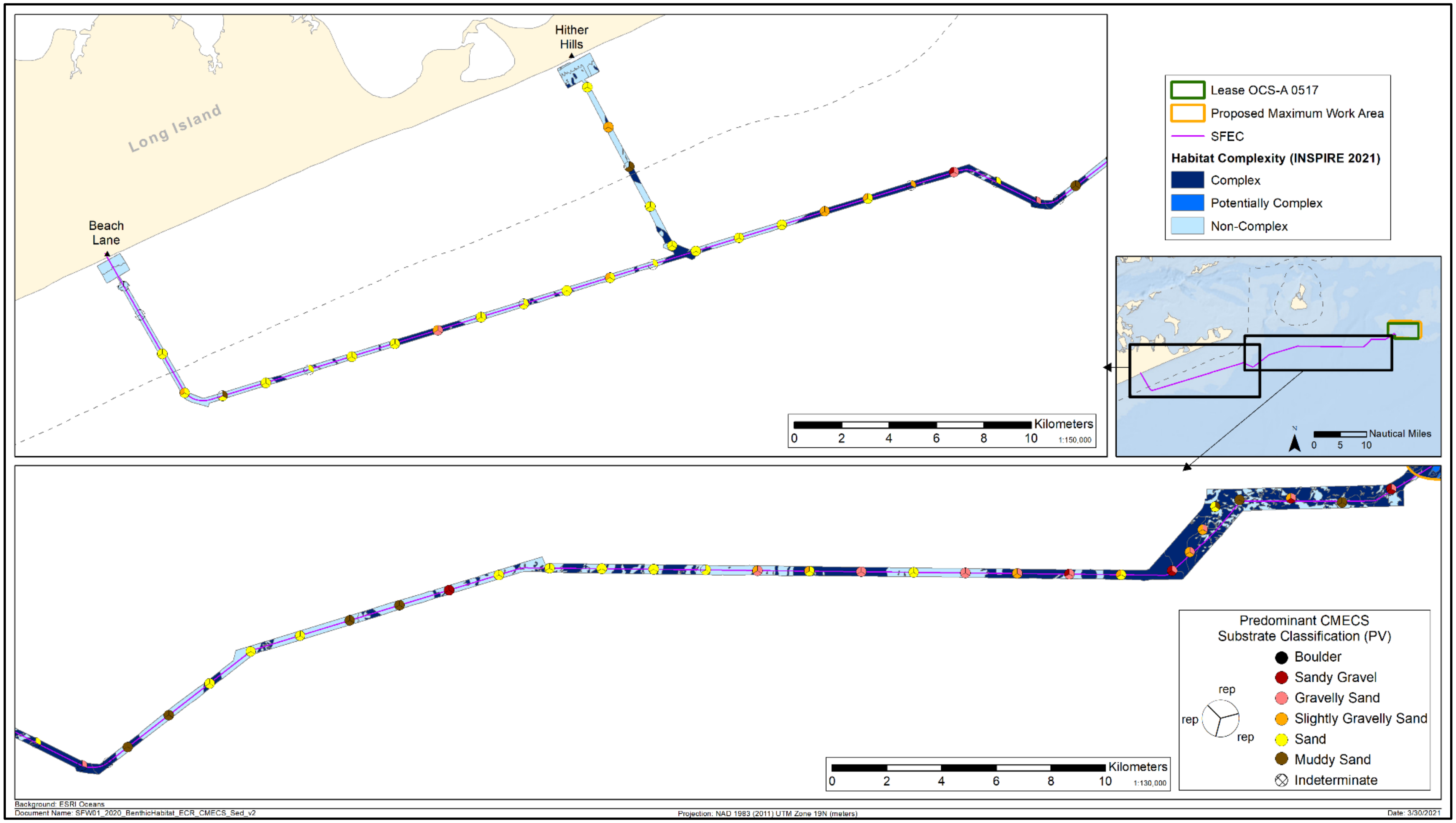


Figure 3.4.2-2. Distribution of complex, potentially complex, and soft-bottom benthic habitats and CMECS substrate classifications within the proposed MWA for SFEC construction, including the Hither Hills route alternative.

3.4.2.1.2 ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with NMFS on activities that could adversely affect EFH. NOAA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (NOAA 2004, 2018). The majority of the EFH-listed species occurring in the waters of the mid-Atlantic and southern New England OCS are managed under federal fishery management plans (FMPs) developed by the NEFMC and the Mid-Atlantic Fishery Management Council (MAFMC) (2018; NEFMC 2018). In addition to these species, several other protected and/or highly migratory species that are managed through an FMP developed by NMFS (NOAA 2019) are known or likely to occur in the geographic area.

BOEM has prepared an EFH assessment for the Project (BOEM 2021a). The EFH assessment provides detailed species descriptions and life history information. In summary, EFH has been designated for the following species or management groups that occur on the southern New England and mid-Atlantic OCS (MARCO 2019):

- Northeast multispecies (e.g., Atlantic cod, haddock [*Melanogrammus aeglefinus*], Atlantic pollock [*Pollachius virens*], and summer flounder [*Paralichthys dentatus*])
- Shellfish, Atlantic sea scallop (*Placopecten magellanicus*), Atlantic surfclam (*Spisula solidissima*), and ocean quahog (*Arctica islandica*)
- Monkfish (*Lophius americanus*)
- Atlantic herring (*Clupea harengus*)
- Skates (Rajidae)
- Small-mesh species (e.g., silver hake [*Merluccius bilinearis*] and red hake [*Urophycis chuss*])
- Bluefish (*Pomatomus saltatrix*)
- Mackerel (*Scomber scombrus*), squids (Decapodiformes), and butterfish (*Peprilus triacanthus*)
- Highly migratory species (e.g., tunas [Thunnini], swordfish [*Xiphias gladius*], sharks [Selachimorpha], and billfish [Istiophoridae]
- Atlantic salmon (*Salmo salar*)
- Tilefish (Malacanthidae)
- Red crab (*Chaceon quinquedens*)
- Scup (*Stenotomus chrysops*) and black sea bass (*Centropristis striata*)
- Spiny dogfish (*Squalus acanthias*)

Some, but not all, of the EFH species covered by the respective FMPs occur within the geographic area. The Project EFH assessment (BOEM 2021a) identifies the EFH species and designated habitats by life stage that are known or likely to occur in the geographic area and provides a detailed assessment of the potential effects of the Proposed Action on EFH. The EFH assessment is available to the public on BOEM's SFW Project website (https://www.boem.gov/renewable-energy/state-activities/south-fork).

NOAA and fishery management councils also identify habitat areas of particular concern (HAPCs) as a component of EFH. HAPCs are high-priority areas for conservation, additional management focus, or research because they are rare, sensitive, stressed by development, or important to ecosystem function. The only HAPCs that could be impacted by Project activities are specific habitats for summer flounder. The summer flounder HAPC includes all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes (i.e., submerged aquatic vegetation [SAV]) in any size bed, as well as loose aggregations, found within currently designated adult and juvenile summer flounder EFH. In locations where native SAV species have been eliminated from an area, then exotic species are included (MAFMC et al. 1998). The HAPC for juvenile Atlantic cod is defined as rocky habitats, in SAV or in sandy habitats adjacent to rocky and SAV habitats, from the mean high-water line to a depth of 66 feet (20 meters) in designated juvenile EFH in coastal areas extending from Maine through and including portions of Rhode Island. The juvenile inshore cod HAPC does not occur within the area impacted by Project activities and is therefore not considered further. No eelgrass, macroalgae, or other SAV is present within the dredging footprint, but eelgrass beds and other SAV are present approximately 375 feet (114 meters) to the northwest and 900 feet (275 meters) to the south and southeast of the O&M facility footprint.

3.4.2.1.3 INVERTEBRATES

For the purposes of the final EIS, marine invertebrates are grouped into three categories: 1) pelagic invertebrates, specifically squid, and pelagic invertebrate eggs and larvae; 2) benthic invertebrates associated with soft sediments (i.e., soft-bottom benthic habitat); and 3) benthic invertebrates associated with hard surfaces, such as boulders, cobble, and coarse gravel (i.e., complex benthic habitat).

Squid, specifically longfin and shortfin squid, are the pelagic invertebrate species likely to occur in the geographic area during their juvenile and adult life stages. However, numerous benthic invertebrate species have pelagic eggs and larvae and rely on currents to disperse their offspring to new habitats. These dispersed eggs and larvae are also a component of EFH, as they form part of the prey base for a variety of species during one or more life stages.

Soft-sediment invertebrates create a permanent or semipermanent home in the bed sediments. Most of these invertebrates possess specialized organs for burrowing, digging, embedding, tube building, anchoring, or locomotion in soft substrates. Some species are capable of moving slowly over the bed surface on soft substrates, but these species are generally not able to travel across hard substrates for long periods. Soft-sediment invertebrates include various types of annelid worms (oligochaetes and polychaetes), flatworms (Platyhelminthes), and nematodes (Nematoda); crustaceans, such as burrowing amphipods (Amphipoda), mysids (Mysida), copepods (Copepoda), and crabs (Brachyura); echinoderms, including sand dollars (Clypeasteroida), starfish (Asteroidea), and sea urchins (Echinoidea); and bivalve mollusks (Pelecypoda) (Federal Geographic Data Committee 2012; Inspire Environmental 2019a; Stantec 2020). Economically important species, including Atlantic sea scallop, bay scallop (*Argopecten irradians*), horseshoe crab (*Limulus polyphemus*), Atlantic surfclam, squid, and ocean quahog, are associated with soft sediments on the mid-Atlantic OCS.

Hard-surface invertebrates prefer harder substrate (such as boulders) and cobbles (defined in Section 3.4.2.1.1) as complex habitat. This group includes a diversity of species, such as members that firmly attach to hard surfaces or that crawl, rest, and/or cling to the surface of and/or shelter in the interstitial spaces between hard substrates. Attached invertebrates use structures like pedal discs, cement, and byssal threads to attach to the surface. Non-attached organisms use feet, claws, appendages, spines, suction, negative buoyancy, or other means to stay in contact with the hard substrate and may or may not be capable of slow movement over the surface. Examples of attached invertebrates include sea anemones, barnacles, corals, sponges, hydroids, bryozoans, mussels, and oysters. Examples of non-attached organisms include crabs, small shrimp, amphipods, starfish, and sea urchins (Federal Geographic Data Committee 2012; Inspire Environmental 2019a). Some economically important invertebrate species—notably, American lobster (*Homarus americanus*; also referred to as lobster)—are associated with hard substrates. Both soft-sediment and hard-surface invertebrate species are likely to be present within complex benthic habitat, with the former using patches of soft substrate commonly found in this habitat type. Soft-sediment invertebrates would be largely dominant in soft-bottom habitats, although some hard-surface species may occur on scattered hard surfaces where they are available.

Several commercially important invertebrate species, such as lobster, Atlantic sea scallop, longfin and shortfin squid, and ocean quahog, occur within the SFWF and SFEC portions of the geographic area (Inspire Environmental 2019a), and bay scallop, lobster, and channeled whelk (*Busycotypus canaliculatus*) occur in Lake Montauk and could occur within the O&M facility footprint (Stantec 2020). Squid eggs, most likely longfin inshore squid (*Doryteuthis pealeii*), were observed in two locations within the SFWF footprint, indicating that this species spawns in the vicinity. Longfin inshore squid also occur within Lake Montauk as foraging juveniles and adults (Inspire Environmental 2019a; Stantec 2020). Squid attach their eggs to bottom substrates and use both complex and soft-bottom benthic habitats for spawning.

The affected environment for invertebrates is influenced by commercial and recreational harvest of certain invertebrate species (e.g., squid, lobster), habitat modification, benthic habitat disturbance by activities like vessel anchoring and bottom-disturbing fishing methods, and regional shifts in biological community structure caused by climate change. Some commercial fishing methods, specifically scallop and clam dredges and bottom trawling, are a source of chronic disturbance of seabed habitats. Depending on the frequency of disturbance, this type of fishing activity can impact community structure and diversity and limit recovery (Nilsson and Rosenberg 2003; Rosenberg et al. 2003). The severity and rate of recovery from fishing-related disturbance is variable and dependent on the type of gear used and the nature of the affected habitat.

3.4.2.1.4 FINFISH

Numerous species of finfish belonging to the demersal, pelagic, and shark assemblages occur in and near the RI/MA WEA and the Montauk O&M facility. These include numerous EFH species and two ESA-listed species that are known or likely to occur within the SFWF and SFEC. The finfish resources of the region support diverse and highly valued commercial and recreational fisheries (see Section 3.5.1). BOEM has funded several surveys of finfish species occurrence in the RI/MA WEA, which are summarized by Guida et al. (2017). The EFH assessment prepared for the Project (BOEM 2021a) provides additional detail on federally managed fish species that occur in the geographic area.

Finfish can be divided into two general groupings, demersal and pelagic, based on their primary habitat association. Demersal species spend their adult life stage on or close to the ocean bottom and associate with specific types of benthic habitat. Examples include species like Atlantic cod, red and silver hake, and black sea bass that live on or near the seabed during one or more life stages and species like skates and flatfish that spend most of their lives directly on the seabed. Habitat preferences vary between species. For example, black sea bass, Atlantic cod, and haddock associate primarily with complex benthic habitats, while red hake and flounder use biogenic complex habitats, artificial reefs, and shell habitats as well as hard-bottom reefs in some portions of the region.

Pelagic fishes are generally schooling fish that occupy the mid- to upper water column as juveniles and adults. Pelagic species occupy the surface to midwater depths (0 to 3,281 feet [0 to 1,000 meters]) from the shoreline to the continental shelf and beyond. Examples include Atlantic herring, bluefish, and several shark species. Some demersal species, such as Atlantic cod and black sea bass, have pelagic eggs and larvae. Additionally, some pelagic species, such as Atlantic herring, have benthic eggs. Some purely pelagic species like tunas are highly migratory and only occur in the near-coastal and shelf surface waters of the Southern New England-New York Bight in the summer, taking advantage of the abundant prey in the warm surface waters.

These two groups encompass a diversity of species that associate with the full range of environment types that occur in the geographic area. Estuarine species, such as summer and winter flounder, are commonly found in nearshore areas, where freshwater inputs from large rivers mix with the ocean. Purely marine species are primarily found in offshore environments and include yellowfin tuna (*Thunnus albacares*), bluefin tuna (*Thunnus thynnus*), bluefish, swordfish, blue shark (*Prionace glauca*), common thresher shark

(*Alopias vulpinus*), and shortfin mako shark (*Isurus oxyrinchus*). Anadromous species spawn in freshwater and migrate to the open ocean to grow to adulthood, using estuarine and nearshore marine habitats for migration and larval and juvenile rearing. Four pelagic species of anadromous fish could be present in the geographic area: American shad (*Alosa sapidissima*), alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), and Atlantic menhaden (*Brevoortia tyrannus*)(BOEM 2013; Petruny-Parker et al. 2015; Scotti et al. 2010). Additionally, striped bass (*Morone saxatilis*) are likely to use nearshore habitats, and Atlantic sturgeon would utilize demersal habitats. The catadromous American eel (*Anguilla rostrata*) also occurs as larvae, juvenile glass eels migrating to freshwater, and adults migrating to spawning habitats in the Sargasso Sea. This species uses pelagic habitats on the continental shelf for larval and juvenile metamorphosis, migration, feeding, and growth (Atlantic States Marine Fisheries Commission 2000).

The demersal and pelagic fish community structure of the mid-Atlantic and southern New England OCS is shifting due to a combination of factors, including climate change, fishing pressure, and modification of coastal and estuarine habitats (NOAA 2021). For example, the fish community structure in nearby Narraganset Sound has been changing over the past 6 decades, marked by dramatic declines in abundance followed by the slow rebuilding of large predators like sharks, the declining abundance of some demersal species (winter flounder, whiting, and red hake), and the increasing abundance for others (Atlantic butterfish, scup, black sea bass, and squid) (Collie et al. 2008; NOAA 2021). These shifts are mirrored throughout the mid-Atlantic and southern New England regions (Hare 2017; NOAA 2021).

Five ESA-listed fish species occur in the waters of the Northwest Atlantic OCS: giant manta ray (*Manta birostris*), Atlantic salmon, oceanic whitetip shark (*Carcharhinus longimanus*), Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), and shortnose sturgeon (*Acipenser brevirostrum*). Oceanic whitetip sharks are not known to occur in the SFWF and SFEC. This species could conceivably encounter Project vessels in open ocean waters as they travel to the Lease Area from Europe. BOEM (2021b) has concluded that vessel encounters would have no effect on this species; therefore, it is not considered further in this assessment. Only the giant manta ray and Atlantic sturgeon are expected to occur in the SFWF and SFEC and could be exposed to the effects of the Project. Refer to the Project biological assessment (BA) (BOEM 2021b) for a detailed assessment of the potential effects on these species.

The giant manta ray is a pelagic relative of the sharks, most commonly found in open ocean waters well to the south of the SFWF and SFEC. However, manta rays migrate seasonally over long distances, and the northern extent of their known range extends to upwelling zones along the edge of the continental shelf immediately to south of, and potentially including, the SFWF and SFEC. Critical habitat has not been designated for this species (NMFS et al. 2019). The Atlantic sturgeon is a large demersal, estuarine-dependent, anadromous species that historically spawned in medium-sized to large rivers on the U.S. Atlantic coast from Labrador to Florida (Atlantic Sturgeon Status Review Team 2007). Five separate distinct population segments (DPSs) of Atlantic sturgeon were listed under the ESA in 2012 (NOAA 2012): Chesapeake Bay (endangered), Carolina (endangered), New York Bight (endangered), South Atlantic (endangered), and Gulf of Maine (threatened). Atlantic sturgeon originating from rivers in Canada are currently not listed. The current marine range of Atlantic sturgeon extends from Labrador Inlet, Labrador, Canada, to Cape Canaveral, Florida (NOAA 2012). Designated critical habitat comprises the core riverine and estuarine habitats used by each DPS (NMFS et al. 2017), which does not occur in the area directly impacted by the SFWF and SFEC but overlaps with areas where Project vessels could transit.

3.4.2.2 Environmental Consequences

3.4.2.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.4.2-1 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for this final EIS.

Table 3.4.2-1. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish

Issue	Impact Indicator	Significance Criteria
Underwater noise and vibration	Extent, frequency, and duration of noise above established effects thresholds, and/or other quantifiable effects as follows: Invertebrates: Eggs and larvae: 210 dB re 1 µPa Juvenile and adult longfin and shortfin squid: Behavioral response to particle motion effects up to 7 feet from monopile foundations Finfish: Varies by hearing group, see Table 3.4.2-4	Negligible: No measurable impacts to species or habitat would occur. Minor: Most impacts to species are avoided; if impacts occur, they may result in the loss of a few individuals. Impacts to sensitive habitats are avoided; impacts that do occur are short term or temporary in nature. Moderate: Impacts to species are unavoidable but would not result in population-level effects. Impacts to habitat may be short term, long term, or permanent and may include impacts to sensitive habitats but would not result in population-level effects to species that rely on them. Major: Impacts would affect the viability of the population and would not be fully recoverable. Impacts to habitats would result in population-level impacts to species that rely on them.
Crushing, burial, and entrainment	Estimated extent of potential disturbance, injury, and mortality-level effects on fish and invertebrates (including eggs and larvae) from crushing or burial by construction equipment and materials placement; entrainment by construction equipment; and burial effects from suspended sediment deposition.	
Seabed and water column alteration	Short-term and long-term effects on water column and benthic habitats by habitat displacement by monopiles; habitat modification by placement of scour protection and concrete mattresses; Short-term alteration of soft-bottom benthic habitat function; and long-term alteration of complex benthic habitat function	
Water quality impacts	Duration and intensity of suspended sediment impacts (quantitative)	
	Accidental spills, releases of trash and debris (qualitative assessment relative to baseline conditions)	
Artificial light	Extent and duration of artificial light effects (qualitative assessment relative to baseline conditions)	
Power transmission	Theoretical extent of potentially detectable electromagnetic field (EMF) and substrate heating effects, as follows: Benthic eggs and larvae, EFH: area exposed to magnetic field effects > 1,000 mG, electrical field effects > 500 mV/m Invertebrates: Benthic infauna: Magnetic fields > 1 mG, Inhabited substrates exposed to measurable heating effects Squid: > 800 mG Finfish: Theoretical extent of potentially detectable EMF effects by species group as follows:* Demersal and pelagic finfish and invertebrates: area exposed to magnetic field effects > 1,000 mG, electrical field effects 20 mV/m Electrosensitive species (sturgeon, skates, sharks): area exposed to magnetic field effects > 250 mG, electrical field effects 20 mV/m (at 60 Hz)	

Note: µPa = micropascal, dB = decibel, Hz = hertz, mG = milligauss, mV/m = millivolts per meter

* EMF sensitivity varies widely, no effect threshold guidance has been established. The minimum EMF levels needed to produce behavioral responses observed in available research are one or more orders of magnitude larger than the anticipated EMF effects likely to result from the Proposed Action. Electrosensitive fish can detect low-frequency bioelectric fields at very weak levels but are unable to detect higher frequency fields > 20 Hz (Bedore and Kajiura 2013).

3.4.2.2.2 NO ACTION ALTERNATIVE

Under the No Action alternative, BOEM would not approve the COP, and the Proposed Action would not be implemented. Existing environmental trends within the two geographic analysis areas would continue, potentially influenced by the development of planned future activities on the mid-Atlantic and southern New England OCS and associated coastal areas over the coming decade. These include other offshore wind and renewable energy projects and potential port improvements to support the development of this industry regionwide (see Appendix E). The potential impacts of these activities on existing conditions and trends would be limited to those IPFs that could conceivably occur within the geographic analysis areas.

This section provides a general description of these IPFs, recognizing the extent and significance of potential effects on conditions cannot be fully quantified for projects that are in the conceptual or proposal stage and have not been fully designed. The intent of this section is to provide a general overview of how future activities might influence future environmental conditions. If any or all of the future activities described in Appendix E proceed, each would be subject to independent NEPA analyses and regulatory approvals, and their environmental effects would be fully considered therein.

The Affected Environment section provides information on existing benthic habitat conditions, EFH, invertebrates, and finfish species occurring in the geographic area and vicinity and describes trends in habitat conditions, including the effects of past and present activities. Attachment 3 in Appendix E provides additional information regarding past and present activities contributing to current conditions in the geographic area. Attachment 3 in Appendix E also discloses future non-offshore wind activities and associated species impacts.

Future Activities (without the Proposed Action)

Accidental releases and discharges: Offshore wind energy development could result in the accidental release of water quality contaminants, trash, or other debris, which could theoretically lead to an increase in debris and pollution in the geographic analysis areas (see Section 3.3.2.2.2 [No Action Alternative] for characterization of existing marine pollution conditions). In general, the types of accidental hazardous materials releases associated with marine construction projects consist of fuels, lubricating oils, and other petroleum products. BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). Compliance with these requirements would effectively minimize releases of trash and debris.

Increased vessel traffic associated with offshore renewable energy construction presents the potential for the inadvertent introduction of invasive species during discharge of ballast and bilge water. BOEM would require all Project construction vessels to adhere to existing state and federal regulations related to ballast and bilge water discharge, including USCG ballast discharge regulations (33 CFR 151.2025) and EPA National Pollutant Discharge Elimination System Vessel General Permit standards, effectively avoiding the likelihood of non-native species invasions through ballast water discharge. Considering these requirements and the dispersed distribution of planned offshore energy facilities, existing water quality trends are likely to continue.

The impacts from ongoing activities and future non-offshore wind activities stem from the increased potential for releases over the next 30 years due to increasing vessel traffic and ongoing, chronic releases. Future offshore wind activities would contribute to an increased risk of releases and impacts on benthic resources. The contribution from future offshore wind activities would represent a low percentage of the overall risk from ongoing activities. In context of reasonably foreseeable environmental trends, the combined impacts on benthic resources (mortality, decreased fitness, disease) from accidental releases and discharges are expected to be negligible, localized, and temporary due to the likely limited extent and duration of a release.

<u>Anchoring and new cable emplacement/maintenance</u>: Up to 1,627 acres could be affected by anchoring or mooring activities during offshore wind energy development within the EFH, finfish, and invertebrate geographic analysis area, as well as up to 27 acres within the benthic geographic analysis area. This offshore energy facility construction would involve direct disturbance of the seabed, leading to direct impacts on benthic, finfish, and invertebrate resources or degradation of sensitive habitats, including EFH. In general, however, these effects would be localized to the disturbance footprint and vicinity. The severity of these effects would vary depending on the species and life stage sensitivity to specific stressors that extend into the area, resulting in minor to moderate impacts on benthic resources. Such impacts are expected to be localized and temporary but could be permanent if they occur in eelgrass beds or hard-bottom habitats.

Future activities would also disturb up to 10,131 acres of seabed from cable installation within the EFH, finfish, and invertebrate geographic analysis area, as well as up to 1,702 acres within the benthic geographic analysis area, resulting in the long-term alteration of benthic habitat. The specific type and extent of habitat conversion and the resulting effects on benthic habitats, EFH, invertebrates, and finfish would vary depending on the project design and site-specific conditions. The widespread development of offshore renewable energy facilities would, however, create a distributed network of artificial reefs on the mid-Atlantic OCS. These reefs form biological hotspots that could support species range shifts and expansions, non-native species, and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). Those changes could influence fish and invertebrate community structure in the future, but the likelihood, nature, and significance of these potential changes are difficult to predict and a topic of ongoing research.

<u>Electromagnetic field (EMF)</u>: At least seven submarine power and communications cables cross the RI/MA WEA. These cables would presumably continue to operate and generate EMF effects under the No Action alternative. While the type and capacity of those cables is not specified, the associated baseline EMF effects can be inferred from available literature. Electrical telecommunications cables are likely to induce a weak EMF on the order of 1 to 6.3 microvolts per meter within 3.3 feet (1 meter) of the cable path (Gill et al. 2005). Fiber-optic communications cables with optical repeaters would not produce EMF effects.

Under the No Action alternative, up to 7,248 miles of cable would be added in the EFH, finfish, and invertebrate geographic analysis area, as well as up to 2,220 miles of cable within the benthic geographic analysis area, producing EMFs in the immediate vicinity of each cable during operations. BOEM anticipates that the proposed offshore energy projects would use high-voltage alternating current (HVAC) transmission, but high-voltage direct current (HVDC) designs are possible and could occur. BOEM would require these future submarine power cables to have appropriate shielding and burial depth to minimize potential EMF effects from cable operation. EMF effects from these future projects on benthic habitats, EFH, invertebrates, and finfish would vary in extent and significance depending on overall cable length, the proportion of buried versus exposed cable segments, and project-specific transmission design (e.g., HVAC or HVDC, transmission voltage, etc.). While EMFs are measurable within tens of feet of cable corridors, bottom-dwelling invertebrates (e.g., lobster) are impacted by the field as they temporarily pass over the cable location. Accordingly, EMF effects from future activities would be negligible. However, Hutchison et al. (2018, 2020c) have observed behavioral responses in lobster that were exposed to an EMF from an HVDC cable in a controlled environment, meaning that higher level (e.g., minor or moderate) effects could result should future projects use HVDC transmission.

Light: Artificial light can attract finfish and invertebrates and can influence biological functions (e.g., spawning) that are triggered by changes in daily and seasonal daylight cycles. Planned future activities include up to 2,547 offshore WTGs and OSS foundations in the EFH, finfish, and invertebrate geographic analysis area as well as up to 267 foundations within the benthic geographic analysis area. The construction and O&M of these structures would introduce new short-term and long-term sources of artificial light to the offshore environment in the form of vessel lighting and navigation and safety lighting on offshore WTGs and OSS foundations, respectively. BOEM has issued guidance for avoiding and minimizing artificial lighting impacts from offshore energy facilities and associated construction vessels (Orr et al. 2013) and has concluded that adherence to these measures should effectively avoid adverse effects on fish and other aquatic organisms. BOEM would require all future offshore energy projects to comply with this guidance. Given the minimal and localized nature of anticipated lighting effects under this guidance, the related effects from proposed future activities on habitat conditions are likely to be negligible.

Noise: Numerous proposed offshore wind project construction projects could be developed on the mid-Atlantic OCS between 2022 to 2030 (see Appendix E). This would result in noise-generating activities—specifically, impact pile driving, HRG surveys, construction and O&M vessel use, and WTG operation. BOEM believes it is reasonable to conclude that impact pile-driving, construction vessel, and HRG survey noise from future projects could adversely affect EFH, invertebrates, and finfish. In addition, construction noise impacts from future actions elsewhere in the mid-Atlantic OCS could adversely affect demersal and pelagic fish and invertebrates that migrate to or use the geographic analysis area during part of their life cycle. Due to the unknowns associated with proposed projects, the timing, extent, and severity of these effects on habitat and aquatic community structure cannot currently be quantified.

Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct drive systems like those proposed for the SFWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 root mean square decibels (dB_{RMS}), occasionally reaching as high as 128 dB_{RMS}, in the 10-hertz (Hz) to 8-kilohertz (kHz) range. This is consistent with the noise levels observed at the Block Island Wind Farm (BIWF) (110 to 125 dB re 1 µPa sound pressure level [SPL] RMS; Elliot et al. 2019) and the range of values observed at European wind farms and is therefore representative of the range of operational noise levels likely to occur from future wind energy projects. More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10 MW) current generation direct drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This suggests that operational noise effects on finfish, including EFH species, could be more intense and extensive than those considered herein, but the findings have not been validated. In general, these noise levels are below established behavioral thresholds for most fish species, comparable to environmental baseline levels in busy marine traffic areas, and unlikely to be detectable to fish and invertebrates outside the respective wind farm footprints. The available information suggests the effects of operational underwater noise from future activities would occur for the life of the project but are not anticipated to have population-level effects and will be moderate.

Port utilization: The development of an offshore wind industry on the mid-Atlantic OCS may incentivize the expansion or improvement of regional ports to support planned and future projects. Activities like dredging and the expansion or development of new overwater structures could lead to adverse effects on coastal and estuarine habitats, finfish, and invertebrates, including EFH species. However, these localized habitat impacts would not affect benthic habitats within an associated geographic analysis area, due to the distance from shore.

Presence of structures: The future addition of up to 2,547 new WTG and OSS foundations in the EFH, finfish, and invertebrate geographic analysis area, as well as up to 267 foundations within the benthic geographic analysis area could result in artificial reef effects that influence benthic habitat and fish and invertebrate community structure within and in proximity to the project footprints. This could in turn influence the abundance and distribution of EFH species. While reef effects would largely be limited to the areas within and or close to wind farm footprints, the development of individual or contiguous wind energy facilities in nearby areas could produce cumulative effects that would be permanent and moderate beneficial for some species from habitat conversion and have minor adverse effects due to permanent habitat loss. New structures would attract structure-oriented fishes as long as the structures remain. Abundance of certain fishes may increase with temporary to permanent moderate impacts.

Hydrodynamic disturbance resulting from the broadscale development of large offshore wind farms is a topic of emerging concern because of potential effects on the Mid-Atlantic Bight cold pool. The cold pool is a mass of relatively cool water that forms in the spring and is maintained through the summer by stratification. The cold pool supports a diversity of fish and other marine species that are usually found farther north but thrive in the cooler waters it provides (Chen 2018; Lentz 2017). Changes in the size and seasonal duration of the cold pool over the past 5 decades are associated with shifts in the fish community composition of the Mid-Atlantic Bight (Chen 2018; Saba and Munroe 2019). Several lease areas within the RI/MA WEA are located on the approximate northern boundary of the cold pool. The potential effects of extensive wind farm development on features like the cold pool is a topic of emerging interest and ongoing research (Chen et al. 2016). Changes in cold pool dynamics resulting from future activities, should they occur, could conceivably result in changes in habitat suitability and fish community structure, but the extent and significance of these potential effects are unknown.

<u>Sediment deposition and burial and seabed profile alterations</u>: As previously noted, under the No Action alternative, up to 7,248 miles of cable would be added in the EFH, finfish, and invertebrate geographic analysis area, as well as up to 2,220 miles of cable within the benthic geographic analysis area. Cable placement and other related construction activities would disturb the seabed, creating plumes of fine sediment that would disperse and resettle in the vicinity. The resulting effects on benthic habitats, EFH, finfish, and invertebrates would be similar in nature to those observed during construction of the BIWF (Elliot et al. 2017) but would vary in extent and severity depending on the type and extent of disturbance and the nature of the substrates. These effects would be short term in duration, effectively ending once the sediments have resettled. Similarly, suspended sediment concentrations close to the disturbance could exceed levels associated with behavioral and physiological effects on fish and invertebrates but would dissipate with distance, generally returning to baseline conditions within a few hours. In theory, bed-disturbing activities occurring nearby (i.e., within a few hundred feet) could elevate suspended sediment levels, resulting in short-term, minor adverse effects on benthic habitat, EFH, finfish, and invertebrates.

<u>Climate change</u>: Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. These changes have affected habitat suitability for the invertebrate and finfish community of the geographic analysis area, including several EFH species. For example, several finfish species have shifted in distribution to the northeast, farther from shore and into deeper waters, in response to an overall increase in water temperatures and an increasing frequency of marine heat waves (NOAA 2021). Warmer water may influence finfish and invertebrate migration and may increase the frequency or magnitude of disease (Brothers et al. 2016; Hoegh-Guldberg and Bruno 2010). Ocean acidification, also a function of climate change, is contributing to reduced growth or the decline of zooplankton and other invertebrates that have calcareous shells (Pacific Marine Environmental Laboratory [PMEL] 2020). Climate change has also resulted in a significant increase in precipitation on the East Coast, increasing the amount of runoff and stormwater pollutants delivered by rivers to coastal and estuarine habitats. This has altered the character of these habitats in ways that have adversely affected some marine finfish and invertebrate species (NOAA 2021). These trends are expected to continue under the No Action alternative. The intensity of impacts resulting from climate change are uncertain but are anticipated to be minor to moderate.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on benthic habitat, EFH, invertebrates, and finfish species associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on benthic habitat, EFH, invertebrates, and finfish species.

While the proposed Project would not be built as proposed under the No Action alternative, BOEM expects ongoing activities, future non-offshore wind activities, and future offshore wind activities to have continuing temporary to permanent impacts (disturbance, displacement, injury, mortality, reduced reproductive success, habitat degradation, habitat conversion) on benthic resources, finfish, invertebrates, and EFH, primarily through resource exploitation/regulated fishing effort, dredging, bottom trawling, bycatch, pile-driving noise, new cable emplacement, the presence of structures, and climate change.

Based on the analysis presented under the above IPFs, BOEM anticipates that the impacts of ongoing activities, especially seafloor disturbances caused by sediment dredging and fishing using bottom-tending gear, would be **moderate** for benthic resources. Reasonably foreseeable activities other than offshore wind include increasing vessel traffic; increasing construction, marine surveys, marine minerals extraction, port expansion, and channel deepening activities; and the installation of new towers, buoys, and piers would result in **minor** impacts for benthic resources. BOEM expects the combination of ongoing activities and reasonably foreseeable activities other than offshore wind to result in **moderate** impacts on benthic resources, primarily driven by ongoing dredging and fishing activities (see Appendix E, Attachment 3).

Likewise, BOEM anticipates that the impacts of ongoing activities, especially fishing, dredging, and climate change, would be **moderate for** EFH, invertebrates, and finfish species. In addition to ongoing activities, reasonably foreseeable activities other than offshore wind may also contribute to impacts on finfish, invertebrates, and EFH. Based on the same reasonably foreseeable activities noted above, BOEM anticipates that the impacts of reasonably foreseeable activities other than offshore wind would be **minor**. BOEM expects the combination of ongoing activities and reasonably foreseeable activities other than offshore wind to result in **moderate** impacts on finfish, invertebrates, and EFH, primarily driven by ongoing fishing activities.

The combined significance criteria in Table 3.1.1-1 and Table 3.1.1-2 are used to characterize the combined effects of all IPFs likely to occur under the No Action alternative. BOEM anticipates that the overall impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse impacts and could potentially include **moderate** beneficial impacts on benthic resources due to the artificial reef effect. Future offshore wind activities are expected to contribute considerably to several IPFs, primarily new cable emplacement and the presence of structures—namely, foundations and scour/cable protection.

Likewise, BOEM anticipates that the overall impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** impacts and could potentially include **moderate beneficial** impacts for EFH, invertebrates, and finfish species. Future offshore wind activities are expected to contribute considerably to several IPFs, the most prominent being the presence of structures. The No Action alternative would forgo the fisheries monitoring that SFW has voluntarily committed to perform, the results of which could provide an understanding of the effects of offshore wind development; benefit future management of finfish, invertebrates, and EFH; and inform planning of other offshore developments. However, other ongoing and future surveys could still provide similar data to support similar goals.

3.4.2.2.3 PROPOSED ACTION ALTERNATIVE

Table 3.4.2-2 summarizes potential short-term and long-term benthic habitat disturbance by offshore Project components (Inspire Environmental 2021). As stated previously, Inspire Environmental (2020, 2021) has characterized benthic habitat conditions using extensive side-scan sonar and backscatter data to determine site-specific benthic habitat conditions.

Table 3.4.2-2. Short-Term and Long-Term Benthic Habitat Disturbance by Project Component

Project Component	Project Component Acres	Short-Term Disturbance		Long-Term Disturbance	
		Acres	%	Acres	%
SFWF*	13,700	1,217	8.9%	396	2.9%
SFEC†	4,944	630	12.7%	357	7.2%
O&M facility‡	0.9	0.034	3.8%	< 0.0001	0.04%
Total	18,645	1,847	9.9%%	754	4.0%

* Component acres are defined by the 13,700-acre SFWF Lease Area. Short-term disturbance area is based on 14.8 acres of foundation seabed preparation, 381.5 acres of seabed preparation for inter-array cable installation (estimated impacts plus a 20% contingency), and 821 acres of vessel-anchoring impacts in soft-bottom benthic habitat. Anchoring impact area is based on an estimated 182 anchoring events and 4.5 acres of benthic habitat disturbance per event. Long-term disturbance area is estimated based on 396 acres of seabed preparation and boulder relocation impacts (estimated impacts plus a 20% contingency), 0.4 acre of monopile foundations, and 31.7 acres of scour and cable protection placement within the seabed preparation footprint. Micrositing of foundation locations and cable routes may result in a greater percentage of cable installation impacts occurring in non-complex (soft-bottom habitat), decreasing the long-term habitat disturbance acreage below the estimate presented here.

† Short-term disturbance acres are based on 357.3 acres of SFEC seabed preparation (including installation trials), and 273 acres of short-term cofferdam construction impacts in soft-bottom benthic habitat (estimated impacts plus a 20% contingency). Long-term disturbance acres are based on 357.3 acres of seabed preparation and boulder relocation and 9.8 acres of cable protection placement within this footprint. Micrositing of cable routes may reduce long-term disturbance extent from this total.

‡ Component acres are defined by the approximate aquatic footprint of the Montauk O&M facility. Short-term disturbance is based on dredging impacts in soft-bottom benthic habitat. Long-term impacts are based on displacement of soft-bottom benthic habitat by five 24-inch-diameter steel piles.

Construction and Installation

Benthic Habitat

Noise and vibration: Benthic habitat is composed of various types of sediment, structural features that are formed by that sediment (e.g., interstitial spaces between boulders, sand waves, etc.), and organisms that reside in and on the sediment. Substrates and associated structural features are unaffected by underwater noise. Benthic invertebrates are sensitive only to the particle motion component of noise. Detectable particle motion effects on invertebrates are typically limited to within 7 feet (2 meters) of the source or less (Carroll et al. 2016; Edmonds et al. 2016; Hawkins and Popper 2014; Payne et al. 2007). Vibration from impact pile driving can also be transmitted through sediments. Recent research (Jones et al. 2020, 2021) indicate that longfin squid, an EFH species, can sense and respond to vibrations from impact pile driving at a greater distance based on sound exposure experiments. This in turn suggests that infaunal organisms, such as clams, worms, and amphipods, may exhibit a behavioral response to vibration effects over a larger area, but additional research is needed. Noise transmitted through water and/or through the seabed can cause injury and/or mortality to benthic resources in a limited area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area. The affected areas would likely be recolonized in the short term, and the overall impact on benthic resources would be moderate.

Impact pile driving may also be used to install up to five 24-inch-diameter steel piles for moorage improvements at the Montauk O&M facility. This would result in similar vibration effects on benthic habitat potentially an unknown distance from the source, as bounded by surrounding shorelines.

Benthic habitat modification: The construction of the SFWF and SFEC would result in a range of temporary short-term and long-term impacts on benthic habitat. The estimated acres of construction-related impacts in each benthic habitat category are summarized by construction activity in Table 3.4.2-3. These values represent the best available estimate for the current Proposed Action design. However, micrositing will be used during construction to minimize impacts on complex benthic habitat to the greatest extent practicable. This would shift some of the projected impacts on complex benthic habitat to potentially complex and non-complex soft-bottom habitat.

Table 3.4.2-3. Acres of Benthic Habitat Disturbance by Habitat Type and Construction Activity

Construction Element	Maximum Construction Disturbance Footprint (acres)	Proportional Distribution of Impacts by Benthic Habitat Type		
		Complex	Potentially Complex	Soft Bottom
Monopile foundations and scour protection*	14.8	Monopile foundations and scour protection*	13%	35%
Inter-array cable and cable protection[‡]	318–382	Inter-array cable and cable protection[†]	10%	48%
Vessel anchoring	821	Vessel anchoring	Unknown	Unknown
SFEC installation and cable protection[‡]	457–549	SFEC installation and cable protection[‡]	1%	61%
Sea to shore transition	273	Sea to shore transition	–	100%
O&M facility	0.034	O&M facility	–	100%

* Approximately 0.925 acre of boulder relocation and seabed preparation could occur anywhere within a potential exposure area defined by a 200-meter radius around each foundation, which collectively have the proportional distribution of habitat types shown.

[†] Ranges represent the total standard and standard +20% contingency estimates of total benthic habitat impacts for inter-array cable and SFEC construction. The standard estimate is the total extent of overlapping habitat impacts from seabed preparation (boulder relocation) and placement of temporary cable protection. The proportional distribution of impacts by habitat type for each Project element is based on the habitat composition of the approved impact corridor for each Project element. The acres of habitat exposed to short- and long-term impacts would likely fall somewhere within this range. The total area impacted by placement of cable protection is 17.7 acres for the inter-array cable and 8.2 to 9.8 acres for the SFEC. These impacts would occur within the respective seabed preparation footprints for each Project component.

This section addresses temporary to short-term effects on soft-bottom benthic habitat resulting from seabed disturbance. While placement of the monopile foundations, scour protection, and concrete mattress cable protection are also elements of Project construction and installation, these features would remain in place throughout the operational life of the Project and would have long-term effects on habitat composition in all habitat types. These long-term effects are therefore considered under Operations and Maintenance and Conceptual Decommissioning.

Seabed preparation, cable trenching,[8] vessel anchoring, and short-term bed disturbance at the sea-to-shore transition site would also directly disturb soft-bottom benthic habitat by crushing and displacing epifaunal organisms on the bed surface and liquifying sand and mud sediments from the bed surface to depths of up to 6 feet, killing and displacing benthic infauna within the cable path. This process would also flatten sand waves and biogenic depressions that provide habitat for fish and invertebrates, including EFH species. Seabed preparation, cable trenching, and sea-to-shore transition construction effects would occur over up 1,204 acres of benthic habitat within the installation corridors for the inter-array cable and SFEC. Those impacts would occur in areas composed of 48% and 61% non-complex benthic habitat, respectively. Cable routes would be microsited in non-complex benthic habitat to the extent practicable; however, some cable installation impact acreage would also occur in complex or potentially complex benthic habitat within these installation corridors. Vessel anchoring would impact an estimated 821 acres of

[8] The potential equipment used for cable trenching (mechanical cutter, mechanical plow, and jet plow) are expected to have comparable effects to benthic habitat.

seabed. The distribution of these impacts by habitat type cannot be predicted with certainty, as vessel and anchor positioning are affected by wind and current conditions in real time. However, the vessel anchoring plan developed by the applicant will be used to identify and avoid impacts to complex benthic habitats to the greatest extent practicable. Impacts on soft-bottom benthic habitat are expected to recover within 18 to 24 months following initial disturbance, as a result of natural sediment transport processes (Daylander et al. 2012) and recolonization by benthic invertebrates from adjacent habitats. This estimate is based on observed recovery rates of sediment disturbance from cable trenching effects at the nearby BIWF (HDR 2020) and from similar types of bed disturbance in other regions (de Marignac et al. 2008).

Prior to construction, the seabed within the designated construction footprint would be cleared using a towed plow. The disturbance estimates presented above include seabed preparation effects on soft-bottom benthic habitat. Seabed preparation in complex and potentially complex benthic habitats would clear larger substrates like boulders and cobbles from the construction footprint. Sessile invertebrates and other benthic organisms would be damaged or killed as these substrates are rolled to the edge of the clearance area. Seabed preparation would impact a maximum of 382 and 549 acres of benthic habitat within the SFWF and SFEC construction footprints, respectively. Although the boulder relocation associated with seabed preparation is strictly a construction activity, relocating boulders within and between benthic habitat types constitutes a long-term habitat modification and is therefore addressed under O&M effects on benthic habitat in the following section.

O&M facility construction includes dredging an existing 0.034-acre berthing area from the existing depth of -5 feet mean lower low water (MLLW) to -12 feet MLLW to provide the draft needed for the 95-foot crew transfer vessel. This activity would change the depth profile of the site and kill or displace benthic organisms. This site is currently used as a commercial berthing area and is periodically dredged to maintain desired depths. Dredged materials would be dewatered in a contained area approximately 1,200 feet long × 26.2 feet wide (366 meters × 8 meters), placed landward of the plane of spring high water on the beach immediately to the west of the Montauk Harbor entrance. The dewatered materials would then be distributed adjacent to the dewatering area between the planes of mean high water and spring high water to nourish the beach. This area is currently used as a beneficial use placement site for materials from other maintenance dredging activities in Lake Montauk. Project O&M would include annual maintenance dredging to maintain the Project depth of -12 feet MLLW. As such, all the effects of O&M facility dredging and dredged material placement are considered in the following section under Operations and Maintenance and Conceptual Decommissioning.

<u>Suspended sediment impacts</u>: Jet plow trenching used to install the inter-array cable and SFEC, construction of the sea-to-shore transition, and O&M facility dredging would disturb the seabed and release plumes of suspended sediment into the water column. These sediments would be dispersed by the current and would settle back to the seabed within minutes to hours of the disturbance. The majority of water column effects would be limited to short-term total suspended solid (TSS) pulses below 100 milligrams per liter (mg/L). The highest TSS concentrations of 1,347 mg/L predicted to result from construction would dissipate quickly, lasting from minutes to hours (BOEM 2021a).

Suspended sediments will resettle on the seabed, blanketing the existing habitat with layers of fine sediment of varying thickness. Fine sediment deposition from inter-array cable construction could exceed 0.4 inch (10 millimeters [mm]) on up to 464 acres and 0.1 inch (3 mm) on up to 2,268 acres. Burial depths from SFEC construction could exceed 0.4 inch (10 mm) over 4.2 acres and 0.1 inch (3 mm) on 2,268 acres. Burial effects would cease within hours of initial bed disturbance. Inter-array cable installation impacts would occur intermittently over a 4-month construction window between May and December, while the SFEC would occur continuously over a period of approximately 2 months. The actual area of effect at a given moment during construction would be limited to the jet plow disturbance footprint and the sediment deposition zone downcurrent of the disturbance. The magnitude and duration of sediment effects must be considered in the context of the environmental baseline. As stated in Section 3.4.2.1.1, the sand and mud substrates on the mid-Atlantic OCS are continually reshaped by bottom currents. This means that these habitats and organisms associated with benthic habitat are regularly exposed to and therefore must be able to recover from burial by mobile sediments. In this context, the temporary to short-term effects of sediment deposition on benthic habitats would be negligible to minor.

Dredging associated with O&M facility construction and O&M would also generate suspended sediments that would resettle to the seabed. Suspended sediment concentrations would likely be similar to levels estimated by the USACE (2020) for maintenance dredging of the adjacent federal navigation channel, on the order of 282 mg/L within 6 feet of the bottom and dissipating to background within approximately 1,150 feet. Given the uncertainty about the potential type of dredging equipment used, potential TSS plumes from O&M facility construction are estimated to extend between 985 to 3,950 feet. While sediment deposition depths have not been estimated for O&M facility dredging, a comparison anticipating TSS concentrations from sea-to-shore transition construction suggests that burial depths of up to 0.4 inch (10 mm) could occur in close proximity to the dredging footprint. This could lead to negligible to minor effects on benthic habitats, as described above.

Essential Fish Habitat

BOEM (2021a) has developed a detailed assessment of the potential effects on EFH resulting from construction of the Proposed Action. EFH species include several species of demersal and pelagic finfish, benthic invertebrates (specifically Atlantic sea scallop, Atlantic surfclam, and ocean quahog), and pelagic invertebrates (specifically longfin and shortfin squid). Construction effects on EFH for these different species groups include the following:

- Benthic habitat disturbance
- Underwater noise and vibration impacts that exceed known thresholds for observable biological effects on EFH species and their prey organisms from the following noise sources:
    - Impact and vibratory pile driving
    - HRG surveys
    - Construction vessel noise
    - Dredging noise
- Temporary to short-term water quality effects from suspended sediments and sediment deposition on EFH species, prey organisms, and habitats

Several Project construction activities, including boulder relocation, placement of monopile foundations, scour protection, and concrete mattress cable protection, would also impact EFH species and their habitats. Because these elements are essential to the operation of the Project and they constitute a long-term habitat modification, their effects on EFH are addressed in the following section under Operations and Maintenance and Conceptual Decommissioning.

A detailed discussion of construction effects on each EFH species and their designated habitats is presented in the EFH assessment (BOEM 2021a). In general, effects on EFH resulting from the construction-related impact mechanisms listed above would be the same or similar in magnitude and extent to the effects on benthic habitat, invertebrates, and finfish and their habitats, as described in the preceding and following sections. These effects are temporary to short term in duration and range from negligible to minor in potential significance. Please see these respective sections for specific examples of potential effects on EFH species and habitats.

As discussed in Section 3.4.2.1.2, designated HAPC for summer flounder (SAV) could occur within the SFWF and SFEC. As stated in Appendix G, Table G-1, the applicant would avoid impacts to complex benthic habitats, including SAV, to the greatest extent practicable. This EPM should effectively avoid and minimize impacts to the extent that any effects on the summer flounder HAPC would be negligible.

Invertebrates

Construction of the Proposed Action would result in adverse effects on invertebrates from exposure to underwater noise; direct injury and mortality from crushing, burial, and entrainment; and exposure to elevated suspended sediments. These effects are described below.

Noise and vibration: Construction-related sources of noise and vibration that could affect invertebrates are impact and vibratory pile driving and HRG surveys. In general, mollusks and crustaceans are less sensitive to noise-related injury than many fish because they lack internal air spaces and are therefore less vulnerable to sound pressure injuries on internal organs than vertebrates (Popper et al. 2001). Most invertebrates are insensitive to hearing injury as they lack the specialized organ systems evolved by vertebrates to sense sound pressure (Popper et al. 2001). Current research suggests that some invertebrate species groups, such as cephalopods (e.g., octopus, squid), crustaceans (e.g., crabs, shrimp), and some bivalves (e.g., Atlantic scallop, Atlantic surf clam, ocean quahog) are capable of sensing sound through particle motion (Andre et al. 2011; Carroll et al. 2016; Edmonds et al. 2016; Hawkins and Popper 2014). Particle motion effects dissipate rapidly and are highly localized around the noise source, with detectable effects on invertebrates typically limited to within 3 to 6 feet of the source (Edmonds et al. 2016; Payne et al. 2007). Non-impulsive noise sources like vessel engines are less likely to produce behavioral effects in invertebrates.

While these conclusions reflect current knowledge, considerable uncertainty remains about sound sensitivity in some invertebrates. For example, squid exposed to 2 hours of continuous noise pulses ranging from 157 to 175 peak dB displayed damage to specialized sensory cells used for balance and orientation (Andre et al. 2011). More recently, Jones et al. (2020, 2021) determined that longfin squid, an EFH species, can likely sense and exhibit behavioral responses to vibration from impact pile driving transmitted through sediments potentially at a greater distance from the source, perhaps several hundred feet. They theorized that intense particle motion exposure could have indirect effects (e.g., impaired ability to detect predators or prey) on squid. These findings suggest that squid could experience injury or behavioral effects from intense underwater noise exposure, but evidence for this type of effect is limited and additional research is needed.

Squid within approximately 6.5 feet (2 meters) of HRG survey equipment may exhibit behavioral responses to particle motion effects, which equates to a total exposure area of 4,151 acres for pre-construction surveys of the SFWF and SFEC corridors. Assuming that bivalves, crustaceans, and other benthic invertebrates may be able to detect and respond to particle motion effects from impact pile driving within 16.4 feet (5 meters) of the source, this would equate to a total behavioral effect area for invertebrates, including prey organisms for EFH species, of less than 1 total acre for all 16 monopiles. Bivalve EFH species and other benthic invertebrate prey organisms are unlikely to be close enough to HRG survey equipment to detect particle motion effects from this noise source. These effects would be limited to temporary behavioral responses, most likely lasting for the duration of the noise impact and short periods (less than 30 minutes) following exposure. This would constitute a negligible effect on invertebrates.

Underwater noise may also affect invertebrate eggs and larvae. Popper et al. (2014) summarized available research on the sensitivity of finfish to underwater noise effects. They recommended thresholds for lethal injury and TTS effects by fish hearing group, including for fish eggs and larvae, which are summarized in Table 3.4.2-4. The applicability of the fish egg and larvae threshold to invertebrate eggs and larvae is unclear, but it is used here to estimate the range of potential effects. Noise impacts could be greater if they occur in important spawning habitat, occur during peak spawning periods, and/or result in reduced reproductive success in one or more spawning seasons, which could result in long-term effects to populations if one or more year classes suffer suppressed recruitment. However, pile driving could be restricted during peak spawning time. As shown in Table 3.4.2-5 in the following section (noise effects on finfish), impact pile driving is the only noise source with the potential to affect invertebrate eggs and larvae. Up to 163 acres surrounding each monopile foundation and 2,830 acres in total could be exposed to lethal noise effects on invertebrate eggs and larvae. Should impact pile driving be used for O&M facility construction, potentially lethal noise effects could occur over approximately 0.03 acre in total. These effects would be temporary in duration, occurring only during the activity. While mortality-level effects on invertebrate eggs and larvae could occur, these impacts are likely to be minor overall because 1) the area of effect is small relative to the available habitat, and 2) the loss of individuals would likely be insignificant relative to natural mortality rates for planktonic eggs and larvae, which can range from 1% to 10% per day or higher (White et al. 2014).

Table 3.4.2-4. Noise Exposure Thresholds for Finfish Lethal Injury, TTS, and Behavioral Effects

Fish Hearing Group	Threshold*				
	Lethal Injury, Peak*, †	Lethal Injury, Cumulative*, §	Recoverable Injury, Cumulative*, §	TTS*, §	Behavioral‡
Fish with swim bladder, involved in hearing	207	207	203	186	150
Fish with swim bladder, not involved in hearing	207	210	203	186	150
Fish without swim bladder	213	219	216	186	150
Eggs and larvae	210	207	None defined	None defined	N/A

* Thresholds from Popper et al. (2014).
† Values in dB re 1 µPa.
‡ Threshold from Fisheries Hydroacoustic Working Group (2008).
§ Values in dB re 1 $\mu Pa^2 s$.

<u>Crushing, Burial, and Entrainment</u>: Invertebrates within the construction footprint would be exposed to crushing and burial effects from seabed preparation, placement of monopiles, scour protection and concrete mattresses, cable installation, sea-to-shore transition construction, and vessel anchoring. The acres of construction-related bed disturbance are summarized by benthic habitat type in Table 3.4.2-3 in the Benthic Habitat section.

Invertebrates within these disturbance footprints could be exposed to crushing and burial effects. The extent and severity of exposure will vary by species and life stage–specific sensitivity and habitat association. For example, mobile pelagic invertebrates like longfin squid would likely be able to avoid being crushed during seabed preparation and materials placement or be overrun by the jet plow. In contrast, immobile eggs on the seabed, such as longfin squid eggs, would be vulnerable to these effects. Immobile or slow-moving benthic invertebrates (e.g., worms, anemones, surfclams, ocean quahogs) and immobile life benthic stages (e.g., longfin squid eggs) within the construction footprint would likely be killed by bed disturbance and could also be injured or killed by sediment deposition. Sessile invertebrates, like sponges and hydroids, attached to boulders and cobbles would be damaged or killed when boulders are relocated during seabed preparation and when scour and cable protection are placed in complex and potentially complex benthic habitats. Mobile benthic invertebrates, like adult lobsters and horseshoe crabs, would likely be able to avoid the jet plow but could be injured or killed by scour and cable protection placement.

The jet plow injects water into the sediments to liquify the seabed for cable installation. While the water intake, located near the water surface, is screened to avoid entraining (suctioning) small fish, it would unavoidably entrain and kill zooplankton and planktonic fish eggs and larvae. Zooplankton comprise a diverse group of invertebrate organisms, including larval life stages of crustaceans (crabs and lobsters), echinoderms (urchins and sand dollars), bivalves (clams and mussels), and other species; and invertebrates that spend their entire lives as zooplankton, such as calanoid copepods. Zooplankton are a central component of the food web and provide an important prey resource for many fish, filter feeding invertebrates, and even large marine mammals like humpback and North Atlantic right whale (NARW) (*Eubalaena glacialis*). Inspire Environmental (2019c) estimated potential plankton mortality based on jet plow intake volume and movement speed and documented plankton density. They calculated that over a billion fish eggs and 8.5 billion invertebrate zooplankton could be killed by entrainment impacts.

While construction impacts could injure or kill invertebrates on over 2,800 acres of benthic habitat (see Table 3.4.2-3) and kill billions of phytoplankton, these impacts must be placed into context to evaluate their significance. Invertebrates associated with soft-bottom habitat are likely to recover from disturbance within 18 to 24 months (de Marignac et al. 2008; Dernie et al. 2003; Desprez 2000; HDR 2020). In contrast, some invertebrates associated with complex benthic habitat, like sponges and hydroids, may take a decade or longer to fully recover (Auster and Langton 1999; Collie et al. 2005; Lukens and Selberg 2004; Tamsett et al. 2010). Accordingly, bed disturbance impacts could range from temporary and negligible for mobile invertebrates like adult squid and crabs; short term and minor for immobile or slow-moving invertebrates like clams, scallops, and worms in soft-bottom habitat; to long term for certain invertebrates associated with complex benthic habitat. The latter could be locally significant and, based on the long-term nature of the impact, would constitute a moderate impact.

While the volume of water used by the jet plow would likely approach 20 million cubic meters (Inspire Environmental 2019c), this represents a tiny fraction of the total habitat available to zooplankton. While distribution is not uniform, it is reasonable to conclude that 8.5 billion zooplankton represent a similarly small fraction of the total resource. Moreover, as stated in the previous section, zooplankton have high natural mortality rates, and losses of even several billion organisms may not be significant relative to natural mortality rates. On this basis, entrainment effects on invertebrates would be temporary and likely negligible.

The Proposed Action includes several EPMs, listed in Table G-1 in Appendix G, that would avoid and minimize impacts on invertebrates. These include design and siting of Project features to minimize the overall Project footprint and impacts on complex benthic habitat where practicable, establishing no-anchor areas to avoid sensitive habitats like observed squid spawning sites. These EPMs and additional mitigation measures would limit, but not completely avoid, crushing, burial, and entrainment impacts on invertebrates.

<u>Suspended sediment</u>: Seabed disturbance during cable installation, sea-to-shore transition construction, and O&M facility dredging would result in elevated suspended sediment concentrations in the water column and burial of benthic habitats as those sediments resettle to the bed surface. TSS concentrations and acres of benthic habitat exposed to different burial depths are summarized above under Benthic Habitat. As discussed, water column TSS concentrations could reach as high as 1,347 mg/L in limited areas but would dissipate quickly (within minutes) to less than 100 mg/L. TSS concentrations of this magnitude and duration are below levels associated with adverse effects on benthic invertebrates, eggs, and larvae (Wilber and Clarke 2001; Yang et al. 2017) and would therefore be negligible. Fine sediment deposition from SFWF construction could exceed 0.4 inch (10 mm) on up to 464 acres and 0.1 inch (3 mm) on up to 2,268 acres. Burial depths from SFEC construction could exceed 0.4 inch (10 mm) over 4.2 acres, and 0.1 inch (3 mm) on 2,268 acres. Invertebrates like burrowing bivalve clams and burrow-forming amphipods are highly tolerant to burial (Gingras et al. 2008; Johnson 2018). More sedentary invertebrates that cannot move within the sediment column as quickly, such as tube-dwelling polychaetas, could exhibit stress or mortality if buried (Johnson 2018). Some invertebrate species and their eggs and larvae could be

adversely affected by burial by as little as 0.4 inch (10 mm) of fine sediment (Wilber and Clarke 2001), but burial depths associated with stress are typically on the order of 2 inches or more (Johnson 2018). Given sediments within the SFWF and SFEC are mobile and continually reshaped by winter storm events (Daylander et al. 2012), the benthic invertebrate community is likely adapted to periodic burial effects. On this basis, sediment effects on invertebrates would be temporary and minor.

Potential discharges, spills, and trash: BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). The Project would comply with these requirements (Jacobs 2021). Given these restrictions, the risk to benthic invertebrates from trash and debris from the Project is negligible.

Construction vessels also pose a potential risk for Project-related accidental spills. Small spills could occur during fuel transfers or collisions with other vessels or structures. SFW would follow strict oil spill prevention and response procedures during all Project phases, effectively avoiding the risk of significant spills. Given the low potential for spills and minimal risk of exposure to small temporary spills, the risk from construction-related petroleum spills is negligible.

Light: Light is an important cue in guiding the settlement of invertebrate larvae (Davies et al. 2015). Artificial light can change the behavior of aquatic invertebrates, although the direction of response can be species and life stage specific. Currently there are no artificial lighting sources present in the SFWF or SFEC, except for periodic vessel transit. The O&M facility would be sited in a developed commercial moorage with existing artificial lighting. Lights would be required on offshore platforms and structures, vessels, and construction equipment during construction of the SFWF. Consistent with BOEM guidance (Orr et al. 2013), construction vessels would implement lighting design and operational measures to eliminate or reduce lighting impacts on the aquatic environment. Although individual invertebrates may detect light effects from construction vessels and may exhibit behavioral responses (e.g., squid being attracted to the lights), these impacts are not expected to measurably affect invertebrates at population levels because of the limited area of impact at any given time and the limited duration of construction activities. Any resulting impacts on invertebrates would therefore be temporary and minor.

Finfish

Construction of the SFWF, SFEC, and Montauk O&M facility could result in potential impacts from 1) underwater noise; 2) crushing, burial, and entrainment; 3) suspended sediment exposure; 5) potential discharges, spills, and trash; and 6) artificial lighting effects.

Noise: Construction-related sources of noise and vibration that could affect finfish are impact and vibratory pile driving, HRG surveys, and vessel and dredging noise. Popper et al. (2014) compiled available research on underwater noise effects on fish and other aquatic life and established noise exposure thresholds for mortality, injury, and temporary threshold shift (TTS) in different species and life stages of fish based on sensitivity to sound. The Fisheries Hydroacoustic Working Group (2008) recommended a generalized threshold for behavioral effects on fish from noise exposure. These thresholds represent the current state of the science regarding potential noise effects on fish and are presented in Table 3.4.2-4 in the previous section (Invertebrates).[9]

[9] The noise thresholds in Table 3.4.2-5 represent the best available science regarding finfish sensitivity to injury-level noise effects. NMFS applies different threshold criteria developed by the Fisheries Hydroacoustic Working Group (2008) to evaluate underwater noise effects on ESA-listed species. The BOEM (2021b) BA for the Proposed Action alternative uses these more conservative thresholds to evaluate potential underwater noise effects on Atlantic sturgeon, manta rays, and their prey and forage species.

Table 3.4.2-4 organizes fish into groups based on the presence of a swim bladder and whether it is involved in hearing. Noise impacts on fish and invertebrates vary depending on the ability of the fish to detect sound pressure. Popper et al. (2014) reviewed the available research and developed a set of recommended injury thresholds for different groups of fishes and invertebrates depending on their specific biological sensitivity to sound. Fish with a swim bladder or other gas chamber involved in hearing (e.g., Atlantic herring and fish in the cod family) are considered hearing specialists and are the most sensitive to underwater noise impacts. Fish that have a swim bladder that is not directly involved in hearing, or hearing generalists, are intermediate in sensitivity to noise impacts. Fish species that lack swim bladders and similar gas-filled organs (e.g., sharks, rays, flatfish) are the least susceptible to underwater noise impacts. Eggs and larvae lack gas-filled organisms and are less susceptible to injury but are unable to avoid noise impacts because they are less mobile than adults.

The Proposed Action includes the installation of 16 monopile foundations using an impact hammer. The installation scenario considered in the analysis assumes 15 “standard” installations requiring approximately 4,500 pile strikes over 2 hours to achieve desired depth and one “difficult” installation requiring 8,000 pile strikes and up to 4 hours due to underlying substrate conditions. Denes et al. (2021) modeled construction noise likely to result from impact pile driving, vibratory pile driving, and construction vessel noise and how far noise exceeding the Popper et al. (2014) and Fisheries Hydroacoustic Working Group by noise source, hearing group, and effect level (Table 3.4.2-5).

Table 3.4.2-5. Maximum Potential Area Exposed to Construction Noise Exceeding Behavioral, TTS, and Lethal Injury Thresholds for Invertebrates and Finfish by Source

Exposure Category	EFH Species Category	Construction Noise Exposure Area by Source and Effect Category - total cumulative acres (instantaneous acres) *					
		Monopile Installation	HRG Surveys	Construction Vessels	Cofferdam Installation	O&M Pile Driving	O&M Dredging
Behavioral Effects	All finfish	204,037 (120,928)	1,627,335 (477)	24,891 (14.2)	420	621	2,315
	Squid	775 (195)	4,151 (< 0.002)	Insignificant	1.5	40	Insignificant
	Bivalves	1 (< 0.02)	Insignificant	Insignificant	0.37	0.37	Insignificant
TTS	All finfish	118,894 (58,744)	Within 16 feet of source	Insignificant	44.5	15.8	956
Lethal Injury	Fish with swim bladder involved in hearing	7,455 (163)	Insignificant	Insignificant	Insignificant	0.03	Insignificant
	Fish with swim bladder not involved in hearing	2,839 (163)	Insignificant	Insignificant	Insignificant	0.02	Insignificant
	Fish with no swim bladder	183 (12)	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
	Eggs and larvae	2,830 (163)	Insignificant	Insignificant	Insignificant	0.03	Insignificant

* Cumulative acres represent the total area exposed to noise effects for each noise source, instantaneous acres represent the exposure area at any given moment. For example, the instantaneous behavioral effect exposure area for HRG survey noise is 477 acres. The cumulative exposure area of 1,627,335 acres extends that instantaneous impact over 621 linear miles of HRG survey effort.

As shown, impact pile driving used to install the SFWF monopile foundations is the most intense source of noise resulting from the Project and would produce the most significant and extensive noise effects on fish. Pile driving would produce noise above the 150 dB_{PEAK} behavioral effects threshold on over 200,000 cumulative acres. While HRG survey noise would exceed the behavioral effects threshold over a larger cumulative area (1,627,335 acres), the continuously moving HRG vessels would distribute those impacts over 621 linear miles of survey effort. The instantaneous behavioral effects exposure area around the

HRG equipment would be smaller, approximately 477 acres. Monopile installation is the only activity likely to produce injury-level noise effects on fish over large areas, ranging from 183 to 7,455 cumulative acres for the least and most sensitive species groups, respectively. O&M facility construction could also produce injury-level effects but over a much smaller area (less than 0.1 acre).

Noise impacts on fish are likely to vary by species depending on general sensitivity to sound and how noise impacts overlap with sensitive life stages. Noise impacts could be greater if they occur in important spawning habitat, occur during peak spawning periods, and/or result in reduced reproductive success in one or more spawning seasons, which could result in long-term effects to populations if one or more year classes suffer suppressed recruitment. For example, Atlantic cod, hake, and black sea bass belong to the hearing specialist group and rely on sound for communication and other important behaviors. Alteration of the ambient noise environment could interfere with this ability, leading to potentially significant effects. Stanley et al. (2020) determined that noise from activities like impact pile driving could interfere with black sea bass communication during spawning but concluded that they would likely return to normal spawning behavior once the impact ceased.

In contrast, Atlantic cod rely on communication to spawn effectively, using low-frequency grunts to locate potential mates and signal fertility (Rowe and Hutchings 2006). Cod also select specific spawning locations and are known to spawn on Cox Ledge, in the vicinity of the SFWF (Inspire Environmental 2019d). Alteration of the ambient noise environment could interfere with communication and alter behavior in ways that could disrupt localized cod spawning aggregations (Dean et al. 2012; Rowe and Hutchings 2006), raising concerns about noise impacts from the Proposed Action. Monopile installation is the most extensive noise impact and the most likely to cause this potential effect. Impact pile driving would only occur from May through December. BOEM has documented the presence of spawning Atlantic cod within and in proximity to the SFWF in mid-December (Inspire Environmental 2019), indicating that pile driving could occur when maturing and mature spawning cod are present in the vicinity.

While HRG survey and construction vessel noise could occur during winter and early spring, the instantaneous noise exposure areas from these moving noise sources are small. This suggests that that any impacts on cod spawning would be limited in extent and short term in duration. Other hearing specialist species may be exposed to construction noise, but the consequences of exposure will vary depending on multiple factors. For example, monkfish spawn between May and December but do so over broad areas and likely multiple times per year (Johnson et al. 2008). Red hake spawn during summer, and the SFWF and SFEC is located within a broader area identified as a hotspot for spawning and larval dispersal (Northeast Fisheries Science Center [NEFSC] 2020). However, unlike cod, this species spawns in the water column and does not associate with specific benthic habitats and therefore has less potential for direct noise exposure.

Hearing generalist species have a swim bladder that is not directly involved in hearing. Species in this group may also use sound to communicate (Ladich and Schultz-Mirbach 2016; Popper et al. 2014). Examples of hearing generalists that occur in the SFWF and SFEC include ocean pout, butterfish, scup, and tunas. While the presence of a swim bladder makes these species susceptible to sound-related injury, they are less vulnerable than the hearing specialists. Impact pile driving is the only source of construction noise likely to cause injury in this group, with an effect area limited to approximately 2,840 cumulative acres (see Table 3.4.2-5). Fish that lack a swim bladder are the least vulnerable to noise impacts. While they have hearing organs and are susceptible to hearing injury, the lack of a swim bladder makes them less vulnerable to internal injuries leading to death (Popper et al. 2014). Examples of species in this hearing group that occur in the SFWF and SFEC include flatfishes (e.g., summer, winter, and yellowtail flounder), skates (e.g., little, barndoor, and winter skate), and sharks (e.g., sand tiger, tiger, and sandbar shark). Monopile installation is the only activity likely to cause injury-level noise effects on this species group within a cumulative exposure area of approximately 183 acres (see Table 3.4.2-5).

Fish eggs and larvae are potentially susceptible to injury and mortality from intense underwater noise. While available evidence is limited, Popper et al. (2014) defined injury criteria for eggs and larvae that are used in this final EIS to evaluate potential effects on both fish and invertebrates (see Table 3.4.2-4). Impact pile driving is the only construction noise source likely to produce injury-level effects on eggs and larvae. These impacts could occur over approximately 2,830 cumulative acres from monopile installation, and 0.03 acre from O&M facility construction. However, the extent and consequences of exposure are likely to vary. The instantaneous injury exposure area is relatively small (164 acres). Stationary eggs and larvae within this area would likely experience higher than natural levels of mortality. In contrast, eggs and larvae that drift with the current would not remain in the exposure area for extended periods and the additional impacts would not likely be significant relative to natural mortality rates on the order of 1% to 10% per day (White et al. 2014).

In summary, Project construction is likely to result in temporary to short-term noise impacts sufficient to cause a range of effects on finfish. These effects range from behavioral responses and temporary hearing threshold shifts to direct injury and mortality. The significance of these effects are likely to vary by species, depending on the number of individuals exposed and the degree to which noise impacts might interfere with important biological functions like spawning. As stated, timing restrictions would minimize adverse impacts on Atlantic cod spawning and likely avoid broader population-level effects. On balance, construction noise impacts on finfish would likely range from minor to moderate.

<u>Crushing, burial, and entrainment</u>: Finfish within the construction footprint would be exposed to crushing and burial effects from seabed preparation, placement of monopiles, scour protection and concrete mattresses, cable installation, sea-to-shore transition construction, and vessel anchoring. The acres of construction-related bed disturbance are summarized by benthic habitat type in Table 3.4.2-3 in the Benthic Habitat section.

Finfish within these disturbance footprints would be directly exposed to disturbance. Juvenile and adult fish are mobile and would likely avoid being harmed or killed by construction equipment and materials placement. In contrast, certain fish species, such as cod, ocean pout, pollock, and winter flounder, have benthic eggs and/or larvae that would be vulnerable to these effects. The extent of exposure would vary by species and habitat association. For example, cod and ocean pout eggs are typically found in complex benthic habitat, meaning that they are more likely to be exposed to boulder relocation and placement of scour and cable protection. Winter flounder lay their eggs in soft-bottom benthic habitat, which translates to greater exposure to jet plow, O&M facility dredging, and sea-to-shore transition construction.

The jet plow would entrain and kill pelagic fish eggs and larvae that are near the intake during operation. Inspire Environmental (2019c) estimated that over a billion fish eggs could be exposed to entrainment impacts, with exposure varying by species. For example, entrainment would kill an estimated 23,000 Atlantic cod larvae, a negligible number of haddock and pollock larvae, and up to 2.8 million Atlantic mackerel larvae. Effects on species like cod and mackerel must be placed into context to evaluate their significance. The total volume of water entrained by the plow (approximately 20 million cubic meters) represents a miniscule fraction of the billions of cubic meters of near-surface habitat on the mid-Atlantic OCS. A typical female cod lays over 1 million eggs (Alonso-Fernández et al. 2009), meaning that a spawning aggregation could produce hundreds of millions of eggs and larvae. The natural mortality rate for cod eggs and larvae is 10% to 20% and 6% each day (Mountain et al. 2008). The loss of 23,000 larvae would be negligible relative to natural conditions. Mackerel are abundant, and each female can produce between 300,000 and 2 million planktonic eggs (Morse 1980). The loss of 2.8 million eggs and larvae would be insignificant relative to the billions spawned in the region each year. On balance, entrainment of eggs and larvae would constitute a temporary and minor effect on finfish.

Suspended Sediment: The Project would result in temporary, elevated levels of suspended sediment near major bed-disturbing activities like cable installation. Anticipated water column sediment concentrations and burial depths resulting from this impact mechanism are described in the previous section (Invertebrates). TSS concentrations of the magnitude and duration anticipated are below levels associated with measurable adverse effects on finfish (Wilber and Clarke 2001; Yang et al. 2017) and would therefore be negligible. Juvenile and adult finfish associated with benthic habitats are unlikely to be significantly affected by sediment deposition at the burial depths anticipated, but benthic eggs and larvae of some species could be harmed (Kjelland et al. 2015; Michel et al. 2013; Wilber and Clarke 2001). While sensitivity varies widely, the eggs and larvae of some species can be killed by as little as 0.4 inch (10 mm) of sediment deposition. The eggs of certain species, like winter flounder, are particularly sensitive and can be killed by burial depths less than 0.1 inch (3 mm) (Michel et al. 2013). Given the temporary nature of the impact and limited extent of significant burial effects relative to the amount of habitat available, burial effects on benthic eggs and larvae would be minor.

Potential discharges, spills, and trash: Potential impacts from potential discharges, spills, and trash are the same as those discussed above in the Invertebrates section. In summary, BOEM and the USCG prohibit the discharge of trash and debris, and the Project EPMs (see Table G-1 in Appendix G) include specific measures for avoiding and minimizing accidental spills and discharges of hazardous substances. Therefore, there would be negligible Project-related adverse effects on fish from potential discharges, spills, and trash.

Light: Artificial lighting during construction at the SFWF and O&M facility would be associated with navigational and deck lighting on vessels from dusk to dawn. Lighting would be hooded and directed downward to avoid unnecessary illumination of the surrounding environment to the extent practicable. Reaction of finfish to this artificial light is highly species-dependent and could include attraction and/or avoidance of the area. Artificial lighting could disrupt the migration patterns of fish, increase risk of predation and disrupt predator prey interactions, and alter species richness and community composition in the affected area (Nightingale et al. 2006; Orr et al. 2013). However, these types of effects are most associated with bright permanent lights on nearshore and overwater structures. As stated in the previous section (Invertebrates), construction vessels would comply with BOEM guidance to eliminate or reduce measurable lighting effects on the aquatic environment. Construction lighting effects on finfish would be minimal, temporary, and therefore negligible.

Operations and Maintenance and Conceptual Decommissioning

Benthic Habitat

Project O&M would have continuing effects on benthic habitat conditions throughout the life of the Project. Most notably, the long-term presence of the structures would alter the character of the benthic habitat environment, converting existing soft-bottom benthic habitat into hard surfaces in the form of steel piles, rock scour protection, and concrete mattresses. These structures would become colonized by benthic organisms over time, leading to additional effects on benthic habitat conditions. Power transmission would generate EMF and substrate heating effects in proximity to the cables. These impact mechanisms and effects on benthic habitat are discussed further below.

Certain Project maintenance activities may also impact benthic habitat. For example, placement of additional scour protection may be required if erosion is observed around the monopile foundations. The inter-array cable and SFEC are not expected to require maintenance, but activities like reburial or placement of additional cable protection may be required if segments of cable become exposed by seabed movement. These maintenance activities would have similar adverse effects on benthic habitat to those described above for construction, but they would be periodic, limited in scale, and dispersed over a wide area. The berthing area at the Montauk O&M facility would be dredged annually to maintain desired depths, and dredged material would be used for beach nourishment. The annual dredging impacts are expected to be virtually the same as those described for Project construction, although the duration of dredging and volume of material removed each year would be smaller. This affected site is currently used for commercial fishing vessel moorage and is regularly dredged for maintenance purposes. Once desired depths have been achieved, future maintenance dredging of the O&M facility would not significantly change the area and frequency of maintenance dredging activities in Lake Montauk harbor relative to baseline conditions.

SFW monitoring measures, described in Section 2.1.1.7, would not measurably impact benthic resources because of the small intensity and scope of the surveys associated with the monitoring measures relative to impacts to benthic habitat from ongoing activities.

Long-term habitat conversion: Within the area directly affected through habitat conversion, the Proposed Action would alter existing benthic habitat, converting soft-bottom substrate to hard surfaces and vice versa. Benthic habitat impact acreage is summarized in Table 3.4.2-3. In general terms, SFWF and SFEC construction would permanently displace some benthic habitat within the monopile footprints, would alter the character of existing hard-bottom habitat exposed to reef effects, and would convert some soft-bottom benthic habitat to new hard surfaces in the form of scour protection and concrete mattresses. In total, an estimated 690 to 754 acres of benthic habitat within the area of direct effects would be exposed to long-term habitat conversion effects from monopile and inter-array cable and SFEC installation, and the subsequent placement of scour and cable protection within this footprint. Approximately, 0.4 acre of benthic habitat would be displaced by monopile foundations. Seabed preparation for monopile installation would modify approximately 14.8 acres of benthic habitat, and the subsequent placement of rock scour protection around the monopiles would permanently modify 14.0 acres within this footprint. Approximately 318 to 382 acres of benthic habitat would be modified by seabed preparation (boulder relocation) for inter-array cable construction, and 17.7 acres within this footprint would subsequently be modified by placement of cable protection. Seabed preparation for SFEC construction and pre-construction installation trials would modify approximately 357 acres of benthic habitat, and 8.2 to 8.9 acres of benthic habitat within this footprint would be modified by the subsequent placement of SFEC cable protection. The values presented as ranges represent the best current estimate of impacts and that estimate plus a 20% contingency based on the currently known Project configuration.

The distribution of habitat conversion impacts by benthic habitat type cannot be predicted with certainty, as pre-construction micrositing will affect where Project features are ultimately located. However, the habitat conversion impacts described above would occur within areas having the habitat composition shown in Table 3.4.2-3. In general, long-term impacts from boulder relocation are expected to occur in areas where boulders are most prevalent. However, boulder relocation may move boulders into soft-bottom (non-complex) habitat, changing its character. Cable protection would most likely be required in areas where hard substrates, such as boulder fields, prevent cable burial. This means that cable protection impacts are more likely to occur in complex benthic habitat, and those acres of impacts would overlap habitats previously impacted by boulder relocation. The values presented in this EIS likely overestimate the total acres of impacts that would occur, as micrositing of the foundations and cable routes would emphasize relocating Project features into soft-bottom benthic habitat where practicable. This would reduce the extent of long-term impacts. For example, adjusting cable routes to avoid complex benthic habitat may mean that less cable protection is ultimately required. Therefore, fewer acres of long-term habitat impacts would occur.

The introduction of 16 monopile foundations would alter pelagic habitats by introducing vertical hard surfaces into the water column. Over time the monopiles, the surrounding scour protection, and cable protection mattresses would become colonized by sessile invertebrates, such as mussels, tunicates, anemones, and sponges, creating complex habitat. Complex benthic habitat damaged during construction would also recover over time as benthic communities recover. Hutchison et al. (2020a) observed that turbine foundations at the BIWF developed dense colonies of mussels, extending from the surface to the scour protection on the seabed, within 3 years of construction. Other epifaunal species, such as hydroids, algae, and corals, had also started colonizing the structures. Shell hash and detritus falling from the foundations enriched the surrounding sediments, increasing biological productivity. Similar artificial reef effects have been observed at other offshore wind facilities (Causon and Gill 2018; Degraer et al. 2020; Langhamer 2012; Taormina et al. 2018). While benthic organisms colonized the BIWF relatively quickly, it could take a decade or more before damaged and newly introduced hard surfaces achieve full habitat function (Auster and Langton 1999; Collie et al. 2005; Lukens and Selberg; 2004; Tamsett et al. 2010). Offshore wind structures could in theory provide a foothold for harmful non-native species invasions. Non-native species have been observed at the BIWF and other wind farms (Hutchison et al. 2020a; Degraer et al. 2020), but negative impacts on native biological communities have yet to be demonstrated (Degraer et al. 2020).

The Proposed Action would permanently alter benthic habitats within the geographic analysis area, generating an array of effects on benthic habitat function. Soft-bottom habitats would be permanently displaced, while effects on complex and potentially complex benthic habitats would range from short term to long term or permanent. For example, some benthic species could take a decade or more to recover from damage and/or colonize new surfaces like concrete mattresses. Concrete mattresses used at the BIWF did not exhibit growth on the surface after 3 years but were observed to provide refuge space (HDR 2020). This would constitute a long-term reduction in benthic habitat function. In contrast, biologically productive reef effects like those observed at the BIWF would likely develop within 3 to 4 years after construction, continuing to mature over the life of the Project. These effects could be minor to moderate adverse and moderate beneficial, depending on how benthic habitat change influences the broader biological community.

<u>EMF and heat effects</u>: The inter-array cable and SFEC would generate EMF and substrate heating effects, altering the environment for organisms associated with those habitats. The cables would be contained in grounded metallic shielding to minimize electrical field effects and buried to target depths of 4 to 6 feet in soft-bottom benthic habitat (1.2 to 1.8 meters). Cable segments that cross unavoidable hard substrates will not be buried and will be laid on the bed surface covered with a concrete mattress for protection. EMF effects in these areas would be greater than for buried cable segments. EMF levels diminish rapidly with distance and would become indistinguishable from baseline conditions within about 26 feet (8 meters) of both buried and exposed cable segments (Exponent Engineering 2018). Hughes et al. (2015) and Emeana et al. (2016) evaluated the thermal effects of buried and exposed electrical transmission cables on the surrounding environment. They determined that heat from exposed cable segments would dissipate rapidly without measurably heating the underlying sediments. In contrast, the typical HVAC cable buried in sand and mixed sand and mud (i.e., soft-bottom benthic habitat) can heat sediments within 1.3 to 2 feet (0.4 to 0.6 meter) of the cable surface by +10 to 20 degrees Celsius (°C). EMF and substrate heating effects are summarized in Table 3.4.2-6.

Table 3.4.2-6. Behavioral, TTS, and Lethal Injury Thresholds for Invertebrates and Finfish by Source

Component	Installation	Total Cable Length (linear miles)	Magnetic Field		Electrical Field		Substrate Heating
			At Seabed	1 m above Seabed	At Seabed	1 m above Seabed	
Inter-array cable	Buried to target depth	15.6	21 mG	9 mG	1.4 mV/m	0.9 mV/m	+10 to +20°C within 0.4 to 0.6 m of cable
	On bed surface	5.8	65.1 Mg	27.9 mG	4.3 mV/m	2.8 mV/m	Negligible
SFEC	Buried to target depth	58.6	30 mG	21 mG	2.1 mV/m	1.4 mV/m	+10 to +20°C within 0.4 to 0.6 m of cable
	On bed surface	3.2	76.6 mG	53.6 mG	5.4 mV/m	3.6 mV/m	Negligible

The significance of EMF and cable heating on benthic habitat are best characterized in terms of how they might affect benthic invertebrates. These effects are evaluated in the following sections.

Conceptual decommissioning of the SFWF and SFEC components would follow the same relative sequence and time frame as construction but in reverse. The SFEC and inter-array cable would be removed from the seabed to recover valuable metals. Cable segments that cannot be removed successfully would be cut, capped, and buried. Rock and concrete blanket scour and cable protection would be removed and disposed of. The WTGs and OSS would be disassembled, and the foundation piles would be cut below the seabed using a cable saw. These conceptual decommissioning activities would produce short-term bed disturbance and suspended sediment effects similar to those described above for Project construction. The associated adverse effects on benthic habitat would be minor.

Conceptual decommissioning would reverse the artificial reef effect, converting approximately 50.2 acres (2.8% of the SFWF and SFEC footprints) from hard-bottom habitat back to soft-bottom habitat. Conceptual decommissioning effects on benthic habitat would be similar to those described above for construction, with damage to benthic organisms taking between 18 to 24 months to a decade or more to recover in soft-bottom and complex benthic habitats, respectively. Leftover shell hash and detritus from the reef effect would remain on the seabed after conceptual decommissioning. This would alter the character of the underlying sediments. Although this represents a long-term change from pre-Project conditions, localized alteration of sediment characteristics is unlikely to measurably change the ability of benthic habitat to support the biological community structure, which is relatively uniform across the diversity of substrate types that occur in the Lease Area (Guida et al. 2017). Therefore, the post–conceptual decommissioning adverse effects of the Project on benthic habitat would be negligible.

Essential Fish Habitat

BOEM (2021a) has developed a detailed assessment of the potential effects on EFH resulting from the O&M of the Proposed Action. EFH species include several species of demersal and pelagic finfish, benthic invertebrates (specifically Atlantic sea scallop, Atlantic surfclam, and ocean quahog), and pelagic invertebrates (specifically longfin and shortfin squid). Impact mechanisms affecting EFH for these different species groups from Project O&M include the following:

- Long-term habitat alteration
- Operational noise effects
- EMF and substrate heating effects
- Hydrodynamic effects

A detailed discussion of operational effects on each EFH species and their designated habitats is beyond the scope of this final EIS. The reader interested in this level of analysis is directed to the EFH assessment (BOEM 2021a). The following sections describe these impact mechanisms in detail and provide examples of their potential effects on representative invertebrate and finfish EFH species and their habitats.

Designated HAPC for summer flounder could occur within the SFWF and SFEC. HAPC for this species includes all native species of macroalgae as well as loose aggregations of algae and SAV wherever they are found within designated EFH (MAFMC et al. 1998). Project O&M could affect HAPC for this species by providing new hard substrates that may become colonized by algae. Should such habitats develop, they would become a component of HAPC by definition. This could in theory produce a beneficial effect on summer flounder HAPC lasting for the life of the Project. These habitat-forming surfaces would be removed during conceptual decommissioning, negatively affecting HAPC. These opposing effects would be long term in duration and moderate in significance.

Invertebrates

Long-term habitat alteration: The new hard structures created by SFWF monopiles, scour protection around the monopile foundations, and cable protection would displace existing habitat for invertebrates that use soft-bottom benthic habitat and create new habitats for invertebrates that colonize hard surfaces. As stated previously, approximately 0.12 acre of soft-bottom benthic habitat would be displaced by monopile foundations, 5.4 acres would be displaced by scour protection around the foundations, and 231.5 acres would be displaced concrete mattresses protecting exposed segments of the inter-array cable and SFEC. Those habitats would no longer be available to invertebrate infauna like tube worms and copepods and bivalves, including three EFH species (Atlantic surfclam, Atlantic sea scallop, and ocean quahog). Longfin squid, another invertebrate EFH species, also associate with soft-bottom benthic habitat.

Habitat for invertebrates that colonize hard surfaces or associate with complex benthic habitat would increase. Epibenthic organisms (e.g., mussels and anemones) and crustaceans that prefer hard-bottom habitat (e.g., American lobster and crab) would gain habitat, but as stated in the previous section (Benthic Habitat), it may take a decade or more for damaged or new habitats to fully recover habitat function. Degraer et al. (2020) have documented the development of diverse invertebrate communities on offshore wind structures. A diverse and biologically productive invertebrate community developed on turbine foundations at the nearby BIWF within 3 years after construction (Hutchison et al. 2020a). The structures were initially colonized by dense aggregations of mussels and barnacles, followed by corals, hydroids, anemones, and predatory invertebrates like crabs, sea stars, and snails. An invasive tunicate, already widespread and common in the region, is also present. As the reef effect matures over time, the diversity and biological productivity of the invertebrate community is expected to increase (Causon and Gill 2018). The resulting effects on invertebrates could be positive, negative, or neutral depending on a variety of factors. For example, the displacement of soft-bottom benthic habitat would constitute a limited but long-term moderate impact on invertebrates that use this habitat type. Some of these negative effects could be offset by organic enrichment and increased biological productivity in soft-bottom habitats at the edge of the reef effect zone (e.g., Hutchison et al. 2020a). Other invertebrate species, like those observed at the BIWF would gain new habitat and create opportunities for invertebrate species that would otherwise not be present in the offshore environment. Also, at the BIWF, concrete mattresses used to protect cable did not show any growth of invertebrate communities after 3 years (HDR 2020). To summarize, long-term habitat modification would create winners and losers, with some invertebrate species losing a small amount of habitat while others would gain. Negative population effects are unlikely to occur, as invertebrate species that lose habitat would still have abundant habitat available. On balance, the effects of habitat modification on invertebrates are likely to be beneficial, long term in duration, and moderate in significance for some species. However, the loss of some habitat from concrete mattresses would be an adverse minor to moderate long-term impact depending on the amount of cable protection used.

Invertebrates within the Montauk O&M facility footprint would be negatively affected by annual maintenance dredging of the 0.034-acre berthing area. As stated above under Benthic Habitat, this active commercial moorage is routinely dredged to maintain navigation, and the soft-bottom benthic habitats are subject to regular disturbance. Maintenance dredging would continue under the Proposed Action after the berthing area is dredged from the current depth of -5 feet to the desired depth of -12 feet MLLW. The O&M of the Proposed Action would therefore maintain current levels of disturbance and would not significantly alter baseline conditions for invertebrates. Therefore, the effects of O&M facility maintenance on invertebrates would be minor.

Operational noise: The SFWF would employ current generation direct-drive WTG designs that produce less underwater noise and vibration than older generation WTGs with gearboxes. Much of our current understanding about operational noise is based on the monitoring of wind farms in Europe that use these older generation designs. Although useful for generally characterizing potential noise effects, these data are necessarily representative of the noise produced by current generation designs (Elliot et al. 2019; Tougaard et al. 2020). Typical noise levels produced by older generation geared WTGs range from 110 to 130 dB_{RMS} with 1/3-octave bands in the 12.5- to 500-Hz range, sometimes louder under extreme operating conditions (Betke et al. 2004; Jansen and de Jong 2016; Madsen et al. 2006; Marmo et al. 2013; Nedwell and Howell 2004; Tougaard et al. 2009, 2020).

Elliot et al. (2019) summarized findings of operational noise monitoring from the BIWF. The BIWF employs five 6-MW direct-drive WTGs. Operational noise from the direct-drive WTGs at the BIWF were generally lower than older, lower capacity WTGs at European wind farms. Operational noise levels typically ranged from 110 to 125 dB_{RMS}, occasionally reaching as high as 128 dB_{RMS}, mostly at low frequencies ranging from 10 Hz to 8 kHz. Particle acceleration effects on the order of 10 to 30 dB re 1 $\mu m/s^2$ at a reference distance of 50 meters. These values are considered usefully representative of the underwater noise effects likely to result from SFWF operations.

Invertebrates lack specialized hearing organs and cannot sense sound pressure in the same way as fish and other vertebrates. Invertebrates can sense sound as particle motion, but particle motion effects dissipate rapidly and are usually undetectable within a few feet of the source. Certain species, specifically squid, may be more sensitive to sound than invertebrates as a group. However, the sound pressure and particle motion effects observed at the BIWF are well below levels associated with injury and behavioral responses in invertebrates and unlikely to cause measurable effects on these species. Moreover, the rapid development of benthic invertebrate communities on operational wind farms worldwide indicates that operational noise effects on invertebrates would be negligible.

EMF and substrate heating effects: The operation of the inter-array cable and SFEC would generate EMF and substrate heating effects that could affect benthic and pelagic invertebrates. These effects are summarized in Table 3.4.2-6.

The evidence for EMF effects on invertebrates is equivocal, varying considerably between species and based on the type and strength of EMF effects (Albert et al. 2020; Hutchison et al. 2020c). Several studies have observed no apparent behavioral responses in crustaceans and mollusks at EMF field strengths 10 to 100 times higher than the maximum levels likely to result from the Project. A handful of studies have observed apparent physiological effects on clams, mussels, and worms after a few hours of exposure to EMF levels well below those likely to result from the Project, while other studies have observed no apparent effects on the same types of organisms from much higher exposures over longer periods. These contradictory results are compounded by differences in study methods and the type of EMF exposure, making it difficult to draw any conclusions about the sensitivity of benthic infauna to EMF effects (Hutchison et al. 2020b). Given this uncertainty, the potential long-term effects on invertebrates that live in or directly on the seabed from Project-related EMFs could range from negligible to moderate.

While directed studies are lacking, there is little evidence that cephalopods like squid are sensitive to EMFs, even at exposure levels 10 times stronger than those likely to result from the Proposed Action (Love et al. 2015; Normandeau et al. 2011; Williamson 1995). This suggest that EMFs from the Project would have negligible effects on invertebrates like longfin and shortfin squid, both EFH species.

In addition to EMF effects, buried segments of the inter-array cable would generate sufficient heat to raise the temperature of the surrounding sediments by as much as 10 to 20°C above ambient temperatures within 1.3 to 2 feet (0.4 to 0.6 meter) of buried cable segments (see Benthic Habitat). Temperature changes of this magnitude could adversely affect Atlantic surfclam and ocean quahog (Acquafredda et al. 2019; Harding et al. 2008) as well as other benthic infauna species. However, the amount of suitable habitat exposed to these effects would be limited. Cable burial at 4 to 6 feet (1.2 to 1.8 meters) would limit substrate heating effects to depths 2 feet or more below the bed surface, below the depths inhabited by most invertebrate species. Cable segments at the transitions between fully buried and exposed cable segments would be buried at shallower depths, potentially exposing quahog and surfclam habitat and infaunal prey species to adverse thermal effects. However, these habitats would also be covered by concrete mattresses, meaning that the affected habitats would no longer be available to these species. On this basis, substrate heating would have a negligible effect on invertebrates.

Hydrodynamic effects: The presence of the SFWF monopile foundations and associated scour protection has the potential to affect hydrodynamic circulation at local scales. Vertical structures extending from the water surface will affect currents as they flow by the structures, creating turbulence. These turbulent wakes can extend from 200 to over 3,000 feet downcurrent, depending on site-specific conditions. That turbulence can increase mixing between bottom and surface layers, potentially affecting stratification, nutrient circulation, and larval dispersal (Carpenter et al. 2016; Floeter et al. 2017; Schultze et al. 2020). WTGs intercept wind energy that would otherwise contribute to mixing, with measurable effects extending 3 to 12 miles downwind from turbine arrays (van Berkel et al. 2020). While considerable uncertainty remains, these conclusions are most likely applicable to offshore wind facilities developed in environments with strong seasonal stratification (Miles et al. 2020; van Berkel et al. 2020).

Rhode Island Sound and the SFWF area are seasonally stratified, with warmer waters and higher salinity leading to strong stratification in the late summer and early fall. This stratification effect contributes to the formation of the Cold Pool, a band of cold, near-bottom water extending across much of the Middle Atlantic Bight from spring through fall (Lentz 2017). Mixing effects around pile foundations are masked in strongly stratified environments (Schultze et al. 2020; van Berkel et al. 2020), meaning that the same factors that form and maintain the Cold Pool are likely to limit the extent of measurable hydrodynamic effects. Localized mixing will still occur, however, bringing nutrients to the surface that can enhance phytoplankton growth and primary productivity at local scales (Floeter et al. 2017). The implications of these hydrodynamic effects for invertebrates are unclear. The limited research conducted to date has not been able to distinguish hydrodynamic effects on the fish and invertebrate community from natural variability (van Berkel et al. 2020). It is likely that filter-feeding invertebrate colonies that form on the monopile foundations would benefit from hydrodynamic effects that lead to localized increases in phytoplankton production (Slavik et al. 2019). This would in turn contribute to the reef effect described above, supporting the increased biological productivity of the invertebrate community that forms on and around the monopile foundations. Filter feeders would also eat the planktonic eggs and larvae of other fish and invertebrates, including EFH species. These impacts would be localized and unlikely to negatively affect the reproductive success of any invertebrate species.

For the purpose of this final EIS, measurable hydrodynamic effects would be expected occur within 600 to 1,300 feet downcurrent of each monopile. Given the relatively small number of monopile foundations at 1.1–linear mile spacing, the hydrodynamic effects of one monopile are not expected to influence the effects of another. Therefore, long-term hydrodynamic impacts would be localized to small areas within and downcurrent from the SFWF. The resulting effects on invertebrates would range from minor to moderate in significance, varying by species. The SFEC and O&M facility include no features that are likely to produce any measurable hydrodynamic impacts of significance for invertebrates.

Conceptual decommissioning: Project conceptual decommissioning would have similar effects on invertebrates to those described for the Proposed Action, but the extent and magnitude of these effects would differ.

The newly introduced surfaces are expected to develop a complex community of benthic invertebrates. The removal of these surfaces would injure or kill invertebrates attached to the surfaces or hiding in interstitial spaces and permanently alter benthic habitats within the conceptual decommissioning footprint. Mobile invertebrates living in association with these habitats may or may not survive, depending on their ability to reach other suitable habitats. As with Project construction, invertebrates associated with soft-bottom benthic habitats may recover relatively quickly, within 18 to 24 months after conceptual decommissioning is complete. In contrast, invertebrates associated with complex benthic habitat within the conceptual decommissioning footprint may take a decade or more to fully recover. That recovery could be inhibited if current trends in ocean habitat conditions resulting from climate change continue (Degraer et al. 2020). Collectively, Project conceptual decommissioning could have short- to long-term effects on invertebrates ranging in significance from minor to moderate.

Finfish

Long-term habitat alteration: The ongoing presence of monopiles, their foundations, and scour protection during Project O&M within the SFWF and SFEC would create an artificial reef effect.

The attractive effect of these artificial reefs on finfish is well documented (Degraer et al. 2020; Hutchison et al. 2020a; Kramer et al. 2015). In a meta-analysis of studies on wind farm reef effects, Methratta and Dardick (2019) observed an increase in the abundance of epibenthic and demersal fish species, while effects on pelagic species are less clear (Floeter et al. 2017; Methratta and Dardick 2019). Increased fish abundance around wind farm structures can also attract predators like seals (Russel et al. 2014).

Hutchison et al. (2020a) documented a significant increase in the abundance of black sea bass, an EFH species, around the BIWF. This species is known to associate with complex benthic habitat and artificial reef structures and is clearly benefiting from the habitat and foraging opportunities created by the artificial reef effect. Several other fish species have also been observed in abundance, including EFH species like Atlantic cod, scup, bluefish, monkfish, winter flounder, and dogfish. Atlantic striped bass and tautog, highly valued commercial and recreational fish species, have also been observed in abundance around the structures. Similar changes in fish community structure would likely occur at the SFWF as the reef effect matures. This indicates that while full recovery of complex benthic habitats damaged by Project construction could take a decade or more, those impacts could be offset over a shorter period of time by beneficial reef effects (see Benthic Habitat section).

The location of the Proposed Action on Cox Ledge, an area of complex benthic habitat used by a variety of highly valued fish species, has raised concerns about potential negative impacts on habitat function. The observations at the BIWF and other European wind farms (Hutchison et al. 2020a; Methratta and Dardick 2019) indicate that commercially valuable species like black sea bass, Atlantic cod, and pollock are likely to be attracted to the increased biological productivity these structures would create. While the available evidence to date suggests that the effects of long-term habitat alteration from wind farm development on finfish are generally beneficial at local and regional scales, considerable uncertainty remains about the potential for broader effects at population scales (Degraer et al. 2020). This could result in beneficial, neutral, or potentially negative effects. For example, increased feeding opportunities could translate to faster growth and increased reproductive success. Greater habitat productivity could also increase larval and juvenile survival within and around the affected habitats. Wind farms could also create "ecological traps" that compel fish to remain in habitats that are unfavorable for spawning and larval survival (Degraer et al. 2020). The latter could also have negative consequences if vulnerable populations of fish are concentrated together with their predators and/or increased fishing effort. Habitat use of European wind farms by cod and pollock has largely been seasonal (Reubens et al. 2014), indicating that negative effects on the migratory and spawning behavior is unlikely, at least for these species.

Beam trawling, placement of fixed gear and passive acoustic monitoring (PAM) mooring equipment, and the use of sediment profile and plan view imaging equipment may impact epibenthic and infauna associated with soft-bottom benthic habitat. This could in theory reduce the amount of prey available to marine fish, including Atlantic sturgeon. However, given the limited extent and duration of bottom-disturbing survey activities relative to the amount of habitat available on the mid-Atlantic OCS, these activities are unlikely to have a measurable effect on the feeding behavior and biological fitness of any individual fish. Vessel strikes or capture of individual fish in fisheries gear (from trawl and ventless trap and pot surveys) has the potential to result in injury and mortality, reduced fecundity, and delayed or aborted spawning migrations. However, the dispersed nature of Project monitoring vessel traffic and limited number of surveys reduces the potential for co-occurrence with individual fish. As such, risk of vessel strikes is assumed to be extremely low, and impacts, if any, would be insignificant (i.e., so minor that the effect could not be measured) (BOEM 2021c). Gillnet sampling poses a risk of injury or mortality to adult sturgeon, and a mortality event has already occurred during pre-construction gillnet sampling. A dead adult Atlantic sturgeon was recovered during a gillnet survey of the reference area to the west of the SFWF in May 2021. This evidence indicates that gillnet sampling is likely to result in adverse effects on Atlantic sturgeon.

In general, the potential effects of long-term habitat alteration on fish are likely to vary by species. The available evidence suggests that demersal fish species, including EFH species, are likely to benefit from increased habitat structure and biological productivity, while pelagic fishes may also benefit to a lesser extent. However, considerable uncertainty remains about the broader effects of this type of habitat alteration at population scales (Degraer et al. 2020). The Proposed Action is relatively small in scale compared to existing and planned wind farm developments, suggesting that broader population effects from this one facility are unlikely. These effects could become more significant when combined with those from other planned offshore energy developments in the future. On this basis, habitat alteration on finfish resulting from the Proposed Action are expected to be long term in duration and moderate in significance.

Operational noise: As discussed in the previous section for invertebrates, the SFWF would be expected to generate operational noise on the order of 110 to 125 dB_{RMS} within the 10-Hz to 8-kHz frequency range and particle acceleration effects on the order of 10 to 30 dB re 1 $\mu m/s^2$ at a reference distance of 50 meters. These noise effects are below injury and behavioral effects thresholds for all finfish species (see Table 3.4.2-4), indicating that potentially significant underwater noise effects from the SFWF on habitat suitability would be restricted to a small area around each monopile. For example, applying the practical spreading loss model (WSDOT 2020) to source noise level of 125 dB_{RMS} at 50 meters, noise levels exceeding the behavioral effects threshold for fish would be limited to within approximately 5 feet of the monopile surface. An individual fish belonging to the hearing specialist group would have to remain within a few inches of the pile surface for 24 hours to experience TTS. The same source would attenuate to an ambient noise levels of 90 to 95 dB_{RMS} within approximately 300 to 700 feet of each turbine.

Cod and other hearing specialist species are also potentially sensitive to particle motion effects. Elliot et al. (2019) compared observed particle motion effects at 164 feet (50 meters) from an operational BIWF turbine foundation to current research on particle motion sensitivity in fish. They concluded that particle motion effects could occasionally exceed the lower limit of observed behavioral responses in Atlantic cod and flatfish within these limits. However, the documented use of complex habitats created by the structures by cod, black sea bass, and other hearing specialist species at the BIWF and European wind farms (Hutchison et al. 2020a; Methratta and Dardick 2019) indicates that low-level operational noise effects are not causing avoidance responses. As stated previously (see Construction and Installation), Atlantic cod are sensitive to changes in the ambient noise environment during spawning (Dean et al. 2012; Rowe and Hutchings 2006). The low-frequency operational noise produced by WTGs overlaps the communication frequencies used by cod and other hearing specialist species like haddock (Stanley et al. 2017). This suggests that operational noise exceeding ambient levels could cause masking effects that reduce the effective communication range for these species and reduce reproductive success and future recruitment for species like cod and haddock.

The CTV used for Project maintenance would travel between the Montauk O&M facility and the SFWF approximately two times per week over the life of the Project. Noise levels generated by the CTV are expected to be on the order of 160 dB_{RMS} re 1 µPa/sec^2 at a reference distance of 1 meter, based on observed noise levels generated by working commercial vessels of similar size and class to the CTVs (Kipple and Gabriele 2003; Takahashi et al. 2019). 160 dB_{RMS} is below identified injury thresholds for all fish and invertebrate hearing groups, indicating that CTV noise is unlikely to cause injury-level effects on any fish species. This value does exceed the 158-dB threshold for TTS effects on hearing specialist fish species, but this threshold assumes 24 hours of continuous exposure. An individual fish is unlikely to remain close enough to the moving vessel hull long enough for any risk of injury to occur. The 160 dB_{RMS} source level may exceed the 150 dB_{PEAK} behavioral effects threshold in some cases, but those effects would be temporary in duration and limited in extent. The low-frequency noise produced by the vessel engine could also cause the same type of auditory masking effects as those described above for WTG operation. However, these effects must be considered against the baseline levels of vessel traffic. Thousands of commercial and recreational vessel trips pass through every year (see Section 3.5.6). Additionally, commercial and recreational fishing activity in and around the SFWF likely generates hundreds of vessel trips to and thousands of operational hours on an annual basis. In this context, O&M vessel use is not likely to significantly alter the ambient noise environment relative to the existing baseline.

Additionally, the relatively low-intensity, low-frequency sounds produced by Project survey vessels are unlikely to result in direct injury, hearing impairment, or other trauma to marine fish. Vessel noise may induce physiological stress responses or avoidance behaviors and could result in auditory masking of biologically significant sounds. However, due to the expected brief periods of exposure to vessel noise, BOEM anticipates that short-term exposure to vessel noise would not measurably alter the alter normal behavior patterns and would therefore be insignificant.

These findings indicate that measurable operational noise would result from the Proposed Action, producing effects detectable by finfish. Those effects are likely to vary in significance by species depending on hearing sensitivity. Effects on species that lack a swim bladder, like sharks, rays, and flatfish, and hearing generalist species like ocean pout, butterfish, scup, and tunas, are likely to be biologically insignificant and therefore minor. In contrast, operational noise could reduce the ability of hearing specialist species, like Atlantic cod, haddock, pollock, and hake, to communicate effectively within a few hundred feet of each turbine. The significance of these effects could range from minor to moderate depending on how each species uses the affected area during periods when communication is important.

<u>EMF and substrate heating effects</u>: The EMF and substrate heating effects anticipated to result from operation of the SFEC and inter-array cable are summarized above in the Benthic Habitat section (see Table 3.4.2-6). The EMF values displayed are the estimated maximum values that would occur at the seabed directly over to the cable. EMF strength would diminish rapidly with distance, becoming undetectable within approximately 30 feet of the cable path (Exponent Engineering 2018). These most intense EMF effects would occur immediately above exposed SFEC segments laid on the bed surface covered by an armoring blanket.

Hutchison et al. (2020b) reviewed available research on the sensitivity of various finfish species to EMF effects. They concluded that the available knowledge base on EMF effects on fish and invertebrates is insufficient to fully evaluate potential EMF effects from the widespread development of offshore renewable energy. Behavioral responses have been observed in some fish species exposed to EMFs, but clear relationships have yet to be established. Researchers studying EMF effects on fish have identified observable effects, but usually at test exposures ranging from tens to hundreds of times greater than the strongest exposures likely to result from the Project. The type of power source is also an important factor. HVAC produces a different type of field effect from HVDC that may not be as detectable by electrosensitive fish species.

BOEM has evaluated the potential sensitivity of commercially and recreationally important fish and invertebrate species to likely EMF levels generated by commercial wind farm transmission cables on the OCS (CSA Ocean Sciences Inc. and Exponent 2019). They determined that most fish species would not be measurably affected by transmission cable EMFs, and those species that are able to detect EMFs would not experience significant physiological or behavioral effects. Normandeau et al. (2011) concluded that the magnetite-based sensory organs of fish are expected unable to detect AC magnetic fields below 50 mG.

More recently, BOEM (2021a) compiled minimum EMF effect thresholds from available research for the EFH assessment. The minimum thresholds for observable physiological and behavioral effects are much higher than the minimum detection threshold suggested by Normandeau et al. (2011), on the order of 250 to over 1,000 mG. The BOEM (2021a) EMF effect thresholds used in the EFH assessment are summarized by species and life stage group in Table 3.4.2-7 and are applied here to evaluate potential EMF effects on finfish.

Table 3.4.2-7. Magnetic and Induced Electrical Field Levels Used to Evaluate Potential EMF Effects on Finfish

Species and Life Stage Group	Type of Effect	Magnetic Field	Induced Electrical Field (mV/m)	Source
Fish eggs and larvae	Survival and development	> 1,000 mG	> 500 mV/m	Brouard et al. 1996 Cameron et al. 1985
Finfish	Physiological and behavioral	> 950 mG	20 mV/m	Armstrong et al. 2015 Basov 1999 Bevelhimer et al. 2013 Orpwood et al. 2015
Sharks and skates	Behavioral	250–1,000 mG	< 2–5 mV/m*	Bedore and Kajiura 2013 Hutchison et al. 2020c Kempster et al. 2013

* This threshold only applies to induced electrical fields at frequencies below 20 Hz; the 60 Hz induced electrical field from the HVAC inter-array cable and SFEC would likely not be detectable by sharks, skates, and rays (Bedore and Kajiura 2013).

As shown, the minimum EMF thresholds associated with observable behavioral and/or physiological effects on finfish and fish eggs and larvae are at least an order of magnitude greater than the strongest magnetic and induced electrical field effects likely to result from the Proposed Action, at 76.6 mG and 5.4 millivolts per meter (mV/m), respectively. Potential magnetic field effects are also well below levels associated with behavioral responses in sharks and skates. Sharks, skates, and other electrosensitive species like sturgeon can detect very weak bioelectrical fields generated by their prey, even at field strengths below 2 mV/m. For example, Atlantic sturgeon have specialized electrosensory organs capable of detecting bioelectrical fields on the order of 0.5 mV/m (Normandeau et al. 2011). However, bioelectric fields typically operate at very low frequencies, on the order of 1 Hz or less. Electrosensitive fish like sharks are generally unable to detect electrical fields at frequencies greater than 20 Hz (Bedore and Kajiura 2013). This suggests that the 60 Hz electrical fields generated by the Proposed Action would not be detectable by electrosensitive species, even at the highest anticipated field strength of 5.4 mV/m.

Substrate heating impacts generated by the inter-array cable and SFEC are not likely to significantly affect finfish for the same reasons described in the previous section (Invertebrates). Heating effects from buried cable segments would not reach the bed surface and would not be detectable to fish. Substrate heating effects could reach the bed surface at transition points between buried and exposed cable segments. However, these transition areas and exposed cable segments would be covered by porous concrete mattresses limiting fish access. Small fishes using the interstitial spaces within the mattresses may be able to detect some cable heating effects, but only within the transition zones described.

Collectively, these findings indicate that long-term EMF effects on finfish would likely be below detectable levels and therefore negligible. Some substrate heating effects may be detectable to finfish, but only to certain fish using habitats in the transition zones between buried and exposed cable segments. These long-term effects would therefore be minor.

<u>Hydrodynamic effects</u>: Long-term hydrodynamic effects expected to result from the Proposed Action are similar to those described for invertebrates in the previous section. As discussed, the SFWF would be expected to produce measurable hydrodynamic effects would be expected occur within 600 to 1,300 feet downcurrent of each monopile. The limited research conducted to date has not been able to distinguish any hydrodynamic effects on fish populations from natural variability (van Berkel et al. 2020). While additional monitoring and research is needed, the likelihood of broader regional effects on fish and fish populations from the SFWF is minimal. This conclusion is based on the location of the Project in a location dominated by strong seasonal stratification (van Berkel et al. 2020), the relatively small number of monopile foundations, and the likelihood that any hydrodynamic effects would be localized around each foundation and not additive across the entire array (see Invertebrates). Therefore, long-term hydrodynamic impacts on finfish would likely be localized to small areas within and downcurrent from the SFWF. Effects on finfish are likely to vary by species, ranging from minor to moderate in significance.

The SFEC and O&M facility include no features that are likely to produce any measurable hydrodynamic impacts of significance for finfish.

Conceptual decommissioning: Conceptual decommissioning of the SFWF and SFEC would lead to impacts similar to those generated during construction, with the exception that there would be no pile-driving impacts. After the WTGs and OSS are removed, the monopile foundations would be cut below the bed surface using a cable saw. Pangerc et al. (2016) found that underwater noise levels produced by this type of equipment are difficult to distinguish from the associated construction vessel noise and are below levels that would cause injury or behavioral effects on fish or invertebrates. The impacts of short-term bed disturbance and water quality effects on fish would be similar to those caused by construction: negligible to minor.

Degraer et al. (2020) commented that the future decommissioning of offshore wind facilities could become controversial if they are shown to support high-value fish and invertebrate species. While this potential is acknowledged, this final EIS considers conceptual decommissioning as a component of the Proposed Action as required by BOEM for COP approval.

The removal of the monopile foundations and scour and cable protection would reverse the artificial reef effect provided by these structures. Portions of the Project footprint, primarily along the SFEC corridor, would return to near pre-Project conditions, as influenced by ongoing environmental trends. Soft-bottom benthic habitats would likely recover to full habitat function within 18 to 24 months of disturbance, while complex benthic habitats could take a decade or longer. Individual fish species (e.g., small fish sheltering in epibenthic structure on the monopiles) may be injured or killed during removal. The fish community that formed around the reef effect would be dispersed, and individuals that are unable to locate new suitable habitats may not survive. While the significance of these future effects for individual finfish species is difficult to predict, measurable long-term impacts on some species are almost certain to occur.

Impacts of this duration and magnitude would constitute a moderate effect on finfish. Any population-level impacts would constitute a major effect.

Potential impacts associated with regulated fishing are addressed in Section 3.5.1.2.2 (No Action Alternative).

Cumulative Impacts

Accidental releases and discharges: The Proposed Action could result in accidental releases of contaminants, trash/debris, or invasive species that could add to releases from other reasonably foreseeable projects. BOEM estimates that the Project would result in a negligible up to a 2% incremental increase in total chemical usage over the No Action alternative across all projects in the Atlantic OCS. When combined with other offshore wind projects, up to approximately 2.3 million gallons of coolants and 10.5 million gallons of oils and lubricants could cumulatively be stored within WTG foundations and the OSS within the EFH, finfish, and invertebrate geographic analysis area as well as up to 27,000 gallons of coolants and 300,000 gallons of oils and lubricants within the benthic geographic analysis area. However, all future offshore energy development projects would comply with BOEM and USCG regulations that prohibit dumping of trash and debris and require measures to avoid and minimize accidental spills. Project proponents would also be required to comply with other state and federal regulations to avoid the unintentional introduction of non-native species. The Proposed Action includes regular inspections of the SFWF to identify and remove derelict fishing gear and other trash and debris. Other future projects are expected to include similar measures in their O&M plans, creating an effective mechanism for identifying and removing derelict fishing gear and other dangerous marine debris from the environment. Collectively, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in negligible to minor beneficial cumulative effects on benthic habitats, EFH, invertebrates, and finfish from this impact mechanism.

Anchoring and new cable emplacement/maintenance: The Proposed Action would result in localized, minor to moderate incremental impacts to benthic habitats, finfish, invertebrates, and EFH through an estimated 821 acres of anchoring and mooring-related disturbance and 913 acres of cabling-related seabed disturbance. BOEM estimates a cumulative total of 2,448 acres of anchoring and mooring-related disturbance and 11,044 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the EFH, finfish, and invertebrate geographic analysis area. BOEM likewise estimates a cumulative total of 875 acres of anchoring and mooring-related disturbance and 2,615 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the benthic geographic analysis area. The duration and significance of these effects would vary depending on the types of habitats impacted. Impacts on soft-bottom benthic habitats and associated fish and invertebrate species would be expected to fully recover within 18 to 24 months, whereas impacts on complex benthic habitats could take a decade or more to fully recover.

Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in minor to moderate impacts to benthic habitats, EFH, invertebrates, and finfish.

EMF: The Proposed Action is not expected to produce significant EMF effects, as discussed in Section 3.4.2.2.3 (Proposed Action Alternative). BOEM anticipates that future offshore wind energy projects in the geographic analysis area would use HVAC transmission and apply similar design measures to avoid and minimize EMF effects on the environment. While uncertainties remain, future actions that produce EMF effects on the order of those generated by the Proposed Action are unlikely to have significant cumulative effects on benthic habitats, finfish, invertebrates, and EFH. Moreover, additive effects from multiple cables are likely to be limited to specific areas where cable routes cross. The standard design practice for subsea transmission cables is to maintain a minimum separation distance of 330 feet from existing transmission and communication cables, except where crossings are necessary. Therefore, cumulative EMF impacts resulting from the Proposed Action in combination with past, present, and reasonably foreseeable activities would largely be negligible, although minor effects could occur in limited areas.

Light: The Proposed Action would result in negligible incremental impacts to benthic habitats, finfish, invertebrates, and EFH through the installation of 16 lighted structures (15 WTGs and one OSS). This represents less than a 1% increase to conditions under the No Action alternative. BOEM estimates a cumulative total of 2,563 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the EFH, finfish, and invertebrate geographic analysis area, as well as up to 283 foundations within the benthic geographic analysis area. However, Project EPMs (see Table G-1 in Appendix G) include construction vessel light shielding and operational restrictions to limit light use to required periods and minimize artificial lighting effects on the environment. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be similar to those impacts described under the No Action alternative and would be negligible, mostly attributable to existing, ongoing activities.

Noise: The Proposed Action would result in localized, temporary, negligible to moderate incremental impacts to benthic habitats, finfish, invertebrates, and EFH through the generation of underwater noise. The Proposed Action would produce injury or behavioral-level noise effects on fish extending up to 84,233 feet from impact pile-driving activities. These effects could be additive to areas ensonified by other temporally or spatially overlapping future activities. BOEM estimates that underwater noise from the construction of up to 16 other offshore wind facilities would result in short-term injury or behavioral effects on finfish over a cumulative area of up to 7,000 square miles. Vessel noise may cause startle and avoidance responses in fish but would not cause injury. Invertebrate species are only sensitive to sound within the immediate vicinity of the source regardless of intensity. Exposed invertebrates would be killed by seabed disturbance from related construction activities, such as trenching and armor placement, so short-term underwater noise effects on these individuals would not occur. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be negligible to moderate.

Port utilization: Although dredging or in-water work for the Port of Montauk could be required for the Proposed Action, these actions would occur within heavily modified habitats. BOEM expect impacts to benthic habitats, finfish, invertebrates, and EFH due to the incremental increase in port expansion resulting from the Proposed Action to be negligible. Therefore, the incremental impact from the Proposed Action would be negligible, and the overall cumulative impact on the geographic analysis area for benthic habitats combined with past, present, and reasonably foreseeable future activities would be similar to the impacts under the No Action alternative and would also be negligible.

Presence of structures: The Proposed Action would result in long-term alteration of water column and seabed habitats, resulting in a diversity of effects on benthic habitat, finfish, invertebrates, and EFH. The 16 monopile foundations and other hard surfaces installed as part of the Proposed Action would create an artificial reef effect. The new offshore structures would also cause localized hydrodynamic effects that would influence primary and secondary productivity within and around this artificial reef. The reef effect would alter biological community structure, producing an array of effects on benthic habitat, finfish, and invertebrates, including several EFH species. Those effects could be positive or negative, varying by species, and would likely range from minor to moderate in significance.

The Proposed Action is limited in scale compared to some of the offshore renewable energy projects planned in the geographic analysis area. BOEM estimates the Proposed Action and other planned future projects will result in the development of 2,563 WTG and OSS foundations in the EFH, finfish, and invertebrate geographic analysis area as well as up to 283 foundations within the benthic geographic analysis area. Most of these projects are larger in scale than the Proposed Action, and many projects could be developed in adjacent lease areas. Depending on how they are located and distributed, the development of multiple large-scale projects could have broader scale cumulative effects on biological communities than the Proposed Action considered in isolation (Degraer et al. 2020; van Berkel et al. 2020). More research is needed to determine the likelihood and potential significance of broader cumulative effects on finfish, invertebrates, and EFH.

Sediment deposition and burial and seabed profile alterations: The Proposed Action would result in localized, temporary, and minor incremental impacts to benthic habitats, finfish, invertebrates, and EFH through an estimated 913 acres of seabed disturbance in the geographic analysis area. These actions would increase suspended sediment and potentially disturb, displace, or injure benthic habitat, finfish, and invertebrates. BOEM estimates a cumulative total of 11,044 acres of cabling-related disturbance for the Proposed Action plus all other future offshore wind projects within the EFH, finfish, and invertebrate geographic analysis area and 2,615 acres of cabling-related disturbance within the benthic geographic analysis area. While the suspended sediment effects from this seabed disturbance are not known, they are expected to be similar in magnitude and extent to those described for the Proposed Action. More extensive suspended sediment and deposition effects could occur in areas where mud and silts are more prevalent in bed sediments. Some projects may also include dredging for O&M facility development or related port improvements. Dredging may result in additional suspended sediment and deposition effects similar in nature to those described for O&M facility construction. When combined with other past, present, and reasonably foreseeable actions, the Proposed Action would result in moderate impacts.

Climate change: The types of impacts from global climate change described for the No Action alternative would occur under the Proposed Action, but the Proposed Action could also contribute to a long-term net decrease in greenhouse gas (GHG) emissions. This difference may not be measurable but would be expected to help reduce climate change impacts, resulting in minor to moderate incremental impacts. When combined with other past, present, and reasonably foreseeable actions, the Proposed Action would result in moderate impacts.

Other considerations: The Proposed Action could affect the endangered Atlantic sturgeon, consistent with the analysis in BOEM's BA for the Proposed Action (BOEM 2020a). Although individuals from the five DPSs of ESA-listed Atlantic sturgeon could be affected by the Proposed Action, no Atlantic sturgeon would be injured or killed. Individuals from these DPSs could be exposed to any of the effects described above on benthic habitats, finfish, and invertebrates that are pertinent to demersal fish species. The most significant impact for individual sturgeon would be underwater noise from pile driving; however, incremental Project effects to individual Atlantic sturgeon would be limited to temporary, minor behavioral effects and disturbance. For this reason, the Proposed Action impacts, when combined with past, present, and reasonably foreseeable future activities, would also be minor and not anticipated to result in adverse population-level consequences.

Adult and subadult endangered Atlantic sturgeon are expected to occur in the offshore waters of the geographic analysis area throughout the year but appear to be present in lower numbers in the summer (Dunton et al. 2015; Ingram et al. 2019; Savoy and Pacileo 2003; Stein et al. 2004). The threatened giant manta ray is expected to occur in the offshore waters south of the SFWF, within upwelling waters at the edge of the continental shelf break. The most prominent cumulative impacts on Atlantic sturgeon and giant manta ray are expected from exposure to pile-driving noise. Giant manta ray occurrence on the mid-Atlantic OCS is rare (NOAA 2017b), but occurrence in proximity to some proposed future actions within the geographic analysis area cannot be completely discounted.

Conclusions

Project construction and installation, O&M, and conceptual decommissioning would impact benthic resources by causing temporary habitat disturbance; permanent habitat conversion; and behavioral changes, injury, and mortality of benthic fauna. EFH, invertebrates, and finfish impacts associated with Proposed Action activities would be specific to the life stage and habitat requirements of a species. Activities that primarily impact benthic habitat (i.e., cable installation, scour protection) are not as likely to impact species or life stages that depend on pelagic habitats. Conversely, the above-mentioned activities are likely to displace or kill benthic species and life stages such as skates, flatfish, squid egg mops, and Atlantic sea scallops. The continued presence of foundations could affect pelagic habitat.

BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible** to **moderate**, including the presence of structures, which may result in **moderate beneficial** impacts to some benthic resources. The most prominent IPFs are expected to be new cable emplacement, noise from pile driving, and the presence of structures. Despite benthic mortality and temporary or permanent habitat alteration, BOEM expects the long-term impact on benthic communities from construction and installation of the Proposed Action alone to be **moderate for benthic resources**, as the effects would be unavoidable but would not affect the viability of the population.

Likewise, BOEM anticipates the impacts resulting from Proposed Action alone would range from **negligible** to **moderate**, including the presence of structures, which may result in **moderate beneficial** impacts for some EFH, invertebrates, and finfish. Overall, the impacts of Proposed Action alone on finfish, invertebrates, and EFH would likely be **moderate**. Although some of the proposed activities and/or IPFs analyzed could overlap, BOEM does not anticipate that this would alter the overall impact rating because it would neither appreciably diminish the aforementioned impacts nor increase them to such a degree that a population-level impact on the affected resource would occur.

The Proposed Action would be more likely to impact benthic species, life stages, and EFH than pelagic species and EFH, since the majority of activities affect benthic habitat. Turbidity, especially associated with dredging, and water withdrawal from jet plowing could temporarily impact pelagic eggs and larvae and EFH. Pile-driving noise, although temporary, could impact all benthic and pelagic life stages. The operational phase of the Proposed Action alone could lead to uncertain but possibly beneficial effects on finfish, invertebrates, and EFH through altering the pelagic environment and through the reef effect. The adverse impacts associated with the construction and installation, operations and maintenance, and decommissioning of the Proposed Action alone are likely to be temporary and/or small in proportion to the overall habitat available regionally.

SFW may elect to pursue a course of action within the PDE that would cause less impact than the maximum-case scenario, but doing so would not likely result in different impact ratings than those described above.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **moderate and moderate beneficial for some benthic resources**. The combined significance criteria in Table 3.1.1-1 and Table 3.1.1-2 are used to characterize the combined effects of all IPFs on benthic habitat. Applying these criteria, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **moderate** impacts to benthic resources in the geographic analysis area, because a notable and measurable adverse impact is anticipated, but most resources would likely recover when the impacting agents were gone and remedial or mitigating actions were taken. The main drivers for this impact rating are bottom temperature changes due to ongoing climate change, recurring bottom disturbance from bottom-tending fishing gear, mortality resulting from offshore construction, and the beneficial presence of structures.

Likewise, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **moderate** and **moderate beneficial for some** finfish, invertebrates, and EFH. The combined significance criteria in Table 3.1.1-1 and Table 3.1.1-2 are used to characterize the combined effects of all IPFs on EFH, invertebrates, and finfish. Applying these criteria, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **moderate** impacts on finfish, invertebrates, and EFH in the geographic analysis area, because a notable and measurable impact is anticipated, but the resource would likely recover completely when the impacting agents were gone and remedial or mitigating action were taken. The main drivers for this impact rating are fishing mortality, climate change, recurring bottom disturbance from bottom-tending fishing gear, and mortality resulting from offshore construction.

The Proposed Action would contribute to the above overall impact ratings primarily through the temporary disturbance due to new cable emplacement and permanent impacts from the presence of structures (cable protection measures and foundations). Although some of the proposed activities and/or IPFs analyzed could overlap, BOEM does not anticipate that this would alter the overall impact rating.

SFW has committed to implement EPMs to reduce potential impacts on benthic finfish, invertebrates, and EFH resources (see Table G-1 in Appendix G). BOEM is considering various mitigation and monitoring measures developed through EFH consultation with NMFS, through coordination with other federal and state agencies, and in response to comments received on the draft EIS (see Table G-2 in Appendix G). While any or all of these additional measures would tend to reduce impacts, the overall significance level of impacts would remain the same even if they were all required as a condition of COP approval.

3.4.2.2.4 VESSEL TRANSIT LANE ALTERNATIVE

The Transit alternative would lead to the same types of impacts on benthic resources, EFH, invertebrates, and finfish from construction and installation, O&M, and conceptual decommissioning as described for the Proposed Action, because the same types of actions would take place within the same Lease Area. However, construction of this alternative would install four fewer foundations and associated inter-array cable segments. Fewer days of impact pile driving would be required, and the overall duration of construction activities would decrease. This would reduce the overall footprint of the Project and associated construction and operational effects on benthic habitat, EFH, invertebrates, and finfish, as compared to the Proposed Action.

Impacts on complex, potentially complex, and soft-bottom benthic habitats from seabed preparation and materials placement associated with the foundations proposed for removal would be eliminated. Micrositing would also be used to further reduce impacts to complex benthic habitats where practicable. Reducing the number of monopile foundations from 16 to 12 would produce a commensurate reduction in associated artificial reef and hydrodynamic effects on the environment. Therefore, BOEM anticipates the impacts resulting from the Transit alternative alone would range from negligible to moderate, including the presence of structures, which may result in moderate beneficial impacts to some benthic resources, EFH, invertebrates, and finfish.

Cumulative Impacts

As noted above, the Transit alternative would result in the same types of incremental impacts on benthic resources, EFH, invertebrates, and finfish as the Proposed Action. While the duration and extent of construction impacts and the physical extent of operational impacts would decrease slightly, the resulting effects of each impact mechanism on benthic habitat, EFH, invertebrates and finfish would be the same as those described for the Proposed Action. Therefore, the overall cumulative impacts of this alternative when combined with past, present, and reasonably foreseeable activities would result in moderate impacts on benthic resources, EFH, invertebrates, and finfish.

If the Transit alternative is implemented, proposed future offshore WTGs may need to be relocated or eliminated within lease areas to accommodate the proposed transit lanes. These shifts could shorten or increase vessel trips, transmission cable lengths, and installation times for other future projects, depending on what WTG changes occur. If WTG shifts result in changes that increase turbidity and sedimentation, alter water currents, or increase risks of inadvertent spills, these effects could increase cumulative impacts relative to the Proposed Action.

Conclusions

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in impacts from construction and installation, O&M, and conceptual decommissioning, BOEM expects that the impacts resulting from the Transit alternative would be similar to the Proposed Action and range from **negligible** to **moderate adverse and moderate beneficial (for some species)**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative’s incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate adverse and moderate beneficial for some species**). The combined significance criteria in Table 3.1.1-1 and Table 3.1.1-2 are used to characterize the combined effects of all IPFs on benthic habitat, EFH, invertebrates, and finfish. Applying these criteria, BOEM anticipates that the overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would result in **moderate** impacts on these resources.

3.4.2.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

The Habitat alternative would eliminate specific monopile locations from the SFWF Project and incorporate additional micrositing to minimize impacts on existing complex benthic habitat to the greatest extent practicable.

On June 7, 2021, NOAA provided its conservation recommendations to BOEM. NOAA recommended that proposed wind turbine locations WTG 1, WTG 5, WTG 15, WTG 16A, and WTG 17A (Figure 2.1.3-2a) be removed from consideration because they would result in substantial adverse impacts to complex habitats. NOAA also recommends that turbine locations WTG 2, WTG 4, WTG 6, WTG 8, WTG 9, WTG 10, WTG 12, WTG 13, WTG 14, OSS, and the associated inter-array cables be microsited into low multibeam backscatter return areas and that restrictions on seafloor disturbance (e.g. anchoring) during construction be required to avoid impacts to higher multibeam backscatter return areas.

On June 14, 2021, SFW provided BOEM with a proposed layout in response to the consistency determination of Rhode Island CRMC, which requires a reduction in the number of wind turbines by three. The proposed layout removes wind turbine locations WTG 5, WTG 6, WTG 9, WTG 16A, and WTG 17A (Figure 2.1.3-2b) from consideration. Micrositing is proposed at WTG 1, WTG 4, WTG 8, WTG 10, and WTG 15.

Tables 3.4.2-8. and 3.4.2-9 provide estimated foundation and inter-array impacts for the Proposed Action and the two layout options considered under the Habitat alternative.

Table 3.4.2-8. Estimated Benthic Impacts for Foundations

Foundations	Total Impact Area Estimate (acres)*	Short-Term to Long-Term Impacts (seabed preparation) (acres)[†]	Long-Term Impact Footprint (monopile and scour protection) (acres)	Proportional Distribution of Impacts by Benthic Habitat Type		
				Complex	Potentially Complex	Soft Bottom
Proposed Action	29.2	14.8	14.4	49%	9%	42%
Habitat alternative layout (a) Conservation Recommendations from NOAA	23.7	12.0	11.7	33%	7%	60%
Habitat alternative layout (b) SFW Technical Memorandum (June 14, 2021)	23.7	12.0	11.7	42%	11%	47%

* Total Impact Area Estimate: The sum total of short-term and long-term impacts; this is the sum of all overlapping impacts occurring at different periods in time.

[†] Short-Term to Long-Term Impact (seabed preparation): Total acreage of the 28-m-wide seabed preparation corridor; this represents the maximum estimated footprint for all overlapping impacts.

Table 3.4.2-9. Estimated Benthic Impacts for Inter-Array Cable

Inter-Array Cable	Total Cable Length (miles)	Total Impact Area Estimate (hort-term + long-term, acres)*	Short-Term Impact (cable installation, acres)[†]	Long-Term Impact (cable protection, acres)[‡]	Short-Term to Long-Term Impact (seabed preparation, acres)[§]	Proportional Distribution of Impacts by Benthic Habitat Type		
						Complex	Potentially Complex	Soft Bottom
Proposed Action	19.4	282.4	57.7	9.2	215.5	42%	10%	48%
Habitat alternative layout (a) Conservation Recommendations from NOAA	14.5	211.7	43.3	6.9	161.5	43%	13%	45%
Habitat alternative layout (b) SFW Technical Memorandum (June 14, 2021)	14.5	211.8	43.3	6.9	161.6	41%	11%	48%

* Total Impact Area Estimate: The sum total of short-term and long-term impacts; this is the sum of all overlapping impacts occurring at different periods in time.

[†] Short-Term Impact (cable installation): Total acreage of the 7.5-m-wide cable installation corridor, entirely contained within the seabed preparation corridor.

[‡] Long-Term Impact (cable protection): Estimated total acres of cable protection impacts, assuming impacts will occur over 10% of the 12-m-wide cable protection corridor (per the COP). Calculation assumes that cable protection will be required over an estimated 10% of IAC corridor length, as stated in the COP. The area covered by the 12-m-wide cable protection buffer is 92.4 acres for full buildout, 69.2 acres for the NMFS layout option, and 69.2 acres for the SFW layout option.

[§] Short-Term to Long-Term Impact (seabed preparation): Total acreage of the 28-m-wide seabed preparation corridor; this represents the maximum estimated footprint for all overlapping impacts.

Removal of three turbines (WTG 1, WTG 5, and WTG 15) as recommended by NMFS [layout (a)] reduces the impact to benthic habitat by 5.5 acres when compared to the Proposed Action. The removal of these foundations and associated scour protection reduces the impact to complex habitat and potentially complex habitat by 6.5 acres and 0.9 acre, respectively. In addition, an estimated 4.9 fewer nautical miles of inter-array cable would be installed, resulting in the reduction of impacts to 71 acres of habitat for both short-term and permanent impacts to habitat. The impacts to complex habitat would be reduced by 28 acres, both short term and long term, with approximately a 0.7-acre reduction of impacts to potentially complex habitat.

Removal of three turbines (WTG 5, WTG 6, and WTG 9) as proposed by SFW [layout (b)] reduces the impact to benthic habitat by 5.5 acres when compared to the Proposed Action. The removal of these foundations and associated scour protection reduces the impact to complex habitat by 4.3 acres and has similar impacts to potentially complex habitat. In addition, an estimated 4.9 fewer nautical miles of inter-array cable would be installed, resulting in the reduction of impacts to 71 acres of habitat for both short-term and permanent impacts to habitat. The impacts to complex habitat would be reduced by 32 acres, both short term and long term, with approximately a 4.9-acre reduction of impacts to potentially complex habitat.

Micrositing of the remaining turbines and inter-array cable would further reduce the impacts reported for the Proposed Action. Reducing impacts on complex benthic habitats would reduce the area exposed to long-term impacts from construction disturbance and artificial reef effects. However, some long-term impacts on complex benthic habitats would still occur. Reducing the number of monopile foundations from 16 to 13 would produce a commensurate reduction in associated artificial reef and hydrodynamic effects on the environment, as compared to the Proposed Action. Therefore, BOEM anticipates the impacts resulting from the Habitat alternative (for either layout option) alone would range from negligible to moderate, including the presence of structures, which may result in moderate beneficial impacts to some benthic resources, EFH, invertebrates, and finfish.

Cumulative Impacts

As noted above, the Habitat alternative under either layout option would incrementally reduce the extent of temporary, short-term and long-term impacts on the environment, with emphasis on reducing impacts on complex benthic habitat. Reduced impacts on benthic habitat would in turn incrementally reduce impacts on EFH, invertebrates, and finfish resulting from the construction and operation of the Project. However, the same impact mechanisms would still occur, generating the same types of effects at similar levels of significance to those described for the Proposed Action. Therefore, the overall cumulative impacts of this alternative when combined with past, present, and reasonably foreseeable activities would result in moderate impacts on benthic resources, EFH, invertebrates, and finfish.

Conclusions

BOEM anticipates that the Habitat alternative under either layout option would incrementally reduce the physical extent and duration of certain impact mechanisms relative to the Proposed Action. However, those impact mechanisms would still occur, and the resulting effects on benthic habitat, EFH, invertebrates, and finfish would still meet the criteria for **negligible** to **moderate** adverse and moderate beneficial (for some species) defined in Table 3.4.2-1. In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative’s incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate** adverse and **moderate beneficial** for some species).

The combined significance criteria in Table 3.1.1-1 and Table 3.1.1-2 are used to characterize the combined effects of all IPFs on benthic habitat, EFH, invertebrates, and finfish. Applying these criteria, BOEM anticipates that the overall impacts associated with the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would result in **moderate** impacts on these resources.

3.4.2.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, BOEM expects that benthic resource, EFH, invertebrate, and finfish impacts would range from **negligible** to **moderate** adverse and **moderate beneficial** (for some species) for all action alternatives.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from **negligible** to **moderate** adverse and moderate beneficial **(for some species)**, because the majority of the impacts result from ongoing activities and other future offshore wind projects. Applying the combined significance criteria in Table 3.1.1-1, the overall impact of any action alternative on benthic habitat, EFH, invertebrates, and finfish when combined with past, present, and reasonably foreseeable activities would be **moderate** on these resources, for the same reasons as noted under previous conclusion sections.

3.4.2.4 Mitigation

Table G-2 in Appendix G identifies the following potential additional mitigation measures:

- Use of noise reduction technologies and field verification during all impact pile-driving activities to achieve a required minimum attenuation (reduction) of 10 dB re 1 micropascal (μPa) to reduce noise impacts during construction.
- Use of a turbidity curtain during construction and O&M activities involving in-water work such as dredging at ports and at the O&M facility to minimize impacts on flora and fauna from suspended sediments.

If BOEM requires the above measures, then Project impacts to benthic habitat, EFH, invertebrates, and finfish could be further reduced, although impacts would still be negligible to moderate.

3.4.3 Birds

The reader is referred to Table 2.3.1-1 and Appendix H for a discussion of current conditions and potential impacts to birds from implementation of the Proposed Action and other considered alternatives.

3.4.4 Other Terrestrial and Coastal Habitats and Fauna

The reader is referred to Table 2.3.1-1 and Appendix H for a discussion of current conditions and potential impacts to other terrestrial and coastal habitats and fauna from implementation of the Proposed Action and other considered alternatives.

3.4.5 Marine Mammals

3.4.5.1 Affected Environment

This section evaluates marine mammal resources within the geographic analysis area—namely, the Scotian Shelf, Northeast Shelf, and Southeast Shelf Large Marine Ecosystems—which captures most of the movement range within U.S. waters for most species in this group (see Figure E-5 in Appendix E). Due to the size of the geographic analysis area, however, for the purposes of the analysis in this final EIS, the focus is on marine mammals that would be likely to have regular or common occurrences in the proposed SFWF and SFEC and could be impacted by Project activities (Figure C-32 in Appendix C

A diverse marine mammal community inhabits the Northwest Atlantic OCS region (the region). Fifty species, comprising six baleen whale species; 39 species of toothed whales, dolphins, and porpoises; four species of seals; and the West Indian manatee (*Trichechus manatus*), could occur, or are known to occur, in the region (BOEM 2014; CSA Ocean Sciences Inc. 2021). All these species are protected under the federal MMPA, and five are listed as endangered under the ESA. One species, West Indian manatee, is listed as threatened under the ESA. Of the six marine mammals listed under the ESA, critical habitat has been designated for only NARW and West Indian manatee. Manatee occurrence in the SFWF and SFEC is unlikely.

Table 3.4.4 1 identifies species known or expected to occur in the region and their likelihood and timing of occurrence in the SFWF and SFEC. The BA and request for incidental harassment authorization developed for the Proposed Action (BOEM 2021; CSA Ocean Associates 2020) provide detailed species descriptions and life history information for all marine mammal species likely to occur in the geographic analysis area. NOAA has summarized the most current information about marine mammal population status, occurrence, and use of the region in their 2019 and draft 2020 stock status reports for the Atlantic OCS and Gulf of Mexico (Hayes et al. 2020, 2021).

The final EIS analysis focuses on 15 marine mammal species that are known to regularly occur in and around the SFWF and SFEC (Figure C-32) where species may be impacted directly. Several of these species are highly migratory and only occur seasonally; some are present year-round; and some could be present year-round but display distinct seasonal peaks. The ESA-listed species expected to occur are NARW, fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), and sperm whale (*Physeter macrocephalus*) (Davis et al. 2020; Kraus et al. 2016; NEFSC and Southeast Fisheries Science Center [SEFSC] 2018). Several other marine mammal species may occur in the general vicinity, including the ESA-listed blue whale (*Balaenoptera musculus*), which is known to occur in the region but primarily in waters along the edge of the OCS. Current status and population trends for marine mammal species that are expected to occur are summarized in Table 3.4.4 2.

Construction and operational noise are IPFs of particular concern. To this end, marine mammals have been organized into different hearing groups for the purpose of evaluating underwater noise impacts based on how they hear and their sensitivity to different types of noise consistent with NOAA (2018) guidance. Low-frequency cetaceans, including NARW and other baleen whales, hear and communicate in low-frequency bands from 7 Hz to 35 kHz. Mid-frequency cetaceans, including dolphins and other toothed whales, hear in the 150-Hz to 160-kHz range. High-frequency cetaceans, including the true porpoises, hear in the 275-Hz to 160-kHz range. Phocid pinnipeds (i.e., seals) hear in the 50-Hz to 86-kHz range.

Table 3.4.5-1. Frequency of Marine Mammal Species Occurrence in Northwest Atlantic OCS and Likelihood of Occurrence in the SFWF and SFEC (Figure C-32)

Common Name	Scientific Name	ESA/MMPA Status*,†	Occurrence in Northwest Atlantic OCS‡	Annual (Peak) Occurrence§	Species Occurs in SFWF and SFEC‡,§,¶,‡‡	Critical Habitat Occurs in the SFWF and SFEC§§
Baleen Whales – Suborder Mysticeti, Family Balaenopteridae						
NARW	*Eubalaena glacialis*	E/D	Common	YR (W-Sp)	Yes	No
Sei whale	*B. borealis*	E/D	Regular	YR (Sp)	Yes	Not yet designated
Fin whale	*B. physalus*	E/D	Common	YR	Yes	Not yet designated
Minke whale	*B. acutorostrata*	None/N	Common	YR (Su-F)	Yes	Not applicable (N/A)
Humpback whale	*Megaptera novaeanglia*	None/N	Common	YR (W-Sp)	Yes	N/A
Toothed Whales – Suborder Odontoceti, Family Physeteridae						
Sperm whale	*Physeter macrocephalus*	E/D	Common	YR (Su-F)	Yes	N/A
Toothed Whales – Family Kogiidae						
Dwarf sperm whale	*Kogia sima*	None/N	Rare	Su	No	N/A
Pygmy sperm whale	*K. breviceps*	None/S	Rare	Su	No	N/A
Toothed Whales – Family Ziphiidae						
Blainville's beaked whale	*Mesoplodon densirostris*	None/S	Rare	YR	No	N/A
Cuvier's beaked whale	*Ziphius cavirostris*	None/S	Rare	YR	No	N/A
Gervais' beaked whale	*M. europaeus*	None/S	Rare	YR	No	N/A
Sowerby's beaked whale	*M. bidens*	None/S	Rare	YR	No	N/A
True's beaked whale	*M. mirus*	None/S	Rare	YR	No	N/A
Toothed Whales – Family Delphinidae						
Risso's dolphin	*Grampus griseus*	None/N	Common[§]	YR (Sp-F)	Yes	N/A
Long-finned pilot whale	*Globicephala melas*	None/S	Common[§]	YR (Sp-Su)	Yes	N/A
White-beaked dolphin	*Lagenorhynchus albirostris*	None/N	Regular (north of Cape Cod)[§]	Sp	No	N/A
Atlantic white-sided dolphin	*L. acutus*	None/N	Regular[§]	YR (Sp-F)	Yes	N/A
Atlantic spotted dolphin	*Stenella frontalis*	None/N	Regular[‡,§]	Sp-F	No	N/A

Common Name	Scientific Name	ESA/MMPA Status[*,†]	Occurrence in Northwest Atlantic OCS[‡]	Annual (Peak) Occurrence[§]	Species Occurs in SFWF and SFEC[‡,§,¶,‡‡]	Critical Habitat Occurs in the SFWF and SFEC[§§]
Striped dolphin	*S. coeruleoalba*	None/N	Rare[‡,§]	YR	No	N/A
Short-beaked common dolphin	*Delphinus delphis*	None/N	Common	YR (Su-F)	Yes	N/A
Bottlenose dolphin	*Tursiops truncatus*	None/D**	Common	YR	Yes	N/A
Toothed Whales – Family Phococenidae						
Harbor porpoise	*Phocoena phocoena*	None/N	Common	YR (F-Sp)	Yes	N/A
Earless Seals – Order Carnivora, Suborder Caniformia, Family Phocidae						
Harbor seal	*Phoca vitulina concolor*	None/N	Common	YR (F-Sp)	Yes	N/A
Gray seal	*Halichoerus grypus*	None/N	Common	YR	Yes	N/A
Harp seal	*Pagophilus groenlandicus*	None/N	Common	W-Sp	Yes	N/A
Hooded seal	*Cystophora cristata*	None/N	Common	W-Sp	Yes	N/A
Order Sirenia						
West Indian manatee	*Trichechus manatus*	Threatened/S	Rare[‡‡]	Unknown	No	No

Sources: BOEM (2014); CSA Ocean Sciences Inc. (2021); Curtice et al. (2018); Kenney and Vigness-Raposa (2010); Kraus et al. (2016); NEFSC and SEFSC (2018).

Note: Species that do not occur in the SFWF and SFEC are unexpected to be affected by the Project and are not considered further in this final EIS.

* ESA status: E = Endangered.

† MMPA status: S = Strategic; N = Not Strategic; D = Depleted.

‡ Kenney and Vigness-Raposa (2010): Common = more than 100 observations; Regular = 10–100 observations; Rare = Fewer than 10 observations.

§ Data from NEFSC and SEFSC (2018) and Davis et al. (2020). YR = year-round; W = winter; Sp = spring; Su = summer; F = fall.

¶ Data from Kraus et al. (2016).

‡‡ Data from CSA Ocean Sciences Inc. (2021).

§§ Data from NOAA (2019). Construction vessels traveling to the analysis area could conceivably travel through NARW critical habitat. However, specific ports of origin and travel routes are not currently known and will be determined by the Project contractor.

** There are two stocks of bottlenose dolphins identified in the area. The Northern Migratory Coastal stock is depleted. The Atlantic offshore stock is not depleted.

Table 3.4.5-2. Population Status, Trend, and Effect of Human-Caused Mortality on Marine Mammal Species Likely to Occur in the SFWF and SFEC (Figure C-32)

Common Name	Scientific Name	Stock	Population Estimate*	Population Trend[†]	Annual Human-Caused Mortality[‡]	Effect of U.S. Human-Caused Mortality[§]	Reference Source
NARW[¶]	*Eubalaena glacialis*	Western North Atlantic	412; 345 to 369; 368	Decreasing	8.15	Significant	Hayes et al. (2021); Pettis et al. (2021); Pace (2021)
Fin whale[¶]	*Balaenoptera physalus*	Western North Atlantic	6,802	Unavailable	2.35	Significant	Hayes et al. (2021)
Sei whale[¶]	*B. borealis*	Nova Scotia	6,292	Unavailable	1.2	Significant	Hayes et al. (2021)
Minke whale	*B. acutorostrata*	Canadian East Coast	21,968	Unavailable	10.55	Insignificant	Hayes et al. (2021)
Humpback whale	*Megaptera novaeanglia*	Gulf of Maine	1,393	+2.8%/year	15.25	Significant	Hayes et al. (2021)
Sperm whale[¶]	*Physeter macrocephalus*	North Atlantic	4,349	Unavailable	Unknown	Unknown	Hayes et al. (2020)
Risso's dolphin	*Grampus griseus*	Western North Atlantic	35,493	Unavailable	53.9	Significant	Hayes et al. (2020)
Long-finned pilot whale	*Globicephala melas*	Western North Atlantic	39,215	Unavailable	21	Insignificant	Hayes et al. (2020)
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	Western North Atlantic	93,233	Unavailable	26	Insignificant	Hayes et al. (2020)
Short-beaked common dolphin	*Delphinus delphis delphis*	Western North Atlantic	172,974	Unavailable	399	Significant	Hayes et al. (2020)
Bottlenose dolphin	*Tursiops truncatus truncatus*	Western North Atlantic - Offshore	62,851	Unavailable	28	Insignificant	Hayes et al. (2020)
		Western North Atlantic – Northern Coastal Migratory	6,639	Decreasing	12.2 to 21.5	Insignificant	Hayes et al. (2021)
Harbor porpoise	*Phocoena*	Gulf of Maine/Bay of Fundy	95,543	Unavailable	150	Significant	Hayes et al. (2020)
Harbor seal	*Phoca vitulina concolor*	Western North Atlantic	75,834	Unavailable	365	Significant	Hayes et al. (2020)
Gray seal	*Halichoerus grypus*	Western North Atlantic (U.S. population)	27,131	Increasing	953	Significant	Hayes et al. (2020)
Hooded seal	*Cystophora cristata*	Western North Atlantic	593,500	Increasing	5,199	Insignificant	Hayes et al. (2019)
Harp seal	*Pagophilus groenlandicus*	Western North Atlantic	7.4 million	Increasing	232,422	Unknown	Hayes et al. (2020)

* Most recently available stock size estimate, per cited reference.

[†] Increasing = beneficial trend, not quantified; Decreasing = adverse trend, not quantified; Unavailable = population trend analysis not conducted on this species.

[‡] Based on annual human-caused mortality as a percentage of potential biological removal (PBR): Significant = > 10% of PBR; Insignificant = < 10% of PBR. Statistic based on fishing-related mortality with inferred contribution from other sources (e.g., vessel collisions).

[§] Reflects human-caused mortality from all known sources, including fishing-related, vessel collisions, and other/unspecified. Per cited reference.

[¶] Species is ESA listed.

3.4.5.2 Environmental Consequences

3.4.5.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.4.5-3 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for the EIS.

Table 3.4.5-3. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Marine Mammals

Issue	Impact Indicator	Significance Criteria[¥]
Seabed and water column alteration	Affected water column and acres of seabed disturbance, potential for displacement effects	Negligible: The impacts on individual marine mammals and/or their habitat, if any, would be at the lowest levels of detection and barely measurable, with no perceptible consequences to individuals or the population. Minor: Impacts on individual marine mammals and/or their habitat are detectable and measurable; however, they are of low intensity, short term, and localized. Impacts on individuals and/or their habitat do not lead to population-level effects. Moderate: Impacts on individual marine mammals and/or their habitat are detectable and measurable; they are of medium intensity, can be short term or long term, and can be localized or extensive. Impacts on individuals and/or their habitat could have population-level effects, but the population can sufficiently recover from the impacts or enough habitat remains functional to maintain the viability of the species both locally and throughout their range. Major: Impacts on individual marine mammals and/or their habitat are detectable and measurable; they are of severe intensity, can be long lasting or permanent, and are extensive. Impacts to individuals and/or their habitat would have severe population-level effects, and compromise the viability of the species.
Long-term habitat alteration and hydrodynamic effects	Measurable extent of potential habitat and hydrodynamic effects, potential for regional effects	
Underwater noise from construction/conceptual decommissioning	Magnitude, duration, and extent of exposure above established effects thresholds, as noted below: Behavioral thresholds:* Impulsive source: 160 dB_{RMS} Non-impulsive source: 120 dB_{RMS} Injury thresholds Impact pile driving (dB_{PEAK}/dB c_{SEL}):[†] Low-frequency cetaceans: 219/183 Mid-frequency cetaceans: 230/185 High-frequency cetaceans: 202/155 Phocid pinniped: 218/185 Vibratory pile driving (dB c_{SEL}): Low-frequency cetaceans: 199 Mid-frequency cetaceans: 198 High-frequency cetaceans: 173 Phocid pinniped: 201	
Underwater noise from operation	Magnitude, duration, and extent of exposure above established effects thresholds, as noted below: Behavioral effect thresholds:[‡] 120 dB_{RMS} Permanent threshold shift (PTS) thresholds All species: Not applicable	
Airborne noise	Magnitude, duration, and extent of exposure above established effects thresholds, as noted below: Behavioral effect thresholds:[§] Harbor seals: 90 dB_{RMS} Other pinnipeds: 100 dB_{RMS} Cetaceans: Not applicable	
Vessel traffic	Qualitative estimate of potential collision risk	
Water quality impacts	Quantitative estimate of intensity and duration of suspended sediment effects	
	Qualitative analysis of potential discharges (fuel spills, trash, and debris) relative to baseline	

Issue	Impact Indicator	Significance Criteria[¥]
Artificial light	Intensity, frequency, and duration relative to baseline	
Power transmission	Theoretical extent of detectable EMF effects	

* Behavioral effect thresholds for impact and vibratory pile driving defined by the NMFS (NOAA 2019). Distance to thresholds modeled by Denes et al. (2021). dB_{RMS} = root mean square decibels re 1 µPa. Behavioral effects thresholds are unweighted,

† NOAA (2018) defines a permanent hearing threshold shift as the onset of physical injury from underwater noise exposure. NMFS has identified different PTS thresholds for the low-, mid-, and high-frequency cetacean, and phocid pinnipeds based on group-specific hearing sensitivity. Distance to PTS thresholds modeled by Denes et al. (2021). dB_{PEAK} = peak dB re 1 µPa. dB_{SEL} = cumulative SEL in dB re 1 $µPa^2$/second. Peak thresholds are unweighted, cumulative SEL thresholds are weighted by hearing group sensitivity.

‡ Onset of potential behavioral effects for vibratory pile driving defined by NOAA (2021), assuming WTGs similarly produce continuous low-frequency underwater noise. Distance to behavioral threshold for vibratory pile driving modeled by Denes et al. (2021).

§ Airborne exposure threshold (unweighted decibels) defined by NOAA (2018). Distance to phocid pinniped thresholds estimated using methods described by the Washington State Department of Transportation (2020). No airborne PTS threshold established for pinnipeds. No airborne thresholds established for cetaceans.

¥ These significance criteria are intended to serve NEPA purposes only, and they are not intended to incorporate similar terms of art used in other statutory or regulatory reviews. For example, the term “negligible” will be used for NEPA purposes as defined here and is not necessarily intended to indicate a negligible impact or effect under the MMPA. Similarly, the use of “detectable” or “measurable” in the NEPA significance criteria is not necessarily intended to indicate whether an effect is “insignificant” or “adverse” for purposes of ESA Section 7 consultation. For ESA Section 7 consultation, “insignificant effects” relate to the size of the impact and should never reach the scale where take occurs. Based on best judgment, a person would not be able to meaningfully measure, detect, or evaluate insignificant effects.

3.4.5.2.2 NO ACTION ALTERNATIVE

Under the No Action alternative, BOEM would not approve the COP and the Proposed Action would not be implemented. Existing environmental trends within the geographic analysis area would continue, potentially influenced by the development of planned future activities on the mid-Atlantic OCS and associated coastal areas over the coming decade. These include other offshore wind and renewable energy projects, and potential port improvements to support the development of this industry regionwide (see Appendix E).

This section provides a general description of these mechanisms, recognizing the extent and significance of potential effects on conditions cannot be fully quantified for projects that are in the conceptual or proposal stage and have not been fully designed. Where appropriate, certain potential effects resulting from these future actions can be generally characterized by comparison to effects resulting from the Proposed Action that are likely to be similar in nature and significance. The intent of this section is to provide a general overview of how future activities might influence future environmental conditions. Should any or all of the future activities described in Appendix E proceed, each would be subject to independent NEPA analyses and regulatory approvals and their environmental effects would be fully considered therein.

The Affected Environment section provides information on existing marine mammal species and habitat trends due to past and present activities. Attachment 3 in Appendix E also provides additional information regarding past and present activities and associated species impacts. Future, non-Project actions include offshore development projects, military activities, dredged material disposal, commercial fishing, and marine transportation.

Attachment 3 in Appendix E also discloses future non-offshore wind activities and associated marine mammal impacts. Impacts associated with future offshore wind activities are described below. These activities and their potential effects on marine mammals have been or will be subject to independent NEPA analysis as they are planned and developed.

Future Activities (without the Proposed Action)

Accidental releases and discharges: BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)).

BOEM also requires applicants to develop spill response and containment plans to quickly address accidental spills of fuels, lubricants, and other contaminants. While marine vessels are an inherent source of accidental releases of trash, debris, and contaminants, these requirements would effectively avoid and minimize these impacts such that the resulting effects to marine mammals would be negligible.

Entanglement in fishing gear is a substantial ongoing threat to marine mammals. Fisheries interactions are likely to have demographic effects on marine mammal species, with estimated global mortality exceeding hundreds of thousands of individuals each year (Read et al. 2006; Reeves et al. 2013; Thomas et al. 2016). In the Atlantic, bycatch occurs in various gillnet and trawl fisheries in New England and the Mid-Atlantic coast, with hotspots driven by marine mammal density and fishing intensity (Lewiston et al. 2014; NMFS 2018a). Entanglement in fishing gear has been identified as one of the leading causes of mortality in NARWs and may be a limiting factor in the species recovery (Knowlton et al. 2012). Entanglement may also be responsible for high mortality rates in other large whale species (Read et al. 2006).

BOEM anticipates that future projects would perform regular inspections to identify and remove derelict fishing gear and other marine debris from offshore structures, either as an EPM or a mitigation requirement. These inspections would provide a mechanism for removing harmful marine debris, reducing associated risks to marine mammals. Entanglement in or ingestion of marine debris is a significant source of human-caused mortality in many marine mammal species. For example, Baulch and Perry (2014) identified ingested debris as the likely cause of mortality in 22% of beached marine mammal carcasses. Approximately 50% of marine mammal species worldwide have been documented ingesting marine litter (Werner et al. 2016). Entanglement in commercial fishing gear has been identified as one of the leading causes of mortality in NARWs and may be a limiting factor in the species recovery, with 83% of observed individuals showing evidence of at least one and 53% showing evidence of multiple entanglements (Knowlton et al. 2012). Accordingly, future actions would likely aid in reducing risks to marine mammals from marine debris by removing derelict fishing gear, resulting in a minor beneficial effect to marine mammals.

<u>EMF</u>: At least seven submarine power and communications cables cross the RI/MA WEA. These cables would presumably continue to operate and generate EMF effects under the No Action alternative. While the type and capacity of those cables is not specified, the associated baseline EMF effects can be inferred from available literature. Electrical telecommunications cables are likely to induce a weak EMF on the order of 1 to 6.3 µV/m within 3.3 feet (1 meter) of the cable path (Gill et al. 2005). Fiber-optic communications cables with optical repeaters would not produce EMF effects.

Under the No Action alternative, up to 7,248 miles of cable would be added in the geographic analysis area, producing EMF in the immediate vicinity of each cable during operations. BOEM anticipates that the proposed offshore energy projects would use HVAC transmission, but HVDC designs are possible and could occur.

EMF effects on marine mammals from these future projects would vary in extent and magnitude depending on overall cable length, the proportion of buried versus exposed cable segments, and project-specific transmission design (e.g., HVAC or HVDC, transmission voltage, etc.). However, measurable EMF effects are generally limited to within tens of feet of cable corridors. BOEM would require these future submarine power cables to have appropriate shielding and burial depth to minimize potential EMF effects from cable operation. Therefore, effects on marine mammals are likely to range from negligible to minor, with minor effects only likely to occur under certain circumstances (i.e., in proximity to exposed HVDC transmission cables).

<u>New cable emplacement/maintenance</u>: Future offshore wind projects could disturb up to 10,131 acres of seabed while installing associated undersea cables, causing an increase in suspended sediment (see Appendix E, Attachment 4 for calculation details). Those effects would be similar in nature to those observed during construction of the BIWF (Elliot et al. 2017). While suspended sediment impacts would

vary in extent and intensity depending on project and site-specific conditions, measurable impacts are likely to be on the order of 500 mg/L or lower, lasting for minutes to hours, and limited in extent to within a few feet vertically and a few hundred feet horizontally from the point of disturbance. The resulting effects on marine mammals would likely be negligible to minor.

Noise: Numerous proposed offshore wind project construction projects could be developed on the mid-Atlantic OCS between 2022 to 2030 (see Appendix E). These activities include impact pile driving, HRG surveys, construction and O&M vessel use, and WTG operation. Based on the extent of noise impacts for these types of activities, it is reasonable to conclude that impact pile-driving, construction vessel, and HRG survey noise from these projects could adversely affect marine mammals. In addition, construction noise impacts from future actions could affect marine mammal use of the geographic analysis area, and/or the availability of fish and invertebrate prey resources.

As stated, future wind energy development projects would undergo independent NEPA analysis of both project-specific and cumulative effects. BOEM recently completed a programmatic ESA consultation for HRG survey activities supporting planned offshore wind energy development on the mid-Atlantic OCS from June 2021 through June 2031. In addition to project-specific EPMs, BOEM would require compliance with all mitigation and monitoring measures imposed as conditions of ESA and MMPA compliance and other federal regulations. That process is likely to result in additional measures to avoid and minimize adverse noise effects on marine mammals resulting from the various potential exposure scenarios described below.

Impulsive Noise***:*** Up to 2,547 new offshore structures associated with offshore wind development would be installed on the geographic analysis area under the No Action alternative (NMFS 2021). The anticipated construction windows for these projects would begin in 2022 and continue through 2030. Many of these structures would be installed using impact pile driving, producing high-intensity impulsive underwater noise at levels exceeding biologically significant effect thresholds for marine mammals. In addition, as stated above, noise impacts from future actions could affect marine mammal use of the geographic analysis area, and/or the availability of fish and invertebrate prey resources. These effects would vary in extent and intensity based on the scale and design of each project. Moreover, noise effects could increase in significance if individual marine mammals and/or their prey and forage resources experience repeated stressor exposures from multiple projects.

Marine mammals could experience any of the following three potential exposure scenarios under the No Action alternative:

- Concurrent exposure to noise from two or more impact hammers, operating within the same project or in adjacent projects
- Non-concurrent exposure to noise from multiple pile driving events within the same year
- Exposure to two or more concurrent or non-concurrent pile driving events over multiple years

Based on currently planned project schedules, the concurrent exposure scenario could occur under the No Action alternative and could result in impacts on marine mammals. The number of potential concurrent exposure days within the RI/MA WEA ranges from 106 to 357 assuming one foundation installation per project per day, and from 53 to 179 days assuming two foundations per project per day, depending on the year (see Table E-4 in Appendix E for details). Behavioral avoidance of noise impacts could also indirectly affect marine mammal use of the area, even if significant impacts do not occur therein.

In terms of broader regional effects, project construction in the Delaware and Maryland lease areas under the No Action alternative could generate up to 17 days of concurrent pile driving in 2023 and 129 days of concurrent pile driving in 2024, assuming one foundation per day (see Table E-4 in Appendix E for details). An individual marine mammal present in either of these areas on those days could be exposed to the noise from more than one pile driving event per day, repeated over a period of days.

Concurrent pile driving within and between future projects would increase the intensity and extent of sound exposure within the respective impact areas but would decrease the total number of days of stressor exposure in any given year. It may be desirable to plan for concurrent pile driving in order to avoid underwater noise impacts during critical periods when sensitive or particularly vulnerable populations (e.g., NARW) are most likely to be present. However, this could result in greater exposure for marine mammal species that are more likely to be present when concurrent pile driving occurs. These individuals may be more likely to suffer noise-related injuries and other adverse physiological and behavioral effects as a consequence. Physiological effects may include elevated chronic stress and depressed immune function (Erbe et al. 2018; Romano et al. 2004; Wright et al. 2007).

Under the second exposure scenario, individual marine mammals could be exposed to multiple non-concurrent pile-driving activities at different times within the same year. This scenario includes concurrent neighboring projects that time their respective pile-driving activities to occur on different days. Non-concurrent pile driving would decrease the intensity and extent of impulsive noise exposure but would increase the total number of exposure days. Given that multiple future actions are proposed for construction between 2022 and 2030 (see Table E-2 in Appendix E), it is likely that some individual marine mammals will experience two or more impact pile-driving noise exposure days within the same year.

In addition to impact pile driving, HRG surveys supporting project construction would also produce mobile impulsive underwater noise. BOEM (2021a) reviewed underwater noise levels produced by the available types of HRG survey equipment as part of a programmatic biological assessment for this and other activities associated with regional offshore wind energy development. NMFS (2021) concurred with BOEM's determination that planned HRG survey activities using even the loudest available equipment types would be unlikely to injure or measurably affect the behavior of ESA-listed marine mammals. The rationale supporting this conclusion also applies to non-listed marine mammal species. Specifically, the noise levels produced by HRG survey equipment are relatively low, meaning that an individual marine mammal would have to remain close to the sound source for extended periods of time to experience injury. This type of exposure is unlikely as the sound sources are continuously mobile and directional (i.e., pointed at the bottom). Moreover, consistent with BOEM requirements the applicant has developed a mitigation plan (SFW 2020) that includes protected species observer (PSO) monitoring of species-specific clearance zones around HRG survey activities and mandatory shutdown procedures to further minimize exposure risk. These measures would effectively avoid the risk of permanent threshold shift (PTS) or TTS effects on marine mammals from HRG survey activities. While individual marine mammals may be exposed to HRG survey noise sufficient to cause behavioral effects, those effects would be temporary in nature and unlikely to cause any perceptible longer-term consequences to individuals or populations.

As stated, considering the number and extent of projects planned in the geographic analysis area, it is likely that underwater noise impacts sufficient to cause adverse effects on marine mammals could occur under the No Action alternative. This could result from direct noise impacts that adversely affect marine mammals and/or their prey species, or from behavioral effects that alter marine mammal use of the area. The extent, duration, and significance of these effects would vary based on project specific factors. All future actions are expected to include EPMs to avoid and minimize impacts on marine mammals. Those actions are also likely to be required to comply with additional mitigation measures as a condition of permitting. When these factors are considered, the effects of impulsive noise exposure on marine mammals under the No Action alternative would range from minor to moderate, varying by species.

Non-impulsive Noise: Under the No Action alternative, several new sources of non-impulsive underwater noise would be introduced to the environment. These sources include vibratory pile driving used for various aspects of project construction, HRG surveys, helicopters and fixed-wing aircraft, construction and O&M vessel noise, and operational noise. These non-impulsive noise sources would add to other manmade sources of non-impulsive noise that account for the majority of ambient noise pollution in the marine environment. Continuous low-frequency sound from large vessel engines, specifically ocean-going cargo, tanker, and container vessels, is the primary source of ambient noise pollution in the marine environment (Basset et al. 2012). While smaller vessels, activities like vibratory pile driving, and offshore wind farm operations also generate non-impulsive noise, these sources are likely to account for a small percentage of ambient noise energy in the marine environment.

Construction and O&M vessels associated with planned offshore wind projects are the most likely sources of non-impulsive underwater noise impacts to occur in the geographic analysis area. Vibratory pile driving noise from the installation of cofferdams as part of cable installation for future projects could also occur in the geographic analysis area. Non-impulsive noise impacts on marine mammals resulting from these activities would vary in location, extent, and duration, as determined by the specific design and construction requirements for each project. The resulting effects on marine mammals would similarly range from minor to moderate, varying by marine mammal species.

Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct-drive systems like those proposed for the SFWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 dB_{RMS}, occasionally reaching as high as 128 dB_{RMS}, in the 10-Hz to 8-kHz range. This is consistent with the noise levels observed at the BIWF (110 to 125 dB re 1 µPa SPL RMS; Elliot et al. 2019) and the range of values observed at European wind farms and is therefore representative of the range of operational noise levels likely to occur from future wind energy projects. More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10 MW) current generation direct-drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This suggests that operational noise effects on marine mammals could be more intense and extensive than those considered herein, but the findings have not been validated. As discussed in Section 3.4.4.2.3, operational noise from offshore wind turbines would typically attenuate below the 120 dB_{RMS} marine mammal behavioral disturbance and auditory masking threshold within approximately 120 feet and below existing ambient noise levels within a few to several hundred feet of each foundation, respectively. This indicates that operational noise effects from other future actions would likely be minor.

O&M vessels could travel through the geographic analysis area, generating underwater noise. More broadly, BOEM considers it unlikely that vessel noise from wind farm operations would be detectable and measurable, but short term and localized. Impacts on individuals and/or their habitat would not lead to population-level effects. On this basis, the effects of underwater noise from future O&M vessel activities would likely be minor.

Planned future actions may also employ helicopters and fixed-wing aircraft for initial site surveys, establishing and monitoring protected species exclusion zones during project construction, and for periodic facility inspections during project O&M. Aircraft associated with projects in the geographic analysis area could travel through and affect marine mammals. In general, marine mammal behavioral responses to aircraft most commonly occur at distances of less than 1,000 feet, and those responses are typically limited and likely insignificant (Patenaude et al. 2002). Similarly, aircraft could disturb hauled-out seals if aircraft overflights occur within 2,000 feet of a haul-out area. BOEM would require all aircraft operations to comply with current approach regulations for any sighted NARWs or unidentified large whale. Current regulations (50 CFR 222.32) prohibit aircraft from approaching within 1,500 feet of NARW. BOEM expects that most aircraft operations would occur above this altitude limit except under specific circumstances (e.g., helicopter landings on the service operations vessel or visual inspections of WTGs). Aircraft operations could result in temporary behavioral responses, including short surface durations, abrupt dives, and percussive behaviors (i.e., breaching and tail slapping) (Patenaude et al. 2002), but BOEM does not expect that these brief and infrequent exposures would result in biologically significant effects on marine mammals. On this basis, noise and disturbance effects on marine mammals from aircraft operations under the No Action alternative are expected to be negligible to minor.

Port utilization: The development of an offshore wind industry on the mid-Atlantic OCS may incentivize the expansion or improvement of regional ports to support planned and future projects. Port improvements could lead to an increase in vessel traffic during construction (see Vessel traffic), O&M, and conceptual decommissioning. The resulting change in vessel traffic in the geographic analysis area cannot be predicted because, while some ports have been identified as possibilities for expansion, no specific project plans have been proposed.

However, any future port expansion and associated increase in vessel traffic would be subject to independent NEPA analysis and regulatory approvals requiring full consideration of potential effects on marine mammals regionwide.

Presence of structures: The future addition of up to 2,547 new WTG and OSS foundations in the geographic analysis area would result in artificial reef and hydrodynamic effects that influence primary and secondary productivity and the distribution and abundance of fish and invertebrates community structure within and in proximity to project footprints. Depending on proximity and extent, hydrodynamic and reef effects from future actions could influence the availability of prey and forage resources for marine mammals. Project-specific effects would vary, recognizing that larger and/or contiguous projects could have more significant hydrodynamic effects and broader scales. This could in turn lead to more significant effects on prey and forage resources, but the extent and significance of these effects cannot be predicted based on currently available information.

The long-term presence of WTG structures could displace marine mammals from preferred habitats or alter movement patterns, potentially changing exposure to commercial and recreational fishing activity. The evidence for long-term displacement is unclear and varies by species. For example, Long (2017) studied marine mammal habitat use around two commercial wind farm facilities before and after construction and found that habitat use appeared to return to normal after construction. He cautioned that these findings were not definitive and additional research was needed. In contrast, Tielmann and Carstensen (2012) observed clear long-term (greater than 10 years) displacement of harbor porpoises from commercial wind farm areas in Denmark. Displacement effects remain a focus of ongoing study (Kraus et al. 2019). Other studies have documented apparent increases in marine mammal density around wind energy facilities. For example, Russel et al. (2014) found clear evidence that seals were attracted to a European wind farm, apparently attracted by the abundant concentrations of prey created by the artificial reef effect. Gray seals are particularly susceptible to entrapment in trawl fisheries (Lyssikatos 2015). If commercial trawling were to occur near wind farms, increased interactions and resulting mortality of gray seals might be anticipated.

Hayes et al. (2021) note marine mammals are following shifts in the spatial distribution and abundance of their primary prey resources driven by increased water temperatures and other climate-related impacts. These range shifts are primarily oriented northward and toward deeper waters. The widespread development of offshore renewable energy facilities may facilitate climate change adaptation for certain marine mammal prey and forage species. The artificial reefs created by these structures form biological hotspots that could support species range shifts and expansions and changes in biological community structure (Degraer et al. 2020; Methratta and Dardick 2019; Raoux et al. 2017). In contrast, broadscale hydrodynamic impacts could alter zooplankton distribution and abundance (van Berkel et al. 2020). There is considerable uncertainty as to how these broader ecological changes will affect marine mammals in the future, and how those changes will interact with other human-caused impacts. The effect of these IPFs on marine mammals and their habitats under the No Action alternative could be positive or negative, varying by species, and their significance is unknown.

The presence of structures could also concentrate recreational fishing around foundations, potentially increasing the risk of marine mammal entanglement in both lines and nets and increasing the risk of injury and mortality due to infection, starvation, or drowning (Moore and van de Hoop 2012). These structures could also result in fishing vessel displacement or gear shift. The potential impact to marine mammals from these changes is uncertain. However, if a shift from mobile gear to fixed gear occurs, there would be a potential increase in the number of vertical lines, resulting in an increased risk of marine mammal interactions with fishing gear. Entanglement in fishing gear has been identified as one of the leading causes of mortality in NARW and may be a limiting factor in the species recovery (Knowlton et al. 2012). Johnson et al. (2005) report that 72% of NARWs show evidence of past entanglements. Additionally, recent literature indicates that the proportion of NARW mortality attributed to fishing gear entanglement is likely higher than previously estimated from recovered carcasses (Pace et al. 2021). Entanglement may also be responsible for high mortality rates in other large whale species (Read et al. 2006). Abandoned or lost fishing gear may get tangled with foundations, reducing the chance that abandoned gear would cause additional harm to marine mammals and other wildlife, though debris tangled with WTG foundations may still pose a hazard to marine mammals. These potential long-term intermittent impacts would persist until decommissioning is complete and structures are removed.

Light: The addition of up to 2,547 new offshore structures in the geographic analysis area with long-term hazard and aviation lighting, as well as lighting associated with construction vessels, would increase artificial lighting. Orr et al. (2013) concluded that the operational lighting effects from wind farm facilities to marine mammal distribution, behavior, and habitat use were uncertain but likely negligible if recommended design and operating practices are implemented. BOEM would require wind farm developers to comply with the current design guidance for avoiding and minimizing artificial lighting effects. On this basis, BOEM anticipates artificial lighting impacts from future wind farm development and other offshore activities would be negligible.

Seabed and water column alteration: The future addition of up to 2,547 new WTG and OSS foundations in the geographic analysis area would result in artificial reef and hydrodynamic effects that influence primary and secondary productivity and the distribution and abundance of fish and invertebrates community structure within and in proximity to project footprints. Depending on proximity and extent, hydrodynamic and reef effects from future actions could influence the availability of prey and forage resources for marine mammals. Project-specific effects would be similar in nature across proposed offshore wind projects, recognizing that larger and/or contiguous projects could have more significant hydrodynamic effects and broader scales. This could in turn lead to more significant effects on prey and forage resources, but the extent and significance of these effects cannot be predicted based on currently available information.

Traffic: BOEM estimates that construction of future offshore wind projects would begin in earnest in 2021, peak in 2025, and conclude in 2030. Vessel activity could peak in 2024 with as many as 379 vessels involved in the construction of reasonably foreseeable projects (see Section 3.5.6.2.2 [No Action Alternative]).

Once future projects are operational, they would be serviced by CTVs making routine trips between the wind farms and port-based O&M facilities several times per week. Increased vessel traffic presents a potential increase in collision-related risks to marine mammals. BOEM anticipates that those risks would be minimized by project-specific EPMs and compliance with additional mitigation measures required as a condition of ESA and MMPA compliance. While these measures are likely to be effective avoiding adverse effects on sensitive species like NARW, they would not eliminate risks to other marine mammal species. Accordingly, effects to marine mammals from increased vessel activity could range from minor to moderate, recognizing that additional mitigation measures would likely be imposed if vessel operations result in unacceptable adverse effects.

Unplanned maintenance activities would require the periodic use of larger vessels of the same class used for project construction. Unplanned maintenance would occur infrequently dictated by equipment failures, accidents, or other events. The number and size of CTVs and number of trips per week required for planned maintenance would vary by project based on the number of WTGs. Vessel requirements for unplanned maintenance would also likely vary based on overall project size. These future actions would pose the same type of vessel-related collision risks to marine mammals as for planned trips, but the potential extent and number of animals potentially exposed cannot be determined without project-specific information. Accordingly, effects to marine mammals from increased vessel activity could range from minor to moderate, recognizing that additional mitigation measures would likely be imposed if vessel operations result in unacceptable adverse effects.

Climate change: Global climate change is an ongoing risk to marine mammals. Hayes et al. (2021) note marine mammals are being forced to adapt to changes in the spatial distribution and abundance of their primary prey resources. The range of habitats for many finfish, invertebrate, and zooplankton species on the mid-Atlantic OCS are shifting northward and toward deeper waters in response to changes in temperature regime, acidification, and other climate-driven effects on the ocean environment. The potential implications of these and other related environmental changes for marine mammals, and the ways in which they are likely to interact with the effects of regional offshore wind development, are complex and uncertain. This is particularly true when evaluating potential effects at the scale of the geographic analysis area. However, it is likely that some species are likely to adapt to these environmental changes more effectively than others. In contrast, populations that are already vulnerable, such as NARW, may face increased risk of extinction as a consequence of climate change and other factors.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on marine mammals associated with the Project would not occur. However, ongoing and future activities would result in a range of temporary to long-term impacts (disturbance, displacement, injury, mortality, and reduced reproductive and foraging success) on marine mammals, primarily from exposure to construction-related underwater noise, vessel activity, and habitat changes resulting from artificial reef and hydrodynamic effects associated with offshore wind structures.

BOEM anticipates that impacts from ongoing activities, especially vessel traffic and noise, as well as fisheries gear interactions, would be **moderate**. In addition to ongoing activities, reasonably foreseeable activities other than offshore wind may also contribute to impacts on marine mammals. Reasonably foreseeable activities other than offshore wind include increasing vessel traffic; new submarine cable and pipeline installation and maintenance; marine surveys; marine minerals extraction; port expansion; channel-deepening activities; military readiness activities; and the installation of new towers, buoys, and piers. BOEM anticipates that the impacts of reasonably foreseeable activities other than offshore wind would be **moderate**. BOEM expects the combination of ongoing activities and reasonably foreseeable activities other than offshore wind to result in **moderate** impacts on marine mammals, primarily driven by ongoing noise impacts and interaction with commercial and recreational fisheries gear.

The combined significance criteria in Table 3.1.1-1 and Table 3.1.1-2 are used to characterize the combined effects of all IPFs likely to occur under the No Action alternative. BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse effects because of the presence of structures and pile-driving noise and increased vessel traffic. Additionally, the presence of structures could potentially result in **minor beneficial** impacts on some marine mammal species. The majority of offshore structures in the geographic analysis area for marine mammals would be attributable to the offshore wind industry. The offshore wind industry would also be responsible for a majority of the impacts associated with new cable emplacement and EMF, but effects to marine mammals resulting from these IPFs would be localized and temporary and would not be expected to be biologically significant. The offshore wind industry would be responsible for a majority of the impacts associated with pile-driving noise, which could lead to moderate impacts to marine mammals in the geographic analysis area. However, overall, this conclusion assumes that irreversible impacts on individual marine mammals would not have negative significant consequences at the population level, or that any population-level effects would be recoverable.

The No Action alternative would forgo any long-term monitoring that SFW has committed to, or would be required to perform, the results of which could provide an understanding of the effects of offshore wind development, benefit future management of these resources, and inform planning of other offshore developments. BOEM acknowledges, however, that other ongoing and future monitoring and surveys could provide similar data to support similar goals.

3.4.5.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Seabed and water column disturbance: Construction of the SFWF and SFEC Project components would physically disturb the water column and seabed. However, the area affected at any given time would be small and insignificant compared to current baseline levels of disturbance. Similarly, the water column and seabed in Lake Montauk would be disturbed during dredging and construction activities at the O&M facility. However, the affected area would be limited in size and relatively confined within the harbor (Stantec 2020), where routine maintenance dredging already occurs. Therefore, direct impacts from seabed disturbance are unlikely to measurably affect individual marine mammals. While indirect effects to fish and invertebrate prey resources would occur, these impacts are not likely to significantly affect the availability of prey and forage resources for marine mammals (see Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish] for additional discussion). Therefore, seabed and water column disturbance during construction would have negligible to minor effects on marine mammals, varying in significance by species.

Noise: Construction of the SFWF and SFEC would produce short-term underwater and airborne noise with the potential to affect marine mammals. Construction noise sources include impact and vibratory pile driving, construction vessels, HRG survey equipment, and helicopters and fixed-wing aircraft.

Impact pile driving would be used to install the SFWF monopile foundations and may also be used to a limited extent to construct moorage improvements at the Montauk O&M facility. Vibratory pile driving may be used to construct the temporary cofferdam at the SFEC sea-to-shore transition and would also be used for O&M facility improvements. Construction vessels and HRG survey equipment would be used throughout SFWF and SFEC construction. Smaller construction vessels and dredging equipment would be used for O&M facility construction.

Impact hammer installation of the SFWF monopile foundations would produce the most intense underwater noise impacts with the greatest potential to cause injury-level effects on marine mammals. The action alternatives incorporate a range of EPMs that SFW has committed to in their COP Table ES-1 and are described in Appendix G, Table G-1.

Vibratory pile driving would generate intense non-impulsive noise impacts. Non-impulsive noise is less likely to cause injury to marine mammals, but the loud, continuous sound field generated by these sources can interfere with, or mask, communication and the ability to detect predators and locate prey (Hatch et al. 2012; Putland et al. 2017). HRG survey equipment is mobile, meaning that the sound source and the receptor, marine mammals, are moving in relation to one another. This tends to limit the duration of exposure such that injury-level effects are unlikely, but exposures exceeding behavioral and auditory masking thresholds may still occur. In contrast, vibratory pile driving used to install the temporary cofferdam at the SFEC sea-to-shore transition site would be stationary. While vibratory pile driving is lower in intensity than HRG survey equipment, the continuous noise it generates can cause auditory masking effects over great distances. Vessel engines also produce non-impulsive low frequency sound. While lower in intensity than vibratory pile driving, vessel engines operate continuously and can substantially alter the ambient noise environment.

Alternatively, SFW could use casing pipe for the temporary cofferdam, which would be installed using impact pile driving, which would result in less acoustic impact than vibratory pile driving to construct a cofferdam (Zeddies 2021).

Underwater noise impacts on marine mammals are evaluated using behavioral and injury-level thresholds for different marine mammal species groups developed by NMFS (NOAA 2018). Specific hearing loss thresholds are defined for different marine mammal species groups based on hearing sensitivity. These thresholds are summarized in Table 3.4.4 3. As shown, marine mammals are organized into four different groups based on hearing sensitivity, specifically the range of sound frequencies they are most sensitive to. NOAA (2018) has defined dual PTS and TTS criteria for each group that can be used to evaluate the potential for hearing injury from exposure to different types of noise exposure, such as instantaneous exposure to a single pile strike, cumulative exposure to multiple pile strikes or cumulative exposure to non-impulsive sources like vibratory pile driving or vessel noise (NOAA 2018). NMFS (NOAA 2018) has also defined threshold criteria for behavioral effects from impulsive and non-impulsive noise sources and for behavioral and auditory masking effects from non-impulsive noise sources (see Table 3.4.4 3).

Denes et al. (2021) developed sound source level estimates for monopile installation, vibratory pile driving used for sea-to-shore transition construction, and construction vessel noise. They then used those source values to estimate the distance required for that noise to attenuate to the marine mammal exposure thresholds shown in Table 3.4.4 3. The resulting values represent a radius extending around each noise source where potential injurious-level effects could occur. CSA Ocean Associates (2020) used similar methods to estimate an effect radius for HRG survey equipment. These effect radii are shown in Table 3.4.4 4. The single strike injury distances apply only to impact pile driving and represent how close a marine mammal would have to be to the source to be instantly injured by a single pile strike. The cumulative injury distances consider total estimated daily exposure, meaning a marine mammal would have to remain within that threshold distance over an entire day of exposure to experience hearing injury. The behavioral and auditory masking values are instantaneous exposure distances, meaning that any animal within the effect radius is assumed to have experienced a temporary to short-term adverse effect.

Table 3.4.5-4. Distance Required to Attenuate Underwater Construction Noise Below Marine Mammal Injury and Behavioral Effect Thresholds by Activity and Hearing/Species Groups

Construction Activity	Species Group	Exposure Distance to Single Strike Injury Threshold (feet)	Exposure Distance to Cumulative Injury Threshold (feet)	Exposure Distance to Behavioral Effect Threshold (feet)
Monopile foundation installation*	Low-frequency cetaceans	30	28,517	15,794
	Mid-frequency cetaceans	3	197	8,465
	High-frequency cetaceans	797	11,900	7,142
	Phocid pinnipeds (seals)	39	3,750	11,837
Temporary cofferdam installation†,*	Low-frequency cetaceans	Not applicable (N/A)	4,823	120,374
	Mid-frequency cetaceans	N/A	0	68,537
	High-frequency cetaceans	N/A	207	52,598
	Phocid pinnipeds (seals)	N/A	338	100,784

Construction Activity	Species Group	Exposure Distance to Single Strike Injury Threshold (feet)	Exposure Distance to Cumulative Injury Threshold (feet)	Exposure Distance to Behavioral Effect Threshold (feet)
Construction vessel operation‡,*	Low-frequency cetaceans	N/A	367	48,077
	Mid-frequency cetaceans	N/A	115	44,236
	High-frequency cetaceans	N/A	338	42,362
	Phocid pinnipeds (seals)	N/A	164	47,001
HRG surveys¥	Low-frequency cetaceans	0	5	463
	Mid-frequency cetaceans	0	< 3	463
	High-frequency cetaceans	0	120	463
	Phocid pinnipeds (seals)	0	< 3	463
O&M facility improvements§,¶	Low-frequency cetaceans	N/A	169	N/A
	Mid-frequency cetaceans	N/A	15	N/A
	High-frequency cetaceans	N/A	250	N/A
	Phocid pinnipeds (seals)	N/A	103	4,460

* Data from Denes et al. (2021). Values are maximum modeled effect distance estimates for difficult installation of an 11-meter monopile using an IHC S-4000 impact hammer with 10-dB attenuation. A difficult installation would nearly double the number of hammer strikes anticipated for a typical pile installation. The cumulative injury threshold distances for typical pile installation would be smaller, as described under Impulsive noise below.

† Sheet pile cofferdam installed using a vibratory hammer.

‡ Analysis considered use of dynamic positioning thrusters by construction vessels. This analysis did not consider the timing, frequency, and duration of noise from background vessel traffic in and near the Lease Area. Noise levels produced by construction vessels are expected to be similar to these background sources.

§ Distance to threshold estimated assuming the use of AZ-type sheet piles, with a maximum of 33 piles driven within a 24-hour period.

¥ Threshold distances based on the loudest type of HRG survey equipment, as summarized by CSA Ocean Sciences Inc. (2020).

¶ Calculated using the methods and associated analysis tools described in NOAA (2018).

The Proposed Action includes the installation of 16 monopile foundations using an impact hammer. The installation scenario considered in the analysis assumes 15 “standard” installations requiring approximately 4,500 pile strikes over 2 hours to achieve desired depth, and one “difficult” installation requiring 8,000 pile strikes and up to 4 hours due to underlying substrate conditions. After each pile is driven to depth, the construction vessel would attach appurtenant platforms and equipment and then reposition to the next foundation site. Under the most aggressive installation scenario a total of six foundations could be installed in 7 days. These exposures distance estimate reflect the planned use of a noise attenuation system that will reduce the source noise level by an average of 10 dB per hammer strike, which is achievable with currently available technologies (Bellman et al. 2020).

Monopile installation is the most likely source of permanent hearing injury and other temporary to short-term effects to marine mammals from Project-related underwater noise. The likelihood of injury depends on proximity to the noise source, the intensity of the source, the effectiveness of noise attenuation measures, and the duration of noise exposure. A detailed discussion of noise is provided in Vineyard Wind final EIS Section 3.4.1.1.1 (BOEM 2021b). For example, a low-frequency cetacean would have to remain 5.4 miles (28,517 feet) from the impact hammer operation over the 4 hours required for a difficult monopile installation to potentially experience permanent hearing injury, referred to as a PTS. Over a shorter time frame, the low-frequency cetacean would have to be closer to the pile to experience a PTS. Mid-frequency cetaceans and phocid pinnipeds are less sensitive to the intense, low-frequency sounds produced by impact pile driving and would have to be much closer to the source to be injured. For example, phocid pinnipeds would need to remain at 0.7 mile (3,750 feet) from the same noise source to experience cumulative injury. Aversion responses (avoidance of sound levels or acoustic sources that are disturbing or injurious) by marine mammals have been documented (Dunlop et al. 2017; Ellison et al. 2012; Southall et al. 2007). While avoidance responses are often variable and remain poorly understood, the available information suggests that mobile marine mammals are likely to leave areas where potentially harmful noise effects are occurring, thereby reducing risk of PTS and TTS.

Vibratory pile driving used during construction of the SFEC sea-to-shore transition would create a large exposure area for underwater noise in excess of the 120 dB_{RMS} threshold for behavioral effects from non-impulsive noise sources, extending outward in a semicircle up to 120,374 feet (22.8 miles) from the potential cofferdam sites (Denes et al. 2021) (see Figure C-32 in Appendix C). This noise source would be limited in duration, lasting no more than 18 hours per day over a maximum of 2 days (up to 36 hours total for installation and removal). Impulsive noise from HRG survey equipment (sparkers and boomers) and non-impulsive noise exceeding thresholds from construction vessels would extend outward from each source up to 463 and 48,077 feet (9.1 miles), respectively, and would occur intermittently over up to 60 total days.

As discussed above, the applicant-committed EPMs and additional mitigation measures would effectively minimize hearing impairment risks to most marine mammals from instantaneous and cumulative noise exposure. These measures emphasize protection of the critically endangered NARW, such as concentrating construction within a timing window when this species is least likely to be present. This timing window is not protective for all species, and some impact areas for PTS, TTS, and behavioral effects are large enough that the potential for individual exposure cannot be ruled out.

CSA Ocean Sciences Inc. (2020) developed estimates of the number marine mammals that could be exposed to potential adverse noise-related effects. They used a sophisticated exposure model to estimate the number of individuals by species that could be exposed to noise levels sufficient to elicit some degree of PTS (i.e., permanent hearing injury), TTS (i.e., a temporary and recoverable loss of hearing sensitivity), and other short-term physiological and behavioral effects from construction noise exposure over a 48-day work period, but the proposed work is planned for only 30-day work window. The modeled scenario included the planned use of noise attenuation system capable of achieving at least a 10-dB reduction in sound source level and timing restrictions to protect NARW but did not account for other measures to reduce exposure risk (i.e., clearance zone monitoring using PSOs and PAM, soft starts, and shutdown procedures). These results are summarized in Table 3.4.45.

Table 3.4.5-5. Estimated Number of Marine Mammals Experiencing a Permanent Threshold Shift and Temporary Threshold Shift or Behavioral Effects from Construction-Related Impact Pile Driving

Functional Hearing Group	Species	Estimated Number of Affected Individuals*		
		PTS Cumulative Sound Exposure	PTS from Peak Sound Pressure Exposure	TTS or Physiological Behavioral Effects
Low-frequency cetaceans	Fin whale	1	< 1	6
	Minke whale	1	< 1	10
	Sei whale	< 1	< 1	< 1
	Humpback whale	4	< 1	8
	NARW	< 1	< 1	4

Functional Hearing Group	Species	Estimated Number of Affected Individuals*		
		PTS Cumulative Sound Exposure	PTS from Peak Sound Pressure Exposure	TTS or Physiological Behavioral Effects
Mid-frequency cetaceans	Sperm whale	< 1	< 1	< 1
	Atlantic spotted dolphin	< 1	< 1	2
	Atlantic white sided dolphin	< 1	< 1	107
	Common bottlenose dolphin	< 1	< 1	43
	Common dolphin	< 1	< 1	197
	Risso's dolphin	< 1	< 1	<1
	Pilot whale	< 1	< 1	< 1
High-frequency cetaceans	Harbor porpoise	1	2	78
Phocid pinnipeds	Gray seal	< 1	< 1	60
	Harbor seal	< 1	< 1	54

Source: CSA Ocean Sciences Inc. (2020).

* Modeled exposure estimates based on impact hammer installation of 16 11-meter monopiles. Installation scenario assumes one difficult and 15 normal installations requiring 4 hours and 2 hours of pile driving, respectively, and use of a noise attenuation system achieving 10-dB effectiveness. Values < 1 indicate a modeled exposure estimate of greater than 0 but less than 0.5 individual, which is considered a result of zero for regulatory purposes.

† See impact significance criteria definitions in Table 3.4.4-3.

As shown, CSA Ocean Sciences Inc (2020) estimated that up to one fin whale, one sei whale, four humpback whales, and three harbor porpoises could experience PTS injury from exposure to cumulative and peak impact pile-driving noise under the Proposed Action. None of the other marine mammal species that occur in the noise impact area, including NARW, are likely to experience PTS (as indicated by an individual exposure estimate of < 1). Individuals from several species are likely to experience noise exposure sufficient to cause TTS or behavioral effects. TTS and behavioral exposures can have an array of adverse effects on marine mammals, even in the absence of overt behavioral responses. For example, a reduction in effective "communication space" caused by auditory masking can it more difficult to locate companions and maintain social organization (Cholewiak et al. 2018). This can increase physiological stress, leading to impaired immune function and other chronic health problems (Hatch et al. 2012; Rolland et al. 2012), and even lead to broader changes in distribution, and population fragmentation (Brakes and Dall 2016; Davis et al. 2017). These kinds of effects are most associated with long-term changes in the ambient noise environment, specifically from chronic exposure to noise from increasing levels of marine vessel traffic. All construction-related noise sources would cease once construction is completed, and any animals suffering from TTS or stress from auditory masking and behavioral exposure would be expected to recover fully within hours to days.

Using the significance criteria in Table 3.4.4-3, the construction noise exposures summarized in Table 3.4.4-5 would result in moderate effects on fin, minke, and humpback whales and harbor porpoises; and minor effects on NARW and Atlantic spotted, Atlantic white-sided, common bottlenose, and common dolphins. Construction noise effects on Risso's dolphin and sei, sperm, and pilot whales would be negligible. These are likely overestimates, in that they do not consider establishment and monitoring of clearance zones using PSOs and PAM, soft-start and shutdown procedures, and other planned measures to avoid and minimize exposure.

CSA Ocean Sciences Inc. (2020) did not explicitly consider exposure to vessel noise in their assessment. In general, construction vessel noise is unlikely to cause cumulative hearing injury in marine mammals because this would require prolonged exposure at close proximity to the source (i.e., within 400 feet for 24 hours). This is an unlikely scenario. For example, an animal swimming at 2.5 miles per hour, the lower end of average swim speeds for the NARW (Baumgartner and Mate 2005), would travel 400 feet in less than 2 minutes. Moving vessels produce lower noise levels, further reducing the potential for injury-level exposure. Animal movement would also reduce exposure to potential behavioral and auditory masking effects. For example, a marine mammal moving away from a stationary construction vessel at 2.5 miles per hour would clear the maximum potential behavioral exposure zone within approximately 4 hours. As stated above, available data suggests that mobile marine mammals would avoid behavioral disturbances like those resulting from vessel noise, meaning that the duration of exposure to noise from slow-moving, or closely clustered and stationary construction vessels would be limited. Moreover, a substantial portion of construction vessel activity would occur in an area having high existing levels of vessel traffic. In these areas, construction vessel noise would contribute to, but may not substantially alter, ambient noise generated by existing large vessel traffic in the vicinity. While some individual marine mammals may experience short-term behavioral and auditory effects from vessel noise exposure, these effects would be short term in duration and broader stock or population-level impacts are unlikely. Therefore, construction vessel noise impacts on marine mammals would likely be minor.

Construction of the O&M facility would include dredging to bring the proposed berthing area to suitable depth for crew transport and maintenance vessels, and vibratory pile driving to install five 2-foot-diameter steel piles. A limited number of impact hammer strikes may be used to complete installation of each pile. Pile driving used to install moorage improvements at the Montauk O&M facility could cause cumulative injury exposure and instantaneous behavioral effects in seals that remain within 103 feet and 4,460 feet of the activity, respectively. Dredging would also generate underwater noise. However, the O&M facility site, other berthing areas in Lake Montauk Harbor, and the federal navigation channel adjacent to the site are routinely dredged to maintain desired depths. Dredging noise effects on marine mammals from O&M facility construction would therefore be negligible relative to this baseline. Vibratory and impact pile-driving noise would be limited in duration and contained entirely within Lake Montauk by the surrounding shorelines (BOEM 2021). Gray and harbor seals, harbor porpoise, and potentially some dolphin species may occur in Lake Montauk and could be exposed to O&M facility construction effects. The larger whales, including the ESA-listed species (see 3.4.4-1), are not likely to occur in Lake Montauk (USACE 2019). Based on the noise levels produced by 24-inch piles and the limited duration of vibratory and pile driving, injury-level effects on seals are unlikely to occur. Behavioral-level effects on small numbers of individual seals and porpoises may occur, but these effects would not be significant at the population level and therefore minor.

Impact pile-driving noise could kill or injure or temporarily alter the distribution of fish and invertebrate prey (see Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish), leading to indirect effects on marine mammal prey resources. These effects would be limited in extent, short term, and are unlikely to measurably affect the amount of prey available to marine mammals across the OCS. Therefore, the indirect adverse effects of underwater noise on marine mammal prey species would be negligible to minor.

Pile driving also produces airborne noise. NMFS has established a behavioral threshold of 90 dB_{RMS} for harbor seals and 100 dB_{RMS} for other otariid and phocid pinniped exposure to airborne noise sources like pile driving (NOAA 2018). No equivalent airborne noise behavioral thresholds have been established for other marine mammal species. Harbor and gray seals are the only pinniped species group expected to occur in the SFWF and SFEC. Based on methods described by the Washington State Department of Transportation (2020), behavioral-level effects could be experienced within approximately 500 and 10 feet from impact and vibratory pile-driving locations, respectively. However, because seals would experience behavioral- and injury-level exposures to underwater noise at greater distance, behavioral-level exposure to airborne noise is unlikely to occur as an independent effect. Moreover, marine mammal observers would monitor the affected area for seals and would halt construction if individuals are observed within these limits, further minimizing the risk of seal exposure to airborne noise impacts (Baker et al. 2013; Jacobs 2021). On this basis, airborne noise effects on seals would be negligible.

Helicopters and fixed-wing aircraft may also be used during Project construction. In general, marine mammal behavioral responses to aircraft most commonly occur at distances of less than 1,000 feet and those responses are typically limited and likely insignificant (Patenaude et al. 2002). Similarly, aircraft could disturb hauled-out seals if aircraft overflights occur within 2,000 feet of a haul-out area. BOEM would require all aircraft operations to comply with current approach regulations for any sighted NARWs or unidentified large whale. Current regulations (50 CFR 222.32) prohibit aircraft from approaching within 1,500 feet of NARW. BOEM expects that most aircraft operations would occur above this altitude limit except under specific circumstances (e.g., helicopter landings on the service operations vessel). Aircraft operations could result in temporary behavioral responses, including short surface durations, abrupt dives, and percussive behaviors (i.e., breaching and tail slapping) (Patenaude et al. 2002), but BOEM does not expect that these exposures would result in biologically significant effects on marine mammals. On this basis, noise and disturbance effects on marine mammals from aircraft operations under the No Action alternative are expected to be minor.

<u>Suspended sediment and sediment deposition</u>: Seabed disturbance during cable installation, sea-to-shore transition construction, and O&M facility dredging would result in elevated suspended sediment concentrations in the water column. Vinhateiro et al. (2018) modeled the magnitude and extent of anticipated TSS concentrations resulting from SFWF and SFEC construction. Maximum water column TSS concentrations could range between 500 and 1,347 mg/L in close proximity to the disturbance within a few select areas but would dissipate quickly (within minutes) to less than 100 mg/L. The majority of water column effects would be limited to short-term TSS pulses below than 100 mg/L, occurring in plumes extending approximately 6 to 12 feet off the seabed and up to 330 feet downcurrent. TSS concentrations would dissipate to background conditions within approximately 1 to 2 hours after disturbance. These modeled estimates are similar to those developed for BIWF construction. The observed extent of TSS impacts at the BIWF turned out to be far lower than the modeled estimates (Elliot et al. 2017), indicating that the potential impacts described here are likely conservative. Both the modeled TSS effects, which are conservatively high, and the observed TSS effects were short term and within the range of baseline variability. Dredging activities at the O&M facility would also result in temporary TSS plumes. However, these effects would be short term (i.e., a few hours) due to the low mobility of sediments (primarily sand) in the proposed dredge area (Stantec 2020; USACE 2020).

Available information on marine mammal sensitivity to TSS indicates that water quality impacts would have negligible effects on marine mammals. First, periodic TSS concentrations on the order of 100 mg/L at or near the seabed are within the range of baseline variability. Marine mammals that forage on or near the seabed are unlikely to be affected by a short-term increase in TSS that are comparable to existing conditions. For example, researchers have observed that visually impaired grey and harbor seals are able to navigate and locate prey just as effectively as their fully sighted counterparts (McConnell et al. 1999; Newby et al. 1970; Todd et al. 2015), indicating that short-term visual impairment would have no measurable effect on foraging ability. While research on TSS sensitivity in dolphins and large whales is generally lacking, these species developed the ability to echolocate by evolving in environments having variable and often low visibility (Tyack and Miller 2002). This suggests that a short-term reduction in visibility would have no meaningful effects on communication, foraging, and predator avoidance, particularly given that measurable TSS impacts would be limited to within 10 to 12 feet of the seabed.

These factors indicate that marine mammal exposure to water quality effects resulting from construction of the Proposed Action would be limited. Those species that are exposed to elevated TSS would be unlikely to experience measurable effects on behavior, foraging success, or communication. On this basis, water quality effects on marine mammals resulting from Project construction would be negligible.

Vessel traffic: Construction and monitoring vessels pose a potential collision risk to marine mammals, and the noise and disturbance generated by vessel presence may temporarily displace individual marine mammals from preferred habitats.

Based on information provided by SFW, Project construction would require an estimated total of 50 large construction vessel trips between the Port of New London, Connecticut, and the SFWF over the 2-year construction period, or approximately six trips per month. BOEM estimates that at least six vessel trips originating from European ports are likely and an additional 20 trips are possible over the 2-year construction period. Up to four vessel trips could originate from other U.S. ports, including Paulsboro, NJ; Sparrows Point or Baltimore, MD; Norfolk, VA; or possibly other ports on the Atlantic coast or Gulf of Mexico, but BOEM considers this to be unlikely based on current understanding. BOEM estimates that four vessel trips could originate from the Montauk O&M facility site (unlikely), and two additional vessel trips could originate from other unspecified worldwide ports (possible). In addition, approximately 620 linear miles of pre-construction HRG surveys are anticipated to support micrositing of the WTG foundations and cable routes. HRG surveys could occur during any month of the year and would require a maximum of 60 total vessel days. The construction vessels used for Project construction are described in Section 3.1.3.1 and Table 3.1-6 in the COP. Typical large construction vessels used in this type of project range from 325 to 350 feet in length, from 60 to 100 feet in beam, and draft from 16 to 20 feet (Denes et al. 2021).

In total, Project construction would require an estimated 311 one-way vessel trips (approximately 156 round trips) between construction sites and area ports in Rhode Island or Connecticut, and 66 additional one-way trips from other ports, as described above. Large construction vessels would account for an estimated 153 of these one-way trips, with the remainder comprising CTVs and other small support vessels. BOEM (2021) developed a representative analysis of construction vessel effects on regional traffic volume by evaluating the potential increase in transits across a set of analysis cross sections relative to baseline levels of vessel traffic. These cross sections are shown in 3.4.4-1.

BOEM (2021) assumed that the construction vessel trip estimates summarized above would be evenly divided between cross sections 13, 17, and 20 when leaving the SFWF and SFEC construction areas (cross section 20 is under the scale bar), and all vessels traveling to Rhode Island ports would travel through cross section 5 (see Figure 3.4.4-1). Applying this assumption, construction vessel activity would result in 51 additional vessel transits through cross section 13 per year (relative to 31 baseline transits), 51 additional vessel trips through cross section 17 (relative to 60 baseline transits), and 51 additional vessel trips through cross section 20 (relative to 51 baseline transits). Once in the shipping lanes, construction vessel traffic would modestly increase annual vessel traffic by 155 trips (relative to 1,296 baseline transits). These estimates are not fully representative, however, as they do not consider fishing vessel traffic. Over 200 fishing vessels account for 3,000 additional vessel trips each year. In summary, this assessment indicates that construction vessels would likely increase vessel traffic to some degree, and large vessel traffic would measurably increase during the 2-year construction period. This indicates the potential for increased risk of marine mammal collisions in the absence of planned mitigation measures and other requirements.

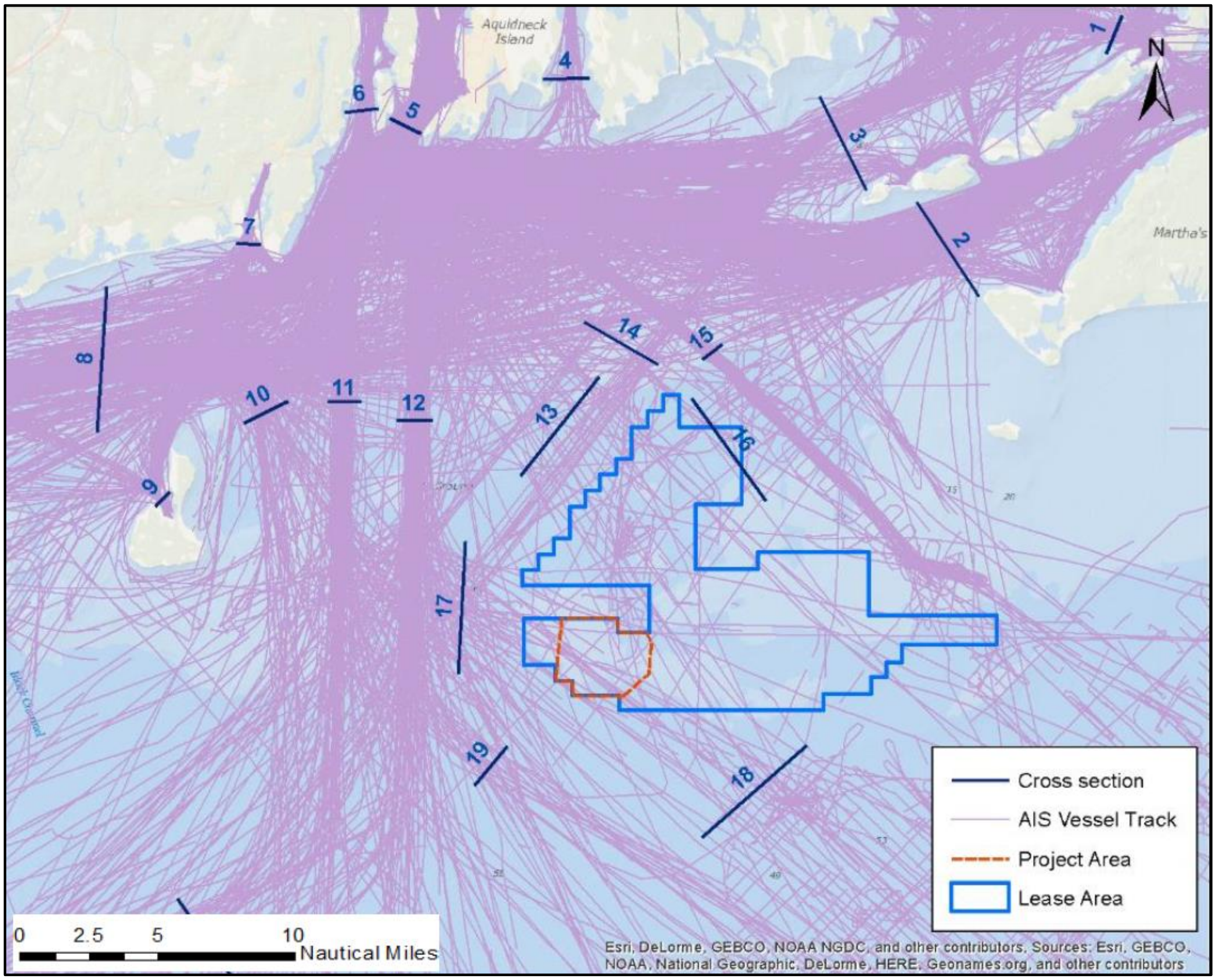


Figure 3.4.5-1. AIS vessel traffic tracks for June 2016 to July 2017 and analysis cross sections used for traffic pattern analysis (DNV GL 2018).

Vessel collisions are a major source of mortality and injury for many marine mammal species (Hayes et al. 2021; Laist et al. 2001; Rockwell et al. 2017), indicating the importance of protective measures to minimize risks to vulnerable species. If a vessel strike does occur, the impact on marine mammals would range from negligible to major depending on the species and severity of the strike. However, the applicant has committed to a range of EPMs to avoid vessel collisions with marine mammals (see Appendix G, Table G-1). These include strict adherence to NOAA guidance for collision avoidance and a combination of additional measures, including speed restrictions to 10 knots or less for all vessels at all times between November 1 and April 30, speed restrictions to 10 knots or less in Dynamic Management Areas (DMAs). All vessel crews would receive training to ensure these EPMs are fully implemented for vessels in transit. Once on station, the construction vessels either remain stationary when installing the monopiles and WTG/OSS equipment or move slowly (i.e., at less than 10 knots) when traveling between foundation locations. Cable laying and HRG survey vessels also move slowly, with typical operational speeds of less than 1 and approximately 4 knots, respectively.

Based on the low density of marine mammals in the SFW Lease Area and a maximum of 156 round trips during construction and installation, there is a low risk of encountering a marine mammal. The operational conditions combined with planned EPMs (see Appendix G for all vessel strike avoidance measures) will minimize collision risk during construction and installation. During periods of low visibility, trained crew would use increased vigilance to avoid marine mammals. Because vessel strikes are not an anticipated outcome given the relatively low number of vessel trips and monitoring and mitigation activities to avoid encountering marine mammals, BOEM concludes vessel strikes are unlikely to occur. Therefore, there is no anticipated effect on marine mammals. In the event of an unanticipated vessel strike of a marine mammal by any vessel supporting the Project, Orsted must immediately cease the activities until BOEM is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with all applicable laws (e.g., ESA, MMPA) and COP approval conditions.

The presence of construction vessels and associated noise and disturbance may cause short-term displacement of marine mammals from preferred habitats. Long (2017) observed temporary marine mammal displacement from offshore wind energy construction sites on the Scottish coast, apparently due to vessel-related disturbance. Habitat use within the affected areas returned to normal after construction was completed, indicating that any such displacement effects would be short term in duration. On this basis vessel displacement effects on marine mammals could range from minor to moderate, recognizing that some portion of these effects are also likely the result of construction noise, as described above.

Marine debris and accidental spills: Construction vessels pose a theoretical source of marine debris and entanglement risk and accidental discharges of petroleum products and other toxic substances. Marine debris are a known source of adverse effects to marine mammals (Laist 1997; NOAA-MDP 2014a, 2014b). BOEM prohibits the discharge or disposal of solid debris into offshore waters during any activity associated with the construction and operation of offshore energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100−220 (101 Stat. 1458)). The applicant would follow strict oil spill prevention and response procedures during all Project phases and has developed a detailed spill response and containment plan as a Project EPM. These regulatory requirements and EPMs would effectively avoid releases of abandoned marine debris, although potential for entanglement associated with active commercial or recreational fishing gear would still exist and would avoid and minimize impacts from accidental spills such that adverse effects on marine mammals are unlikely to occur. Therefore, effects on marine mammals from this impact mechanism would be negligible.

Operations and Maintenance and Conceptual Decommissioning

The operational effects of the Project include the physical presence of the SFWF turbine and substation foundations, alteration of benthic habitat by rock armoring and scour protection, underwater and airborne noise from the operating turbines, O&M vessel traffic and associated underwater noise, and annual maintenance dredging of the O&M facility, water quality degradation due to maintenance dredging, EMF effects generated by the inter-array cable and SFEC, and artificial lighting on the WTG and substation towers.

Project construction and conceptual decommissioning would involve similar vessels, equipment, and methods, and, except for noise, would produce similar effects. Pile driving would not be required for conceptual decommissioning. The monopile foundations would be cut at 15 feet below the seabed in accordance with 30 CFR 585.910 using a cable saw or an internal abrasive waterjet cutting tool and returned to shore for recycling. Noise produced by cutting equipment is generally indistinguishable from engine noise (Pangerc et al. 2016), and therefore would not lead to additional effects beyond vessel noise.

Displacement effects: The presence of SFWF monopile foundations over the life of the Project would alter the character of the ocean environment, and their presence could affect marine mammal behavior; however, the likelihood and significance of these effects are difficult to determine. Long (2017) compiled a statistical study of seal and cetacean (including porpoises and baleen whales) behavior in and around Scottish marine energy facilities. The study found evidence of displacement during construction, but habitat use appeared to return to previous levels once construction was complete and the projects were in operation. Long cautioned that observational evidence was limited for certain species and further research would be required to draw a definitive conclusion about operational effects. Delefosse et al. (2017) reviewed marine mammal sighting data around oil and gas structures in the North Sea and found no clear evidence of species attraction or displacement. Long (2017) found no observable long-term displacement effects on seals, porpoises, dolphins, or large whales, from a network of wave energy converters installed on the Scottish coast, but these findings may not be applicable to offshore wind structures. Other studies have documented apparent changes in marine mammal behavior around wind energy facilities. For example, Russel et al. (2014) found clear evidence that seals were attracted to a European wind farm, apparently attracted by the abundant concentrations of prey created by the artificial reef effect. Gray seals are particularly susceptible to entrapment in trawl fisheries (Orphanides 2020). If commercial trawling were to occur near wind farms, increased interactions and resulting mortality of gray seals might be anticipated. Some research has suggested long-term displacement of species like harbor porpoise, but the evidence is mixed, and observed changes in abundance may be more indicative of general population trends than an actual wind farm effect (Nabe-Nielsen et al. 2011; Tielmann and Carstensen 2012; Vallejo et al. 2017).

The 16 SFWF monopile foundations would be placed in a grid-like pattern with spacing of approximately 1.0 (0.9 to 1.1) nm between turbines. Based on documented lengths (Wynne and Schwartz 1999), the largest NARW (59 feet [18 meters]), fin whale (79 feet [24 meters]), sei whale (59 feet [18 meters]), and sperm whale (59 feet [18 meters]) would fit end-to-end between two foundations spaced at 1 nm 100 times over. This simple assessment of spacing relative to animal size indicates that the physical presence of the monopile foundations is unlikely to pose a barrier to the movement of large marine mammals, and even less likely to impede the movement of smaller marine mammals. On this basis, BOEM concludes that the presence of the SFWF monopile foundations would pose a negligible risk of displacement effects on marine mammals. However, this determination does not consider the potential effects of operational noise, which are addressed further below.

<u>Habitat alteration and hydrodynamic effects</u>: The presence of the SFWF could also cause indirect effects on marine mammals by changing the distribution and abundance of preferred prey and forage species. Monopiles and scour protection would create an artificial reef effect (Degraer et al. 2020), likely leading to enhanced biological productivity and increased abundance and concentration of fish and invertebrate resources (Hutchison et al. 2020). This could alter predator-prey interactions in and around the facility with uncertain and potentially beneficial or adverse effects on marine mammals. For example, fish predators like seals and porpoises could benefit from increased biological productivity and abundant concentrations of prey generated by the reef effect (e.g., Russel et al. 2014).

The presence of vertical structures in the water column could cause localized hydrodynamic effects that could influence the distribution and abundance of fish and planktonic prey resources (van Berkel et al. 2020). Turbulence presence of vertical structures in the water column could lead to localized changes in circulation and stratification patterns, with potential implications for primary and secondary productivity and fish distribution. These effects and their implications for fish, invertebrates, and primary and secondary productivity are discussed in detail in Section 3.4.2.2.3. In summary, the SFWF and SFEC is characterized by strong seasonal stratification, which is expected to limit measurable hydrodynamic effects to within 600 to 1,300 feet downcurrent of each monopile. Localized turbulence and upwelling effects around the monopiles are likely to transport nutrients into the surface layer, potentially increasing primary and secondary productivity. That increased productivity could be partially offset by the formation of abundant colonies of filter feeders on the monopile foundations. While the net impact of these interactions are difficult to predict, they are not likely to result in more than localized effects on the abundance of zooplankton. The 0.9- to 1.1-nm spacing between monopiles ensures that their respective turbulent zones would not overlap. Recent modeling of hydrodynamic effects suggests that surface currents could be affected by the presence of multiple wind farms, potentially impacting the distribution of larvae (Johnson et al., 2021). When considered relative to the broader oceanographic factors that determine primary and secondary productivity in the region, localized impacts on zooplankton abundance and distribution are not likely to measurably affect the availability of prey resources for marine mammals.

In summary, long-term reef and hydrodynamic effects resulting from the Proposed Action could result in minor beneficial effects on fish-eating marine mammals like dolphins and seals that benefit from increased prey abundance around the structures and negligible effects on marine mammals that forage on plankton and forage fish.

Survey fisheries gear (trawl surveys, gillnet and ventless trap and pot gear, and the anchoring lines and buoys used to secure PAM equipment) could also pose an entanglement risk to marine mammals. Post-ROD gillnet and ventless trap and pot surveys would employ the use of both weak link and weak rope technologies that are consistent with recommendations from NMFS. As such, impacts to marine mammals are expected to be negligible based upon the limited number of associated buoy lines and the implementation of risk reduction measures such as no wet storage of fishery monitoring gear; pot gear sampling in July to September will not occur in order to minimize interactions with protected species (e.g., large whales, sea turtles); no buoy lines floating at the surface; all sampling gear will be hauled at least once every 30 days; all gear will be removed from the water at the end of each sampling season; all groundlines will be constructed of sinking line; and all gillnet strings will be anchored with a Danforth-style anchor with a minimum holding strength of 22 pounds. For trawl surveys, large whale species have the speed and maneuverability to avoid oncoming mobile gear (NMFS 2016), and due to the few proposed trawl survey and short tow times, impacts are anticipated to be negligible.

Acoustic telemetry receiver systems pose a negligible risk of harm to marine mammals. Based on the type of equipment and the fact that a small number of receivers deployed (10 in total) would be distributed over a large area, BOEM considers the effects of this Project element on marine mammals to be negligible. Similarly, moored and autonomous PAM systems will use the best available technology to reduce any potential risks of entanglement. PAM system deployment would avoid and minimize impacts. Therefore, the effects of this type of survey equipment on marine mammals are negligible.

Operational noise: Offshore WTGs produce continuous non-impulsive underwater noise during operation, mostly in lower frequency bands below 8 kHz. The low-frequency sounds produced by WTGs are within the range of hearing sensitivity and audible communication frequencies used by many species of marine mammals (NOAA 2018), indicating that this impact mechanism could be a potential source of behavioral and auditory masking effects on marine mammal species.

Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter modern direct-drive systems like those proposed for the SFWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 dB re 1 µPa at a reference distance of 50 meters, occasionally reaching as high as 128 dB re 1 µPa, in the 10-Hz to 8-kHz range. This is consistent with the noise levels observed at the BIWF (Elliot et al. 2019) and the range of values observed at European wind farms. More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10 MW) current generation direct-drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This suggests that operational noise effects on finfish, including EFH species, could be more intense and extensive than those considered herein, but the findings have not been validated.

The potential for behavioral and auditory masking effects on marine mammals can be evaluated by estimating the area exposed to WTG operational noise above the 120 dB_{RMS} behavioral effects threshold for non-impulsive noise sources (3.4.4-3). Applying the practical spreading loss model and the general rule of thumb for estimating dB_{RMS} from dB re 1 µPa (WSDOT 2020),[10] the maximum predicted operational noise

[10] Sound source values in dB_{RMS} can be estimated by subtracting 10 dB from peak source values in dB re 1 µPa (WSDOT 2020).

level of 128 dB_{RMS} would attenuate below 120 dB_{RMS} within approximately 120 feet of each turbine foundation. This suggests that behavioral and masking effects could occur within a small radius around each turbine.

However, it is also probable that operational noise would change the ambient sound environment within the wind farm environment in ways that could affect habitat suitability. This impact can be evaluated by estimating the area exposed to operational noise above the existing environmental baseline. Kraus et al. (2016) measured ambient noise conditions at three locations adjacent to the proposed SFWF over a 3-year and identified baseline levels of 102 to 110 dB re 1 µPa.[11] Maximum operational noise levels typically occur at higher wind speeds when baseline noise levels are higher due to wave action. Applying the same approach described above, the minimum and maximum operational noise levels of 110 and 128 dB_{RMS} would attenuate to the 102 to 110 re 1 µPa baseline within approximately 120 to 560 feet of each turbine, respectively.

Operational noise could interfere with communication and echolocation, reducing feeding efficiency in the areas within a few hundred feet of the monopiles under some conditions. Any such effects would likely be dependent on hearing sensitivity and the ability to adapt to low-intensity changes in the noise environment. For example, based on known hearing sensitivity (Johnson 1967; NOAA 2018), mid-frequency cetaceans like dolphins are likely to be less sensitive to the low-frequency sounds generated by operational WTGs. Dolphins vocalize in low to mid frequencies, suggesting the possibility of partial masking effects, but these species are also known to shift vocalization frequencies to adapt to natural and anthropogenic conditions (David 2006; Quintana-Rizzo 2006).

On balance, any operational noise effects from the SFWF are likely to be of low intensity and highly localized. Jansen and de Jong (2016) and Tougaard et al. (2009) concluded that marine mammals would be able to detect operational noise within a few thousand feet of WTGs, but the effects would have no significant impacts on individual survival, population viability, distribution, or behavior. The findings provided above indicate that operational noise effects would attenuate to ambient levels within a few hundred feet of each foundation, but operational noise could cause auditory masking effects for marine mammals within 120 feet of each turbine. This suggests the potential for a reduction in effective communication space within the wind farm environment for marine mammals that communicate primarily in frequency bands below 8 kHz. This localized, long-term impact would constitute a moderate effect on marine mammals belonging to the low-frequency cetacean hearing group.

The O&M facility would require annual maintenance dredging to maintain CTV berths. Dredging would be completed with the use of a barge-mounted crane or excavator fitted with a clamshell bucket. Seals would likely avoid the area during dredging activities as a result of underwater noise. Montauk Harbor is periodically dredged to maintain navigational access (USACE 2019), meaning that this form of disturbance already commonly occurs. Because underwater and airborne noise would not differ from background noise from existing vessel traffic and harbor maintenance activities, noise and disturbance associated with maintenance dredging noise is not expected to have a meaningful impact on marine mammals; therefore, the effects to marine mammals would be negligible.

BOEM anticipates that underwater noise generated by vessels used for Project monitoring would overlap the hearing range of fin, NARW, sei, and sperm whales and would be audible to these species. However, the noise levels generated by these smaller Project vessels are below the hearing injury threshold of marine mammals; therefore, vessel noise from Project monitoring activities is not expected to result in injury-level effects. Vessel traffic during post-ROD monitoring, and associated noise impacts, could result in repeated localized, intermittent, short-term impacts on marine mammals and result in brief behavioral responses that would be expected to dissipate once the vessel or the individual has left the

[11] These are 50th and 90th percentile values for monitoring locations RI-1, RI-2, and RI-3, as reported by Kraus et al. (2016).

area. BOEM expects that these brief responses of individuals to passing vessels would be infrequent given the patchy distribution of marine mammals, the limited number of planned vessel trips, and the negligible effect of survey activities on baseline levels of vessel traffic in the action area.

<u>Water quality degradation</u>: Annual maintenance dredging activities at the O&M facility would temporarily elevate TSS levels in the area surrounding the dredge footprint. However, these effects would be short term (lasting only a few tide cycles) due to the low mobility of sediments (primarily sand) in the proposed dredge area (Stantec 2020). Therefore, the resulting adverse impacts to marine mammals would be negligible because these species are mobile and forage over large areas, and their ability to feed would not be measurably affected by short-term and limited TSS effects.

<u>EMF</u>: Exponent Engineering, P.C. (2018) modeled EMF levels that could be generated by the SFEC and inter-array cable. They estimated induced magnetic field levels ranging from 13.7 to 76.6 mG on the bed surface above the buried and exposed SFEC cable and 9.1 to 65.3 mG above the inter-array cable, respectively. Induced field strength would decrease effectively to 0 mG within 25 feet of each cable. By comparison, the earth's natural magnetic field is more than five times the maximum potential EMF effect from the Project (see Figure F-8 in Appendix F). Background magnetic field conditions would fluctuate by 1 to 10 mG from the natural field effects produced by waves and currents. The maximum induced electrical field experienced by any organism close to the exposed cable would be no greater than 0.48 mV/m (Exponent Engineering, P.C. 2018). BOEM has conducted literature reviews and analyses of potential EMF effects from offshore renewable energy projects conducted (CSA Ocean Sciences Inc. 2021; Inspire Environmental 2019; Normandeau et al. 2011). These and other available reviews and studies (Gill et al. 2005; Kilfoyle et al. 2018) suggest that most marine species cannot sense low-intensity electric or magnetic fields generated by the HVAC power transmission cables commonly used in offshore wind energy projects. Normandeau et al. (2011) concluded that marine mammals are unlikely to detect magnetic field intensities below 50 mG, suggesting that these species would be insensitive to EMF effects from Project electrical cables. Project-related EMFs would be below this threshold and therefore undetectable, except for those areas where the cables lie on the bed surface. The area exposed to magnetic field effects greater than 50 mG would be small, extending only a few feet from the cable. The 50-mG detection threshold is theoretical and an order of magnitude lower than the lowest observed magnetic field strength resulting in observed behavioral responses (Normandeau et al. 2011). These factors indicate that the likelihood of marine mammals encountering detectable EMF effects is low, and any exposure would be below levels associated with measurable biological effects. Therefore, EMF effects on marine mammals would be negligible.

<u>Artificial lighting</u>: The SFWF would introduce stationary artificial light sources in the form of navigation, safety, and work lighting. BOEM (Orr et al. 2013) summarized available research on potential operational lighting effects from offshore wind energy facilities and developed design guidance for avoiding and minimizing lighting impacts on aquatic life, including marine mammals. They concluded that the operational lighting effects to marine mammal distribution, behavior, and habitat use were negligible if recommended design and operating practices are implemented. The applicant has incorporated this guidance into the Project design and will use only the minimum type and amount of lighting required by regulation (see Appendix G, Table G-1). Therefore, BOEM anticipates that operational lighting effects on marine mammals would be negligible.

<u>Vessel traffic</u>: SFW has estimated that Project O&M would involve up to seven CTV trips per month, or approximately 2,500 vessel trips over the lifetime of the Project, originating from the Montauk O&M facility. The current Project plan includes a single 95-foot-long CTV to service the SFWF over the life of the Project. The majority of O&M vessel trips would be conducted by the 95-foot CTV, with larger vessels making less frequent trips (an average of four round trips annually) to repair scour protection or replace damaged WTGs on an as needed basis.

Project fishery monitoring activities are expected to represent a very small increase in regional vessel traffic. As detailed in Appendix G of the final EIS (BOEM 2021c), all survey vessels would comply with speed restrictions and other minimization measures to minimize risk of collision with marine mammals, making the risk of vessel strikes from Project monitoring vessels unlikely.

As described in the previous section, the applicant has voluntarily committed to specific EPMs, including vessel timing and speed restrictions to avoid and minimize vessel-related risks to marine mammals (see Appendix G, Table G-1). Based on the low density of marine mammals in the SFW Lease Area and a maximum of seven round trips during construction and installation, there is a low risk of encountering a marine mammal. The operational conditions combined with planned EPMs (see Appendix G for all vessel strike avoidance measures) will minimize collision risk during construction and installation. During periods of low visibility, trained crew would use increased vigilance to avoid marine mammals. Because vessel strikes are not an anticipated outcome given the relatively low number of vessel trips and monitoring and mitigation activities are effectively designed and implemented, as required. BOEM concludes vessel strikes are unlikely to occur and therefore there is no anticipated effect on marine mammals. In the event of an unanticipated vessel strike of a marine mammal by any vessel supporting the Project, Orsted must immediately cease the activities until BOEM is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with all applicable laws (e.g., ESA, MMPA) and COP approval conditions.

<u>Conceptual decommissioning</u>: Project conceptual decommissioning would generate the same types of impact mechanisms as those described above for Project construction, except that impact pile driving would not occur. Conceptual decommissioning would require a similar number of marine construction vessels of the same or similar class as used during construction. Conceptual decommissioning activities would produce similar short-term effects on marine mammals from construction noise and disturbance and suspended sediment effects. The associated disturbance would be similar to that described above for construction, with the exception that pile driving would not be required. The monopiles would be cut below the bed surface for removal using a cable saw or abrasive waterjet. Noise levels produced by this type of cutting equipment are generally indistinguishable from engine noise generated by the associated construction vessel (Pangerc et al. 2016). On this basis, short-term effects on marine mammals from conceptual decommissioning would from negligible to moderate.

Conceptual decommissioning would result in long-term habitat changes that could impact marine mammals in a variety of ways. For example, as discussed in Section 3.4.2.2.3, the removal of the monopile foundations and scour and cable protection would reverse the artificial reef effect provided by these structures and remove or disperse the associated biological community. Marine mammal species accustomed to the foraging opportunities provided this community would have to adapt. In contrast, any marine mammal displacement effects caused by operational noise or structure presence would be reversed. In short, conceptual decommissioning effects on marine mammals could be positive or negative, are likely to vary by species, and are difficult to predict at this time. The environmental effects from conceptual decommissioning would be considered in independent NEPA analysis and associated regulatory approvals, which will benefit from improved knowledge about the effects of offshore wind facilities on the environment gained through monitoring of this and other facilities developed on the mid-Atlantic OCS.

Cumulative Impacts

<u>Accidental releases and discharges</u>: Existing and planned future offshore wind-energy development could result in the accidental release of water quality contaminants, trash, or other debris, which could theoretically lead to an increase in debris and pollution in the geographic analysis area (see Section 3.3.2.2.2 [No Action Alternative] for characterization of existing marine pollution conditions). In general, the types of accidental hazardous materials releases associated with marine construction projects include fuels, lubricating oils, and other petroleum products. BOEM prohibits the discharge or disposal of solid

debris into offshore waters during any activity associated with the construction and operation of offshore energy facilities (30 CFR 250.300). The USCG similarly prohibits the dumping of trash or debris capable of posing entanglement or ingestion risk (MARPOL, Annex V, Public Law 100‒220 (101 Stat. 1458). Compliance with these requirements would effectively minimize releases of trash and debris.

Increased vessel traffic associated with offshore renewable energy construction presents the potential for the inadvertent introduction of invasive species during discharge of ballast and bilge water. BOEM would require all project construction vessels to adhere to existing state and federal regulations related to ballast and bilge water discharge, including USCG ballast discharge regulations (33 CFR 151.2025) and EPA National Pollutant Discharge Elimination System Vessel General Permit standards, effectively avoiding the likelihood of non-native species invasions through ballast water discharge. When these factors are considered, BOEM expects that cumulative effects on marine mammals in the geographic analysis area from accidental spills and releases of trash and debris would be negligible.

EMF: BOEM estimates that the Proposed Action in combination with planned future actions would result in the installation of 7,335 cumulative miles of undersea transmission cables within the r geographic analysis area, concentrated within and between the WEAs and nearby shorelines. BOEM anticipates that most planned facilities will use HVAC transmission, but some may use HVDC. BOEM would require all future projects to use cable designs and EPMs to minimize EMF impacts on the environment. While the range of EMF impacts would vary by project, they are expected to be similar in magnitude to those described for the Proposed Action. Standard design practices for offshore energy cables would avoid cable crossings where practicable and would ensure a minimum separation of 330 feet between parallel cable paths. This would effectively avoid additive EMF effects from multiple cables. On this basis, cumulative EMF effects on marine mammals resulting from the Proposed Action combined with existing, planned, and reasonably foreseeable activities would be negligible.

New cable placement: The Proposed Action would result in localized, temporary, negligible incremental impacts to marine mammals through an estimated 913 acres of cabling-related seabed disturbance and associated increased suspended sedimentation within the geographic analysis area. BOEM estimates a cumulative total of 11,044 acres of seabed disturbance for the Proposed Action plus all other future offshore wind projects in the geographic analysis area. No population-level effects on marine mammals are expected from reduced water quality. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in negligible cumulative effects on marine mammals.

Noise: BOEM estimates a cumulative total of 2,563 offshore WTGs and OSS foundations will be developed in the geographic analysis area for marine mammals between 2022 and 2030. This total comprises foundations from the Proposed Action and up to 2,547 foundations associated with existing (BIWF) and planned state and federal offshore wind energy projects on the OCS between North Carolina and Maine (see Appendix E, Table E-3).

Section 3.4.4.2.2 (No Action Alternative) provides an overview of potential concurrent construction activities in the geographic analysis area. The development of each of these projects would involve the same types of project planning and construction activities described for the Proposed Action in Section 3.4.4.2.3 (i.e., HRG surveys, vessel and aircraft activity, impact and vibratory pile driving, etc.). Each action would generate underwater noise of the same general type and intensity as the Proposed Action, scaled in extent to the size of each facility. Each future project would be anticipated to result in adverse effects on individual marine mammals, up to and including PTS, and TTS, auditory masking and behavioral impacts. Construction noise would also contribute to short-term displacement effects, as described above.

All future actions would be subject to the same independent NEPA analysis and regulatory approvals as the Proposed Action. BOEM would require all projects to incorporate the same types of EPMs included in the

Proposed Action to avoid and minimize harmful noise effects and anticipates that additional mitigation measures similar to those described in Appendix G, Table G-2, would be imposed as conditions of ESA and MMPA compliance and other federal regulatory approvals. While these measures would avoid and minimize impacts to marine mammals to the greatest extent practicable, some unavoidable impacts on individuals are likely to occur. The impacts of each project would result in minor to moderate effects on marine mammals, varying by species. BOEM anticipates that future MMPA approvals would consider the combined effects of future projects against the known status of individual marine mammal stocks and populations and would require mitigation measures to avoid major effects on any species. Therefore, BOEM concludes that the cumulative effects of construction noise on marine mammals would be moderate.

As discussed in Sections 3.4.4.2.2 (No Action Alternative) and 3.4.4.2.3 (Proposed Action Alternative), operational noise from offshore wind turbines is expected to be limited in intensity and extent. Operational noise exceeding the 120 dB_{RMS} behavioral disturbance and auditory masking threshold would be limited to within 120 feet of each turbine, although detectable noise above ambient levels could extend up to 560 feet or more. The Proposed Action combined with all existing and planned future actions would place over 2,500 noise-generating structures in the geographic analysis area, distributed between designated WEAs. These structures would contribute to and potentially increase ambient noise within each WEA, albeit at levels generally not associated with adverse effects on marine mammals. However, the 120 dB_{RMS} threshold may not adequately represent the potential for adverse effects of chronic noise exposure (e.g., Cholewiak et al. 2018; Hatch et al. 2012; Jensen et al. 2009; Putland et al. 2017). While the potential for broader effects is unclear, at this time BOEM has no basis to conclude that the cumulative effects of low-level operational noise would result in more than minor effects on any marine mammal species.

<u>Port utilization</u>: The development of an offshore wind industry on the mid-Atlantic OCS may incentivize the expansion or improvement of regional ports to support planned and future projects in the geographic analysis area. These future actions, should they occur, may involve activities like dredging and the expansion or development of new structures that could lead to adverse effects on coastal and estuarine habitats used by marine mammals and their prey species. These projects could result in cumulative effects on marine mammals, but the extent and significance of these effects cannot be evaluated because no project proposals have been developed. However, the environmental effects resulting from any future port expansions would be evaluated in independent NEPA analysis, ESA and MMPA compliance documents, and other regulatory approvals for each project. This would include an evaluation of the potential cumulative effects of port expansion in conjunction with the Proposed Action and other offshore wind development in the geographic analysis area.

<u>Presence of structures</u>: BOEM estimates a cumulative total of 2,563 offshore WTGs and OSS foundations will be developed in the broader geographic analysis area for marine mammals between 2022 and 2030. This total comprises foundations from the Proposed Action and up to 2,547 foundations associated with existing (BIWF) and planned state and federal offshore wind energy projects on the OCS between North Carolina and Maine (see Appendix E, Table E-3). Section 3.4.4.2.2 (No Action Alternative) provides an overview of potential concurrent construction activities in the geographic analysis area between 2022 and 2030.

Project construction is likely to result in short-term displacement effects on marine mammals from the areas affected by disturbance from vessel activity, foundation installation, HRG surveys, and related activities. Several projects would be constructed concurrently, potentially resulting in individual marine mammals being exposed to multiple episodes of habitat displacement. BOEM anticipates that the construction schedules for all future projects would employ the same types of timing restrictions to protect NARW as those included in the Proposed Action, with modifications as needed to adapt to ongoing shifts in the seasonal distribution of this species (e.g., Davis et al. 2017, 2020). However, timing restrictions for NARW would not be protective for all marine mammal species. It is anticipated these projects would also employ a similar range of EPMs and mitigation measures to avoid and minimize impacts to marine mammals, but some level of short-term displacement is likely to occur, and some individual animals are likely to be exposed to multiple episodes of displacement. The significance of these potential impacts is unclear, but when all protective measures are considered, cumulative effects are likely to range from minor to moderate varying by species.

BOEM anticipates that future projects within the RI/MA WEA would be constructed using 1-nm foundation spacing similar to the Proposed Action. As discussed in the previous section, the physical presence of foundations spaced at 1 nm is unlikely to pose a barrier to movement for even the largest marine mammal species. However, the broadscale development of offshore energy structures would introduce an extended network of biologically productive artificial reefs, most generating low levels of non-impulsive sound that are detectable to marine mammals within a few hundred feet. While the individual effects of each turbine would be minor, the broader implications of these habitat changes for marine mammals are unclear. Displacement effects that result in increased interactions between vulnerable populations marine mammals and commercial shipping and/or fishing activity could have significant long-term cumulative effects. Given these uncertainties the potential for displacement effects is unknown, but there is currently no basis to conclude that these impacts would result in moderate to major long-term effects on any species.

Light: The Proposed Action when combined with planned future activities would develop up to 2,563 offshore WTGs and OSS foundations in the geographic analysis area. The construction, operation, and maintenance of these structures would introduce new short-term and long-term sources of artificial light to the offshore environment in the form of vessel lighting and navigation and safety lighting on the structures, respectively. BOEM has issued guidance for avoiding and minimizing artificial lighting impacts from offshore energy facilities and associated construction vessels (Orr et al. 2013) and has concluded that adherence to these measures should effectively avoid adverse effects on fish and other aquatic organisms. BOEM requires all offshore energy projects to comply with this guidance. Given the minimal and localized nature of anticipated lighting effects under this guidance, the cumulative effects from the Proposed Action and existing and planned future activities on marine mammals would be negligible.

Seabed and water column alteration: The broad scale development of up to 2,563 offshore energy structures in the geographic analysis area would introduce a broadly distributed network of biologically productive artificial reefs to the marine environment. Each concentration of foundations would be expected to develop a diverse community of fish and invertebrates and promote increased biological productivity in proximity to the structures (Degraer et al. 2020; Hutchison et al. 2020; Methratta and Dardick 2019). The abundance of fish and invertebrate prey resources created by this reef effect are likely to attract predatory marine mammals, particularly seals (e.g., Russel et al. 2014) and potentially dolphins and porpoises. Increased fish biomass around the structures could attract commercial and recreational fishing activity, leading to increased interactions between humans and marine mammals.

The new wind energy structures would also cause hydrodynamic effects. The geographic analysis area is characterized by strong seasonal stratification, conditions that tend to limit the hydrodynamic influence of individual foundation structures (van Berkel et al. 2020). As discussed in the previous section, the Proposed Action is not anticipated to result in additive hydrodynamic effects. However, broader scale development of contiguous projects could have more extensive effects. For example, Afsharian et al. (2020) modeled the potential effects from installation of over 400 offshore wind turbines in Lake Erie and determined that their cumulative effect on wind energy could disrupt circulation patterns and affect seasonal stratification and water temperatures over broad scales. However, these findings may not be applicable to the open ocean where circulation patterns are strongly influenced by tides and ocean currents.

At present, currently available information suggests that hydrodynamic effects of foundation structures are likely to be localized and not additive when spaced at 1 nm in environments with strong seasonal stratification (van Berkel et al. 2020). Recent modeling of hydrodynamic effects suggests that surface currents could be affected by the presence of multiple wind farms potentially impacting the distribution of larvae (Johnson et al. 2021). There is insufficient information to determine if this conclusion is valid for broader scale development at the levels planned within the geographic analysis area. Therefore, at this time there is no basis to conclude that the cumulative hydrodynamic impacts of Proposed Action in combination with planned and foreseeable future actions would have a measurable effect on marine mammals and their prey and forage species.

In summary, the cumulative effects of long-term habitat alteration and hydrodynamic impacts on marine mammals are unclear, may be positive or negative, could range from negligible to moderate, and are likely to vary considerably by species. There is currently no basis to conclude that these impact mechanisms would result in major effects on any marine mammal species.

Traffic: BOEM estimates that up to 379 construction vessels could be active within the geographic analysis area between 2022 and 2030. In theory, an increase in vessel traffic would present a commensurate increase in collision-related risks to marine mammals. However, as discussed above for project construction, the majority of vessel operations would occur at speeds of less than 10 knots. In addition, BOEM anticipates that all future projects would adhere to all mandatory and voluntary vessel speed restrictions in posted DMAs and Seasonal Management Areas and would implement additional EPMs and measures similar to those described for the Proposed Action during construction and throughout the operational life of the Project (see Appendix G, Table G-1) to avoid marine mammal collisions. BOEM has concluded that these measures would effectively avoid adverse impacts on marine mammals from construction and operational vessel traffic. Therefore, the cumulative effects of increased vessel traffic on marine mammals would be negligible.

Climate change: Global climate change is altering water temperatures, circulation patterns, and oceanic chemistry at global scales. Several marine species, including fish, invertebrates, and zooplankton, prey resources for marine mammals, have shifted northward in distribution over the past several decades (NOAA 2021). Ocean acidification, also a function of climate change, has negatively affected some zooplankton species (PMEL 2020). Marine mammals are modifying their behavior and distribution in response to these broader observed changes (Davis et al. 2017, 2020; Hayes et al. 2020, 2021). These trends are expected to continue, with complex and potentially adverse consequences for many marine mammal species. The Proposed Action in combination with existing and planned future actions would result in the development of a network of artificial reefs distributed across the geographic analysis area. The biological hotspots created by these artificial reefs are expected to influence fish and invertebrate community structure at local scales and may also influence the ability of certain fish and invertebrate species to shift and expand their ranges in response to climate change. This could in turn result in cumulative effects on marine mammals that could be positive or negative depending on a number of complex factors. The nature and potential significance of these effects to marine mammals is unknown and likely to vary by species depending on a number of complex factors.

Conclusions

The construction, O&M, and conceptual decommissioning of the Proposed Action would have **negligible** to **moderate** adverse impacts and could potentially include **minor beneficial** impacts. Adverse impacts are expected to result mainly from pile-driving noise and increased vessel traffic. Beneficial impacts are expected to result from the presence of structures.

In the context of reasonably foreseeable environmental trends in the geographic analysis area, impacts from ongoing and planned actions, including the Proposed Action, are expected to be several times greater than the incremental impacts of the Proposed Action alone. The incremental impacts of the Proposed Action alone would not add to the impacts of the No Action alternative because, under the planned action scenario described in Appendix E, as the total capacity of offshore wind development in the geographic analysis area for marine mammals would be the same whether the Proposed Action goes forward or not. Thus, the primary differences between the Proposed Action and the No Action alternative are the locations and times (years) in which the impacts would occur.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **moderate**, depending on the species, and may potentially include **minor beneficial** impacts. The combined significance criteria in Table 3.1.1-1 and Table 3.1.1-2 are used to characterize the combined effects of all IPFs marine mammals. Applying these criteria, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **moderate** adverse and **minor** to **moderate** beneficial effects on marine mammals because a notable and measurable impact is anticipated, but the resource would likely recover completely when IPF stressors are removed or remedial or mitigating actions are taken. The main drivers for this impact rating are pile-driving, vessel, and construction noise; increased vessel traffic associated with the expanded planned action scenario; and ongoing climate change. The Proposed Action would contribute to the overall impact rating primarily through noise-related IPFs and increased vessel traffic.

3.4.5.2.4 VESSEL TRANSIT LANE ALTERNATIVE

The Transit alternative would lead to the same types of impacts on marine mammals from construction and installation, O&M, and conceptual decommissioning activities as described for the Proposed Action. However, this alternative would reduce the number of monopile foundations by four and remove approximately 4 nm of associated inter-array cable from the Project, slightly reducing the construction impact footprint and installation period. Fewer days of impact pile driving and less bed disturbance would be required, and the overall duration of construction activities would decrease. This would reduce the overall footprint of the Project and associated construction and operational effects on marine mammals, as compared to the Proposed Action.

Operational impacts of the Transit alternative on marine mammals would also be incrementally reduced relative to the Proposed Action. Removing three WTGs[12] would reduce operational noise impacts exceeding the 120 dB_{RMS} behavioral and auditory masking threshold in an approximate 120-foot radius around each foundation. Less habitat would be altered and impacted by operational noise, artificial lighting, and EMFs from the inter-array cable. The smaller overall Project footprint would reduce the extent of anticipated long-term reef and hydrodynamic effects on the local environment. Conceptual decommissioning effects would likewise be similar in magnitude but reduced in extent and duration relative to the Proposed Action.

On balance, the Transit alternative would incrementally reduce the extent and duration of potential construction and installation, O&M, and conceptual decommissioning impacts on marine mammals. This may reduce the number of animals exposed to potentially adverse effects, but some individual animals would still be exposed to those effects at the same levels of significance under the criteria described in 3.4.4-3. On this basis, BOEM concludes the Transit alternative would result in negligible to moderate adverse impacts and could potentially include minor beneficial impacts.

Cumulative Impacts

As stated, the Transit alternative would result in a range of effects to marine mammals of the same general magnitude and significance as those described for the Proposed Action, except that the extent and

[12] The Transit alternative would remove four foundations in total, and would combine a WTG and OSS on a single monopile, reducing the number of operational WTGs relative to the Proposed Action alternative.

duration of some impacts would be slightly reduced. The Transit alternative would reduce the total number of offshore structures planned in the geographic analysis area from an estimated 2,563 to 2,559. This incremental reduction would slightly reduce the extent and duration of some anticipated cumulative impacts but not to the extent that the Transit alternative would alter any of the impact-level conclusions reached for the Proposed Action. On this basis, BOEM anticipates that the cumulative effects of the Transit alternative on marine mammals would be essentially the same as those described for the Proposed Action: negligible to moderate adverse, depending on the species, and potentially minor beneficial.

Conclusions

The Transit alternative would reduce the number of WTGs and their associated inter-array cable segments relative to the Proposed Action. This would in turn result in an incremental reduction in effects on marine mammals from certain construction and installation, O&M, and conceptual decommissioning impacts. However, BOEM expects that any incremental reduction in impacts would not change the resulting effects on marine mammals to the extent necessary to alter the impact-level conclusions for any impact mechanism. Therefore, BOEM concludes that the effects of the Transit alternative on marine mammals would result in **negligible to moderate** adverse impacts, depending on the species, and could potentially include **minor beneficial** impacts.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Transit alternative resulting from individual IPFs would range from **negligible** to **moderate**, depending on the species, and may potentially include **minor beneficial** impacts. The combined significance criteria in Table 3.1.1-1 and Table 3.1.1-2 are used to characterize the combined effects of all IPFs marine mammals. Applying these criteria, BOEM anticipates that the overall impacts associated with the Transit alternative when combined with past, present, and reasonably foreseeable activities would result in the same level of effects as those described for the Proposed Action. Therefore, the Transit alternative would result in **moderate** adverse and **minor** to **moderate** beneficial effects on marine mammals.

3.4.5.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

The Habitat alternative under either layout option would eliminate specific monopile locations from the SFWF Project and incorporate additional micrositing to minimize impacts on existing complex benthic habitat to the greatest extent practicable. The potential design and micrositing scenarios under consideration and resulting changes in associated benthic habitat disturbance are discussed in detail in Section 3.4.2.2.5.

The Habitat alternative under either layout option would eliminate three foundation sites from the Project design. Micrositing would be used at 10 of the remaining foundation sites to minimize impacts on complex benthic habitats. Micrositing would not be required at the remaining three foundation sites. The removal of three foundations would eliminate four inter-array cable segments and approximately 3 nm of associated construction impacts. The removal of three foundations would reduce the construction impact footprint and installation period relative to the Proposed Action. Fewer days of impact pile driving and less bed disturbance would be required, and the overall duration of construction activities would decrease. This would reduce the overall footprint of the Project and associated construction and operational effects on marine mammals, as compared to the Proposed Action.

Operational impacts of the Habitat alternative under either layout option on marine mammals would also be incrementally reduced relative to the Proposed Action. Removing three WTGs[13] would reduce

[13] The Habitat alternative would remove three foundations in total under either layout option. BOEM anticipates that the applicant would combine a WTG and OSS on a single monopile, reducing the number of operational WTGs relative to the Proposed Action alternative.

operational noise impacts exceeding the 120 dB_{RMS} behavioral and auditory masking threshold in an approximate 120-foot radius around each foundation. Less habitat would be altered and impacted by operational noise, artificial lighting, and EMFs from the inter-array cable. The smaller overall project footprint would reduce the extent of anticipated long-term reef and hydrodynamic effects on the local environment. Conceptual decommissioning effects would likewise be similar in magnitude but reduced in extent and duration relative to the Proposed Action.

On balance, the Habitat alternative under either layout option would incrementally reduce the extent and duration of potential construction and installation, O&M, and conceptual decommissioning impacts on marine mammals. This may reduce the number of animals exposed to potentially adverse effects, but some individual animals would still be exposed to those effects at the same levels of significance under the criteria described in 3.4.4-3. On this basis, BOEM concludes Habitat alternative under either layout option would result in negligible to moderate adverse impacts and could potentially include minor beneficial impacts.

Cumulative Impacts

As stated, the Habitat alternative under either layout option would result in a range of effects to marine mammals of the same general magnitude and significance as those described for the Proposed Action, except that the extent and duration of some impacts would be slightly reduced. The Transit alternative would reduce the total number of offshore structures planned in the geographic analysis area from an estimated 2,563 to 2,560. This incremental reduction would slightly reduce the extent and duration of some anticipated cumulative impacts, but not to the extent that the Habitat alternative would alter any of the significance determinations reached for the Proposed Action. On this basis, BOEM anticipates that the cumulative effects of the Habitat alternative under either layout option on marine mammals would be essentially the same as those described for the Proposed Action: negligible to moderate adverse, depending on the species, and potentially minor beneficial.

Conclusions

The Habitat alternative under either layout option would reduce the number of WTGs and their associated inter-array cable segments relative to the Proposed Action. This would in turn result in an incremental reduction in effects on marine mammals from certain construction and installation, O&M, and conceptual decommissioning impacts. However, BOEM expects that any incremental reduction in impacts would not change the resulting effects on marine mammals to the extent necessary to alter the significance determination for any impact mechanism. Therefore, BOEM concludes that the effects of the Habitat alternative under either layout option on marine mammals would result in **negligible to moderate** adverse impacts and could potentially include **minor beneficial** impacts.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Habitat alternative resulting from individual IPFs would range from **negligible** to **moderate**, depending on the species, and may potentially include **minor beneficial** impacts. The combined significance criteria in Table 3.1.1-1 and Table 3.1.1-2 are used to characterize the combined effects of all IPFs marine mammals. Applying these criteria, BOEM anticipates that the overall impacts associated with the Habitat alternative when combined with past, present, and reasonably foreseeable activities would result in the same level of effects as those described for the Proposed Action. Therefore, the Habitat alternative under either layout option would result in **moderate** adverse and **minor** to **moderate** beneficial effects on marine mammals.

3.4.5.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, BOEM expects that impacts to marine mammal from Project construction and installation, O&M, and conceptual decommissioning would range from **negligible** to **moderate** for all action alternatives, varying in significance by species, and may potentially include **minor beneficial** impacts.

The action alternatives represent a relatively small component of the existing, planned and reasonably foreseeable future actions in the geographic analysis area, accounting for 12 to 16 of the up to 2,563 offshore wind energy structures planned for the mid-Atlantic OCS. In this context, the differences between the action alternatives are small relative to the broader cumulative effect of other actions and ongoing environmental trends within the geographic analysis area, and the incremental differences between them are not likely to measurably alter the overall extent and significance of combined cumulative effects on marine mammals.

On this basis, BOEM concludes that while the action alternatives may result in slightly different effects on the environment, and the number of individual marine mammals exposed to Project-related IPFs may vary between alternatives, those differences would not lead to different impact-level conclusions for any IPF following the criteria provided in 3.4.4-3. The effects of each alternative would range from **negligible** to **moderate** for Project construction and installation, O&M, and conceptual decommissioning, with the effect determinations for specific IPFs varying by species, and potentially including **minor beneficial** impacts.

Based on this rationale, BOEM concludes that the combined effects of each action alternative are effectively the same. Applying the combined significance criteria in Table 3.1.1-1 and Table 3.1.1-2, the overall impacts of each action alternative when combined with past, present, and reasonably foreseeable activities would result in **moderate** adverse and **minor** to **moderate** beneficial effects on marine mammals because a notable and measurable impact is anticipated, but the resource would likely recover completely when IPF stressors are removed or remedial or mitigating actions are taken.

3.4.5.4 Mitigation

BOEM has identified the mitigation measures that would likely be required as conditions of federal regulatory approvals to further avoid and minimize potential adverse effects on marine mammals. These measures are summarized in Appendix G, Table G-2. Mitigation requirements include additional time-of-year restrictions, expanded exclusion zone protocols, daily pre-construction surveys, additional vessel speed limits, and expanded vessel strike avoidance measures. The expanded exclusion zone protocols include minimum visibility requirements to ensure PSO effectiveness (e.g., time-of-day and weather restrictions). Construction vessel and O&M vessel crew training, vessel observer requirements, and educational awareness would also reduce impacts by increasing the effectiveness of mitigation and monitoring measures. Specifications for monitoring plan design, data collection, and reporting would improve coordination with regulatory agencies and improve the effectiveness of planned EPMs and ensure that should any incidental take of marine mammals occur, it would not exceed the take exemptions approved under the ESA and MMPA. Per (30 CFR 585.633(b)), additional mitigation measures above and beyond those listed in Appendix G, Table G-2 may be required if monitoring data indicate that adverse effects on marine mammals are greater than anticipated. Mitigation and monitoring requirements are prescribed by NMFS in ITAs under Section 101(a)(5) of the MMPA and through ESA consultation.

3.4.6 Sea Turtles

The reader is referred to Table 2.3.1-1 and Appendix H for a discussion of current conditions and potential impacts to sea turtles from implementation of the Proposed Action and other considered alternatives.

3.4.7 Wetlands and Other Waters of the United States

The reader is referred to Table 2.3.1-1 and Appendix H for a discussion of current conditions and potential impacts to wetlands and other WOTUS from implementation of the Proposed Action and other considered alternatives.

3.5 SOCIOECONOMIC AND CULTURAL RESOURCES

3.5.1 Commercial Fisheries and For-Hire Recreational Fishing

3.5.1.1 Affected Environment

3.5.1.1.1 COMMERCIAL FISHERIES

The following analysis focuses on commercial fisheries in the SFWF and SFEC. The primary source of data was summarized Vessel Trip Report (VTR) data provided by NMFS (2021a). The summary VTR data includes catch estimates by fishing location combined with NMFS estimates of revenue using ex-vessel price data drawn from commercial fisheries dealer reports. A second source of data was the website at NMFS (2021b), which summarizes commercial fisheries data for each proposed WEA along the U.S. Atlantic coast. In addition, figures developed by BOEM based on NMFS Vessel Monitoring System (VMS) data provided by NMFS (2019) are included in the analysis. Additional information on the data sources used in this analysis is presented in Appendix F.

To understand the relative importance of the SFWF and offshore SFEC to regional fisheries, the commercial fishing revenue sourced from each area is compared to the total commercial fishing revenue reported by the NMFS Greater Atlantic Regional Fisheries Office for federally permitted commercial fishing activity in the New England and Mid-Atlantic regions. These two regions include all coastal states from Maine to North Carolina. In addition, to provide further geographical context for the commercial fisheries operating in the SFWF and along the offshore SFEC, commercial fishing revenue in the RI-MA WEAs by FMP fishery, gear type, and port is presented below. The description of commercial fishing in the RI-MA WEAs also includes a discussion of the area of high value fisheries that was excluded from possible leasing for wind energy development in order to reduce conflict with both commercial and recreational fishing activities.

To the extent that data are available, the commercial fishing described here includes federally permitted fishing activity in both state and federal waters. Data on the average annual revenue of federally permitted vessels by FMP fishery, gear type, and port of landing are summarized in the tables below and Figure C-7 through Figure C-28 in Appendix C. In general, the data presented focuses on those FMP fisheries, species, gear types, and ports that are relevant to commercial fishing activity in the SFWF and offshore SFEC. Additional details on the data and methodology used to develop the tables and figures are provided in Appendix F.

Regional Setting

Commercial fisheries operating in federal waters off the Mid-Atlantic and New England regions are known for large catches of a variety of species, including Atlantic herring, clams, squid, sea scallops, skates, summer flounder, groundfish, monkfish, lobster, and Jonah crab. These fishery resources are harvested with a broad assortment of fishing gear, including mobile gear (e.g., bottom trawl, dredge, midwater trawl) and fixed gear (e.g., gillnet, pot, bottom longline, seine, hand line). The fishery resources are managed under several FMPs, consisting of the Sea Scallop FMP, Monkfish FMP, Northeast Multispecies (large- and small-mesh) FMP,[14] Skate FMP, and Red Crab FMP (NEFMC 2019); Surfclam/Ocean Quahog FMP, Mackerel/Squid/Butterfish FMP, Spiny Dogfish FMP, Bluefish FMP, Golden and Blueline Tilefish FMP, Summer Flounder/Scup/Black Sea Bass FMP, and River Herring FMP (MAFMC 2019); Atlantic Herring FMP and Highly Migratory Species FMP (NMFS 2020b); and Lobster FMP and Jonah Crab FMP (ASMFC 2019).[15] These FMP fisheries are referred to frequently throughout the final EIS and therefore the author-date citations are provided here at first mention only.

One way that fishery resources contribute to regional economies is through direct ex-vessel revenue or through revenue generated when a commercial fishing boat lands or unloads a catch. Table 3.5.1-1 shows the average annual revenue by FMP fishery during 2008–2019, the time period for which the most recent data are available. Although there is substantial variability in the year-to-year harvest of various species, on average, federally permitted commercial fishing activity generated approximately $952.4 million in average revenue annually from 2008 to 2019, with the Sea Scallop FMP accounting for more than half (54%) of the total while the American Lobster FMP fishery accounted for 10% and Northeast Multispecies (large-mesh) FMP fishery accounted for 8% of the total. The row labeled “Other FMPs, non-disclosed species, and non-FMP fisheries” comprised 11% of the total average annual revenue.[16]

[14] The Northeast Multispecies (large-mesh) fishery is composed of the following species: Atlantic cod, haddock, pollock, yellowtail flounder, witch flounder, winter flounder, windowpane flounder, American plaice (*Hippoglossoides platessoides*), Atlantic halibut (*Hippoglossus hippoglossus*), Acadian redfish (*Sebastes fasciatus*), Atlantic wolffish (*Anarhichas lupus*), ocean pout, and white hake (*Urophycis tenuis*). The Northeast Multispecies small-mesh fishery is composed of five stocks of three species of hakes: northern silver hake and southern silver hake (*Merluccius bilinearis*), northern red hake and southern red hake (*Urophycis chuss*), and offshore hake (*Merluccius albidus*). Southern silver hake and offshore hake are often grouped together and collectively referred to as “southern whiting.”

[15] The regional setting includes the jurisdictions of two regional fishery management councils created under the Magnuson-Stevens Fishery Conservation and Management Act: the MAFMC manages fisheries in federal waters off the coasts of New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina, and the NEFMC manages fisheries in federal waters off the coasts of Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut. The two councils manage species with many FMPs that are frequently updated, revised, and amended, and they coordinate with each other to jointly manage species across jurisdictional boundaries. Some of the managed fisheries of each council extend into state waters. Therefore, the councils work with the ASMFC, which comprises the 15 Atlantic coast states and coordinates the management of marine and anadromous resources found in the states’ marine waters. In addition, the lobster and Jonah crab fisheries are cooperatively managed by the states and the NMFS under the framework of the ASMFC (ASMFC 2019).

[16] This row includes revenues from the three federal FMP fisheries: 1) Surfclam/Ocean Quahog, 2) Red Crab, and 3) River Herring. In addition, this row includes data for species from listed FMPs that could not be disclosed due to confidentiality rules and revenues from federally permitted vessels operating in other fisheries that are not federally managed. NMFS cannot disclose data to the public unless it includes information from three or more vessels and three or more dealers/buyers. Also note that data for the Surfclam/Ocean Quahog FMP fishery is included in this row in spite of its relatively high annual average value ($60.0 million) for reasons of consistency—revenues for the FMP fishery could not be reported for any of the other SFWF-related tables.

Table 3.5.1-1. Commercial Fishing Revenue of Federally Permitted Vessels in Mid-Atlantic and New England Fisheries by FMP Fishery (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)
American Lobster	$117,251.0	$93,250.1
Atlantic Herring	$32,856.3	$25,929.7
Bluefish	$1,820.4	$1,275.3
Golden and Blueline Tilefish	$6,583.4	$5,553.9
Highly Migratory Species	$4,008.4	$2,219.4
Jonah Crab	$17,082.7	$9,607.8
Mackerel, Squid, and Butterfish	$74,576.6	$51,911.7
Monkfish	$28,943.7	$20,597.3
Northeast Multispecies (large-mesh)	$105,418.2	$73,331.4
Sea Scallop	$661,233.5	$518,891.6
Skate	$10,217.1	$7,448.4
Northeast Multispecies (small-mesh)	$13,499.5	$11,261.1
Spiny Dogfish	$5,237.2	$2,975.4
Summer Flounder, Scup, Black Sea Bass	$45,205.7	$39,807.4
Other FMPs, non-disclosed species and non-FMP fisheries*	$95,261.9	$88,377.6
All FMP and non-FMP fisheries	**$1,132,912.7**	**$952,438.3**

Source: Developed using data from NMFS (2021a).

Note: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the total row.

* Includes revenue from FMP fisheries that are not listed, from species that were not disclosed within listed FMP fisheries and from species in non-FMP fisheries harvested by federally permitted vessels.

Table 3.5.1-2. Commercial Fishing Landings (pounds) of Federally Permitted Vessels in Mid-Atlantic and New England Fisheries by Species (2008–2019)

Species	FMP Fishery	Peak Annual Landings	Average Annual Landings (pounds)
Skates	Skate	674,625	448,302
Atlantic herring	Atlantic Herring	1,002,287	294,448
Monkfish	Monkfish	231,519	125,597
Scup	Summer Flounder, Scup, Black Sea Bass	155,338	95,932
Loligo squid	Mackerel, Squid, and Butterfish	236,158	78,375
Silver hake	Northeast Multispecies (small-mesh)	128,101	58,822
Atlantic mackerel	Mackerel, Squid, and Butterfish	322,243	40,825
Sea scallops	Sea Scallop	73,382	35,164
Spiny dogfish	Spiny Dogfish	66,968	33,109
Summer flounder	Summer Flounder, Scup, Black Sea Bass	54,032	32,891
Yellowtail flounder	Northeast Multispecies (large-mesh)	57,655	25,271
Cod	Northeast Multispecies (large-mesh)	35,157	18,462
American lobster	American Lobster	35,471	17,863
Winter flounder	Northeast Multispecies (large-mesh)	41,948	16,741

Species	FMP Fishery	Peak Annual Landings	Average Annual Landings (pounds)
Red hake	Northeast Multispecies (small-mesh)	22,803	15,766
Bluefish	Bluefish	30,749	12,769
Jonah crab	Jonah Crab	28,305	11,586
Butterfish	Mackerel, Squid, and Butterfish	18,680	11,157
Black sea bass	Summer Flounder, Scup, Black Sea Bass	12,187	7,024
Striped bass	No federal FMP	11,550	6,880

Source: Developed using data from NMFS (2021a).

Table 3.5.1-3 shows the average annual revenue by gear type for the 2008–2019 period. Scallop dredge gear accounted for 51% of the revenue generated by all gear in the New England and Mid-Atlantic regions. Bottom trawl gear and pot-other gear (including pot gear used in the Lobster FMP fishery) also each generated over $115 million in average annual revenue.

Table 3.5.1-3. Commercial Fishing Revenue of Federally Permitted Vessels in Mid-Atlantic and New England Fisheries by Gear Type (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)
Dredge-clam	$65,768.2	$61,333.5
Dredge-scallop	$615,168.5	$489,410.9
Gillnet-sink	$44,624.9	$30,031.6
Handline	$6,222.2	$4,754.5
Pot-other	$146,203.6	$115,055.2
Trawl-bottom	$229,153.5	$187,199.3
Trawl-midwater	$26,600.8	$18,995.8
All other gear*	$62,406.3	$47,305.8
All gear types	**$1,135,221.1**	**$954,086.5**

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the All gear types row.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear.

Commercial fishing fleets are important to coastal communities in the Mid-Atlantic and New England regions by generating employment and income for vessel owners and crews, as well as by creating demand for shoreside products and services to maintain vessels and process seafood products. In 2017, total seafood landings in the New England and mid-Atlantic regions, including landings from non–federally permitted vessels, were valued at $1.80 billion. The region is also home to aquaculture production and research that provides employment and business opportunities for coastal communities. In New England, the seafood industry generated $5.6 billion in personal and proprietor income, while that impact totaled $3.8 billion in the mid-Atlantic (NMFS 2020c). Table 3.5.1-4 shows the average annual revenue by port of landing for the 2008–2019 period. New Bedford accounted for approximately 40% of the total commercial fishing revenue in the New England and Mid-Atlantic regions, and Cape May and Narragansett/Point Judith accounted for 9% and 5%, respectively.

Table 3.5.1-4. Commercial Fishing Revenue of Federally Permitted Vessels in Mid-Atlantic and New England Fisheries and Level of Fishing Dependence by Port

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Commercial Fishing Engagement Categorical Ranking*	Commercial Fishing Reliance Categorical Ranking§
Chilmark/Menemsha, MA	$656.1	$753.4	Medium	High
Fairhaven, MA	$17,395.3	$11,282.5	High	Low
New Bedford, MA	$458,246.7	$378,792.6	High	Medium
Fall River, MA	*$5,123.6*	*$1,135.6*	Medium	Low
Westport, MA	$1,905.8	$1,305.2	Low	Low
New Shoreham, RI	$303.7	$99.9	Medium	Medium
Tiverton, RI	$1,603.1	$1,148.8	Medium	Low
Little Compton, RI	$3,007.4	$1,992.2	Medium	Medium
Newport, RI	$16,111.1	$8,896.3	High	Low
Point Judith, RI	$58,531.0	$46,076.7	High	Medium
New London, CT	$11,117.1	$6,646.6	Medium-High	Low
Stonington, CT	$11,946.4	$10,273.8	High	Low
Montauk, NY	$24,549.9	$18,496.4	High	Medium
Shinnecock/Hampton Bays, NY	$8,642.8	$6,819.1	High	Low
Cape May, NJ	$122,692.9	$83,159.7	High	High
Point Pleasant, NJ	$37,321.9	$30,986.2	Low	Low
Hampton, VA	$19,482.0	$14,379.2	High	Low
Newport News, VA	$54,540.1	$30,970.8	High	Low
Beaufort, NC	$5,210.8	$2,654.1	High	Medium
All other RI-MA WEA ports†	**$342,845.6**	**$298,035.1**	**NA**	**NA**
Other New England/Mid-Atlantic ports‡	**$1,135,221.1**	**$953,904.2**	**NA**	**NA**
All New England/Mid-Atlantic ports	**$656.1**	**$753.4**	**NA**	**NA**

Sources: NMFS (2021a); NOAA Fisheries Office of Science and Technology (2019).

Note: Commercial fishing revenue data are for the 2008–2019 period; levels of fishing dependency are for 2018. Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the All New England/Mid-Atlantic ports row.

* Commercial fishing engagement measures the presence of commercial fishing through fishing activity as shown through permits, fish dealers, and vessel landings. A high rank indicates more engagement. NA indicates that no information is available.

† Includes other ports that had reported landings from federally permitted vessels fishing in the RI-MA WEAs or offshore SFEC in 5 or fewer of the 12 years for the 2008–2019 period.

‡ Includes all other ports that had landings from federally permitted vessels fishing in the New England and Mid-Atlantic regions.

§ Commercial fishing reliance measures the presence of commercial fishing in relation to the population size of a community through fishing activity. A high rank indicates more reliance. NA indicates that no information is available.

Table 3.5.1-4 also presents the level of commercial fishing engagement and reliance of the community in which the port is located. These rankings portray the level of dependence of commercial fishing to the community. As shown in the table, the rankings differ across communities, with Cape May ranking high for both commercial fishing engagement and reliance, and Westport and Point Pleasant ranking low for the two indices. Information regarding how the rankings were determined for each community is provided in the community profiles available at NMFS (2021d). These profiles present the most recent data available for key indicators for New England and mid-Atlantic fishing communities related to dependence on fisheries and other economic and demographic characteristics. Selected socioeconomic characteristics of communities with fishing ports that could be affected by the Project are also presented in Section 3.5.3 (Demographics, Employment, and Economics) and Section 3.5.4 (Environmental Justice).

RI-MA WEAs

The SFWF is located in the RI-MA WEAs. Table 3.5.1-5 shows the average annual revenue in the RI-MA WEAs by FMP fishery for the 2008–2019 period. On average, federally permitted commercial fishing activity in the RI-MA WEAs annually generated an average of $2.6 million in revenue, with the Monkfish FMP and Sea Scallop FMP fisheries each accounting for 14% of the total, while the Lobster FMP fisheries accounted for 12%. The Mackerel, Squid, and Butterfish FMP, Skate FMP, Northeast Multispecies (large-mesh) FMP, and Summer Flounder, Scup, Black Sea Bass FMP fisheries also accounted for between 6% and 9% of the revenue. Table 3.5.1-5 also shows the percentage of each FMP fishery's total revenue in the Mid-Atlantic and New England regions that came from the RI-MA WEAs during the 2008–2019 period. The areas accounted for about 3.06% of the Skate FMP fishery's total revenue, and 1.8% of the Monkfish FMP fishery's total revenue. In total, the RI-MA WEAs accounted for approximately 0.28% of the total revenue across all FMP fisheries in the Mid-Atlantic and New England regions (see Table 3.5.1-1).[17]

Table 3.5.1-5. Commercial Fishing Revenue of Federally Permitted Vessels in the RI-MA WEAs by FMP Fishery (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
American Lobster	$536.4	$319.7	0.34%
Atlantic Herring	$205.9	$64.7	0.25%
Bluefish	$8.0	$4.6	0.36%
Golden and Blueline Tilefish	$4.2	$1.7	0.03%
Highly Migratory Species	$20.1	$3.4	0.15%
Jonah Crab	$105.4	$39.5	0.41%
Mackerel, Squid, and Butterfish	$545.1	$172.6	0.33%
Monkfish	$589.6	$376.1	1.83%
Northeast Multispecies (large-mesh)	$334.2	$159.5	0.22%
Sea Scallop	$955.4	$375.5	0.07%
Skate	$401.4	$228.0	3.06%
Northeast Multispecies (small-mesh)	$176.0	$105.3	0.94%
Spiny Dogfish	$41.5	$18.9	0.64%

[17] The RI-MA WEAs include the lease areas for Revolution Wind (OCS-A 0486), Sunrise Wind (OCS-A 0487), and the SFWF.

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
Summer Flounder, Scup, Black Sea Bass	$359.2	$217.3	0.55%
Other FMPs, non-disclosed species, and non-FMP fisheries*	$1,425.1	$548.3	0.62%
All FMP and non-FMP fisheries	$3,508.9	$2,635.2	0.28%

Source: Developed using NMFS (2021e).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the All FMP and non-FMP fisheries row.

* Includes revenue from FMP fisheries that are not listed, from species that were not disclosed within listed FMP fisheries, and from species in non-FMP fisheries harvested by federally permitted vessels.

In terms of pounds landed, the top species harvested in the RI-MA WEAs were skates, red hake, and monkfish (Table 3.5.1-6).

Table 3.5.1-6. Commercial Fishing Landings of Federally Permitted Vessels in the RI-MA WEAs by Species (2008–2019)

Species	FMP Fishery	Peak Annual Landings (pounds)	Average Annual Landings (pounds)	Average Annual Landings as a Percentage of Total Landings from the Mid-Atlantic and New England Regions
American lobster	American Lobster	98,668	61,780	0.32%
Atlantic herring	Atlantic Herring	1,515,176	496,739	0.32%
Bluefish	Bluefish	11,672	6,894	0.38%
Jonah crab	Jonah Crab	125,727	50,681	0.43%
Atlantic mackerel	Mackerel, Squid, and Butterfish	869,176	84,108	0.45%
Butterfish	Mackerel, Squid, and Butterfish	64,004	26,347	0.81%
Loligo squid	Mackerel, Squid, and Butterfish	377,422	108,355	0.44%
Monkfish	Monkfish	387,218	236,946	2.43%
Striped bass	No federal FMP	2,868	774	0.14%
Cod	Northeast Multispecies (large-mesh)	44,431	19,702	0.26%
Winter flounder	Northeast Multispecies (large-mesh)	39,481	16,422	0.45%
Yellowtail flounder	Northeast Multispecies (large-mesh)	115,197	28,632	1.32%
Red hake	Northeast Multispecies (small-mesh)	87,104	34,751	2.56%
Silver hake	Northeast Multispecies (small-mesh)	302,684	165,990	1.18%
Sea scallops	Sea Scallop	115,003	37,400	0.07%
Skates	Skate	1,248,078	749,989	3.52%
Spiny dogfish	Spiny Dogfish	169,487	91,473	0.68%
Black sea bass	Summer Flounder, Scup, Black Sea Bass	12,144	7,180	0.40%
Scup	Summer Flounder, Scup, Black Sea Bass	222,655	104,438	0.96%
Summer flounder	Summer Flounder, Scup, Black Sea Bass	82,239	33,353	0.36%

Source: Developed using data from NMFS (2021a).

Table 3.5.1-7 shows the average annual revenue in the RI-MA WEAs by gear type for the 2008–2019 period. Together, bottom trawl gear and gillnet-sink gear accounted for approximately 44% of the revenue generated by commercial fishing activity in the RI-MA WEAs, while the clam and scallop dredge gears and pot-other gear generated from 12% to 16%. The areas also accounted for about 1.9% of gillnet-sink gear total revenue in the Mid-Atlantic and New England regions.

Table 3.5.1-7. Commercial Fishing Revenue of Federally Permitted Vessels in the RI-MA WEAs by Gear Type (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
Dredge-clam	$604.9	$454.7	*0.74%*
Dredge-scallop	$938.6	$339.6	0.07%
Gillnet-sink	$916.2	$567.1	1.89%
Handline	$34.7	$7.8	0.16%
Pot-other	$590.5	$414.2	0.36%
Trawl-bottom	$1,166.0	$689.7	0.37%
Trawl-midwater	$185.0	$61.6	*0.32%*
All other gear*	$1,435.5	$338.4	0.72%
All gear types	**$3,509.1**	**$2,873.1**	**0.30%**

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the All gear types row. Gear types shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear.

Table 3.5.1-8 shows the ports at which fish and shellfish caught in the RI-MA WEAs during the 2008–2019 period were landed. Together, New Bedford and Port Judith accounted for 67% of the revenue generated by commercial fishing activity in the RI-MA WEAs. Little Compton and Westport were the ports most dependent on the RI-MA WEAs, with 13.5% and 7.5%, respectively, of their total commercial fishing revenue in the Mid-Atlantic and New England regions derived from the areas.

Table 3.5.1-8. Commercial Fishing Revenue of Federally Permitted Vessels in the RI-MA WEAs by Port (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
Chilmark/Menemsha, MA	$49.0	$24.0	5.09%
Fairhaven, MA	*$66.0*	*$29.0*	*0.26%*
New Bedford, MA	$1,821.3	$971.8	0.26%
Fall River, MA	*$25.9*	*$10.1*	*0.89%*
Westport, MA	$163.6	$98.2	7.52%
New Shoreham, RI	*$2.6*	*$1.0*	*1.02%*
Tiverton, RI	*$98.9*	*$33.0*	*2.87%*
Little Compton, RI	$446.8	$270.1	13.56%
Newport, RI	$323.9	$189.2	2.13%
Point Judith, RI	$1,228.5	$792.7	1.72%

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
New London, CT	*$37.9*	*$13.0*	*0.19%*
Stonington, CT	$59.7	$20.1	0.20%
Montauk, NY	$93.7	$46.4	0.25%
Shinnecock/Hampton Bays, NY	*NA*	*NA*	*NA*
Cape May, NJ	*NA*	*NA*	*NA*
Point Pleasant, NJ	*$22.9*	*$6.7*	*0.02%*
Hampton, VA	*$25.9*	*$8.4*	*0.06%*
Newport News, VA	*$28.1*	*$7.1*	*0.02%*
Beaufort, NC	*$12.2*	*$6.1*	*0.23%*
Other ports*	$348.6	$132.3	0.04%
All ports	**$3,509.1**	**$2,659.0**	**0.28%**

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the All ports row. Ports shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates. NA indicates that the number cannot be calculated with the available data.

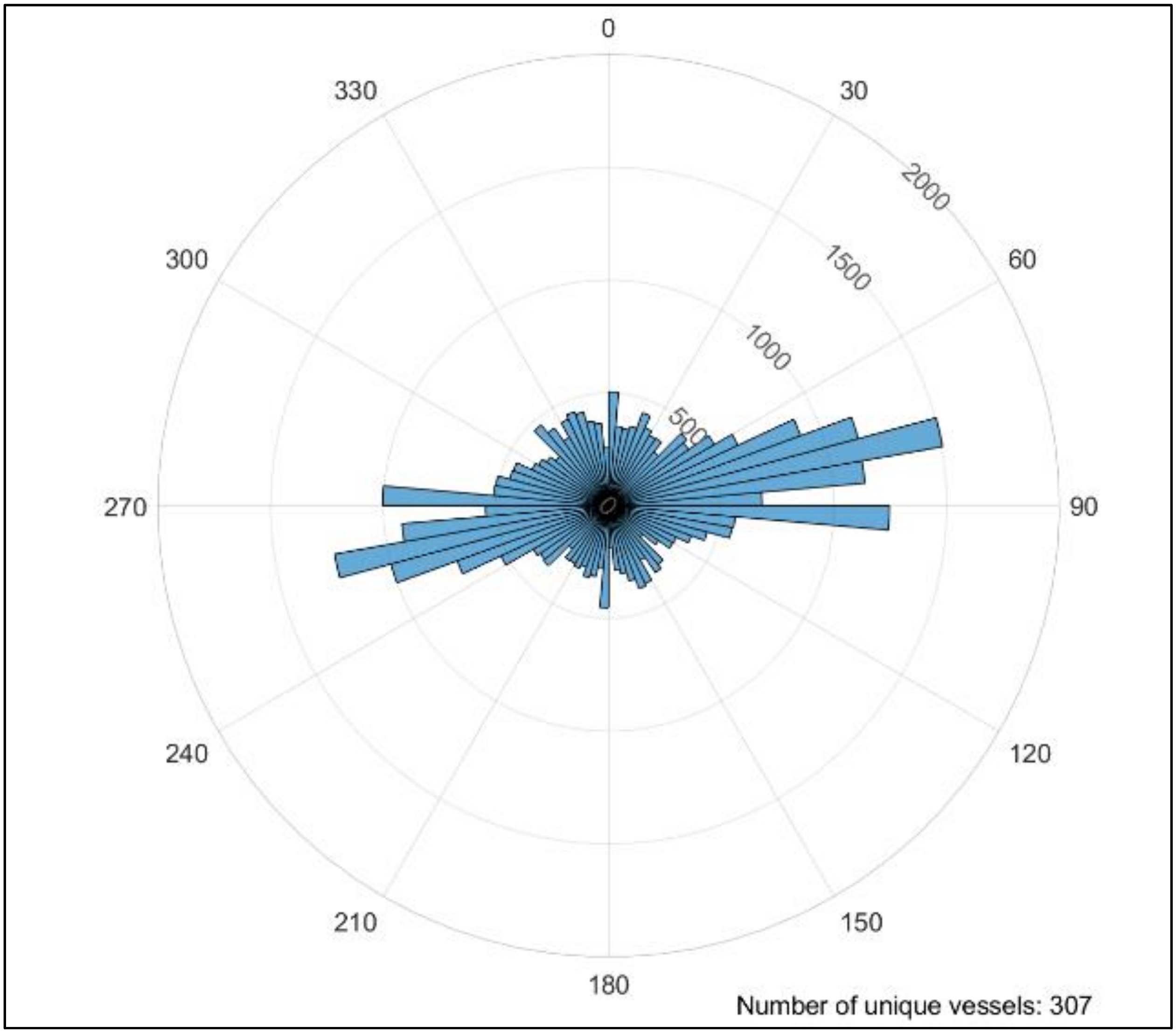
* Includes ports with NA in the table and other unlisted ports that had landings from federally permitted vessels fishing in the RI-MA WEAs during the 2008–2019 period.

In 2010, during the first stage of the public process for BOEM's call for nominations and information to establish the WEA that would eventually become the RI-MA WEAs, all of Cox Ledge was included in the area considered for leasing (i.e., call area). However, BOEM held a lengthy stakeholder and scientific review process that identified "high-value" fishing grounds and excluded those areas from the RI-MA WEAs (BOEM 2012; Smythe et al. 2016). Over the 2008–2019 period, the excluded area accounted for approximately 22% of the revenue generated by all fisheries in the call area. It accounted for 32% of the Sea Scallop FMP fishery revenue and 25% of the Monkfish FMP fishery revenue in the call area (NMFS 2021a). For the Sea Scallop and Monkfish FMP fisheries combined, the revenue per square mile in the excluded area was approximately 50% higher than that in the RI-MA WEAs in 2007–2018 (BOEM 2020).

The NMFS VMS data are a good source for understanding the spatial distribution of fishing vessels in the RI-MA WEAs. As discussed in Appendix F, from 2014 through 2019, vessels with VMS accounted for a substantial portion (90% or greater) of landings in several federally permitted fisheries in the Mid-Atlantic and New England regions, including the Sea Scallop, Monkfish, Atlantic Herring, Mackerel/Squid/Butterfish, Northeast Multispecies (large- and small-mesh), Spiny Dogfish, Summer Flounder/Scup/Black Sea Bass, and Surfclam/Ocean Quahog FMP fisheries. VMS-enabled vessels represented approximately 11% of landings in the Lobster and 14 % in the Jonah Crab FMP fisheries (NMFS 2021a). During the 2014–2019 period, an average of 340 VMS-enabled vessels operated in Atlantic WEAs. Of these vessels, an average of 101 (30%) fished in the RI-MA WEAs, including an average of two vessels fishing for Atlantic herring; 10 vessels fishing for monkfish; 22 vessels fishing for multispecies (groundfish); and 22 vessels fishing for sea scallops (NMFS 2019).

Based on data provided by NMFS (2019), polar histograms (Figure 3.5.1-1 and Figure 3.5.1-2) showing the directionality of VMS-enabled vessels fishing in the RI-MA WEAs were developed using the information conveyed in individual position reports (pings) over the January 2014–August 2019 period. Vessels moving at speeds less than 5 knots were assumed to be actively fishing. The larger bars in the polar histograms represent a greater number of position reports showing fishing vessels moving in a certain direction within the RI-MA WEAs. The polar histograms differ with respect to their scales.

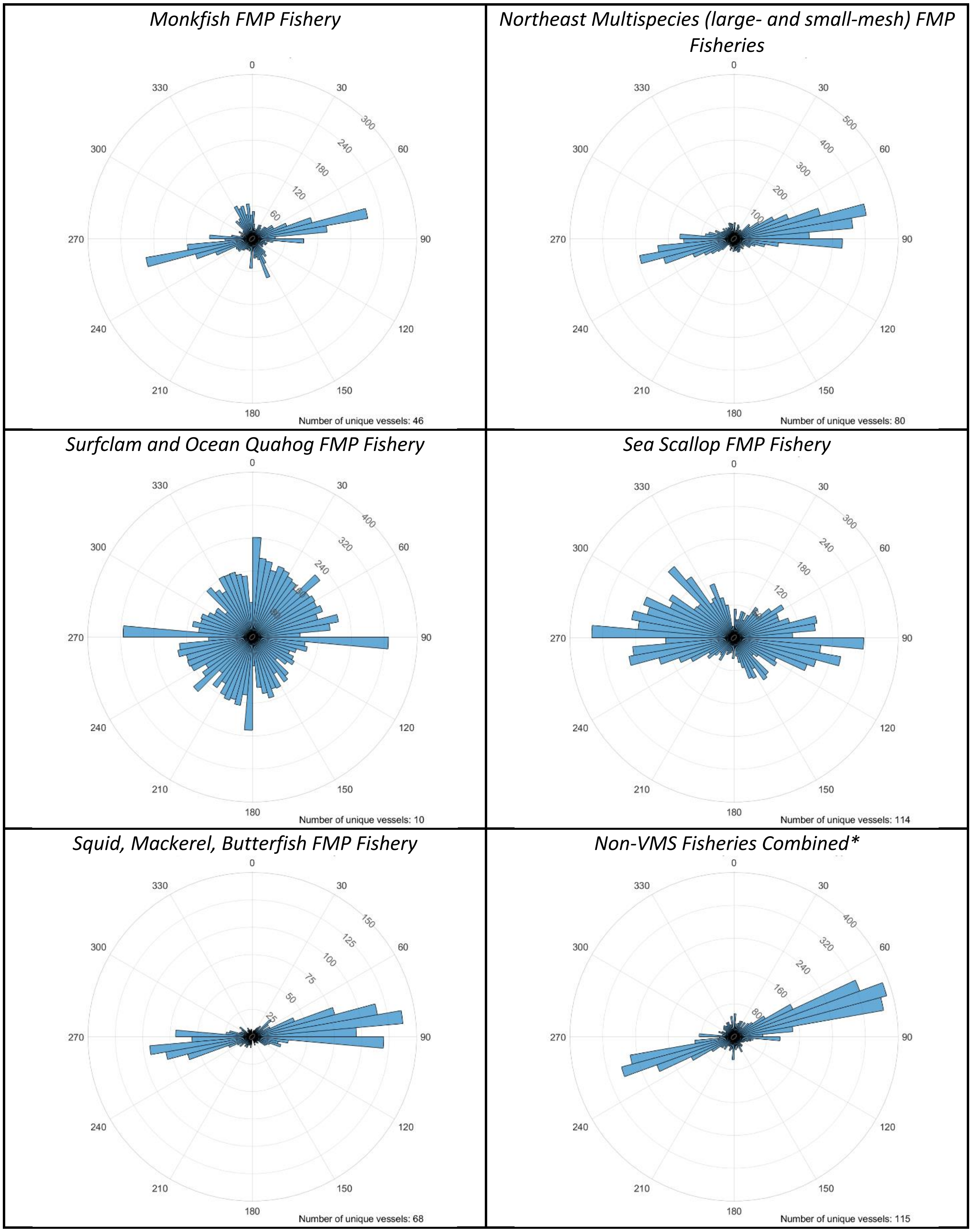
Figure 3.5.1-1 shows most of the 307 unique vessels operating in the RI-MA WEAs followed a slightly northeast–southwest fishing pattern.



Source: Developed by BOEM using VMS data provided by NMFS (2019).

Figure 3.5.1-1. VMS bearings of vessels actively fishing within the RI-MA WEAs, all FMP fisheries combined, January 2014–August 2019.

Figure 3.5.1-2 shows that the orientation of vessels fishing within the RI-MA WEAs varied somewhat by FMP fishery, but in most fisheries, vessels followed a slightly northeast–southwest fishing pattern.



* These are fishing vessels that are transmitting VMS data after having declared themselves as participating in a non-VMS fishery—(e.g. Lobster, Jonah Crab, River Herring, etc.).

Source: Developed by BOEM using VMS data provided by NMFS (2019).

Figure 3.5.1-2. VMS bearings of vessels actively fishing within the RI-MA WEAs by FMP fishery, January 2014–August 2019.

SFWF Lease Area and Offshore SFEC

The commercial fisheries that are most active in the Lease Area and along the offshore SFEC encompass a wide range of FMP fisheries, gears, and landing ports (Table 3.5.1-9 though Table 3.5.1-16). GIS data available from BOEM (2020a) for the 2007–2018 period suggest that most FMP fisheries do not have a high intensity of revenue within the Lease Area and along the offshore SFEC compared with nearby waters. As shown in Figures C-7 to C-17 in Appendix C, across all FMP fisheries, revenue intensity did not exceed $101 to $500 average annual revenue per 0.09 square mile anywhere in the Lease Area. With respect to the offshore SFEC, average annual revenue per 0.09 square mile was in the range of $501 to $1,000 for the Surfclam/Ocean Quahog FMP, Northeast Multispecies (large-mesh), and Monkfish FMP fisheries and was as high as $1,001 to $2,500 for the Sea Scallop FMP fishery; but these high revenues were derived in only small sections of the cable corridor. For all other FMP fisheries, revenue intensity along the offshore SFEC did not exceed $101 to $500 average annual revenue per 0.25 km^2. As shown in Figure C-7 to Figure C-17 in Appendix C, the revenue intensity levels for many FMP fisheries were higher in large expanses of ocean outside the Lease Area and offshore SFEC corridor but within 20 nm of the two areas. In terms of gear types (see Figures C-18 and C-19 in Appendix C), the revenue intensity for mobile gear was in the range of $501 to $1,000 for much of the offshore SFEC, while the revenue intensity for fixed gear was low along the entire cable corridor. In the Lease Area the revenue intensity was low for mobile gear, but for fixed gear it was in the range of $501 to $1,000 in the southern portion of the area. Additional details on the data and methodology used to develop the revenue intensity figures are provided in Appendix F.

Table 3.5.1-9 provides additional information on the average annual revenue in the Lease Area by FMP fishery. On average, federally permitted commercial fishing activity in the Lease Area annually generated $185.6 thousand in revenue during the 2008–2019 period, with the Monkfish FMP fishery accounting for 16% of the total, while the Sea Scallop FMP fishery accounted for 15%, and the Lobster FMP fishery both accounted for 14% of the total revenue. In terms of the percentage of each FMP fishery's total revenue in the Mid-Atlantic and New England regions that came from the Lease Area during the 2008–2019 period, the area accounted for about 0.22% of the Skate FMP fishery's total revenue and around 0.15% of the Monkfish FMP fishery's total revenue. In total, the Lease Area accounted for approximately 0.02% of the total revenue across all FMP fisheries in the Mid-Atlantic and New England regions (see Table 3.5.1-1). As shown in Table 3.5.1-9, the Summer Flounder, Scup, Black Sea Bass; Monkfish; and Skate FMP fisheries accounted for the highest number of vessels fishing in the Lease Area. The average annual revenue of vessels fishing in the Lease Area was highest for vessels participating in the Sea Scallop, Highly Migratory Species, and Atlantic Herring FMP fisheries.

Table 3.5.1-9 also shows the catch revenue in the SFWF MWA, which encompasses the Lease Area and also includes all anchoring and mooring areas that could be used during the construction of the SFWF. Due to the larger size of the MWA, the catch revenue in the area is estimated to be $232.3 thousand, 125% of that for the Lease Area alone. The increase in revenue between the two areas is highest for the Sea Scallop FMP fishery.

Table 3.5.1-9. Commercial Fishing Revenue of Federally Permitted Vessels in the SFWF Lease Area and MWA by FMP Fishery (2008–2019)

FMP Fishery	Peak Annual Revenue in the SFWF Lease Area ($1,000s)	Average Annual Revenue in the SFWF Lease Area ($1,000s)	Average Annual Revenue in the SFWF Lease Area as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions	Average Number of Vessels in the SFWF Lease Area	Average Annual Revenue per Vessel in the SFWF Lease Area	Average Annual Revenue in the MWA ($1,000s)
American Lobster	$48.2	$25.0	0.03%	85	$295	$31.6
Atlantic Herring	*$12.8*	*$5.1*	*0.02%*	*16*	*$319*	$5.9
Bluefish	$0.6	$0.3	0.02%	96	$3	$0.4
Golden and Blueline Tilefish	$0.3	$0.1	0.00%	26	$5	$0.1
Highly Migratory Species	*$12.6*	*$2.5*	*0.11%*	*5*	*$474*	*$2.9*
Jonah Crab	$7.3	$2.6	0.03%	43	$61	$3.3
Mackerel, Squid, and Butterfish	$32.5	$11.3	0.02%	102	$112	$14.5
Monkfish	$79.9	$30.3	0.15%	139	$217	$36.2
Northeast Multispecies (large-mesh)	$29.9	$12.9	0.02%	77	$168	$16.3
Sea Scallop	$87.0	$27.5	0.01%	51	$538	$38.6
Skate	$33.2	$16.4	0.22%	106	$155	$20.2
Northeast Multispecies (small-mesh)	$10.2	$6.6	0.06%	87	$76	$8.4
Spiny Dogfish	$3.4	$1.3	0.04%	38	$34	$1.6
Summer Flounder, Scup, Black Sea Bass	$27.7	$15.2	0.04%	154	$98	$18.8
Other FMPs, non-disclosed species, and non-FMP fisheries*	$109.6	$28.4	0.03%	NA	NA	$33.7
All FMP and non-FMP fisheries	**$292.3**	**$185.6**	**0.02%**	**NA**	**NA**	**$232.3**

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the All FMP and non-FMP fisheries row. FMPs shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates. NA indicates that the number cannot be calculated with the available data. Revenue in the SFWF Lease Area for the Surfclam/Ocean Quahog FMP fishery could not be disclosed; it is included in "Other FMPs, non-disclosed species, and non-FMP fisheries."

* Includes revenue from FMP fisheries that are not listed, from species that were not disclosed within listed FMP fisheries, and from species in non-FMP fisheries harvested by federally permitted vessels.

In terms of pounds landed, the top species harvested in the SFWF and MWA were skates, Atlantic herring, and monkfish (Table 3.5.1-10).

Table 3.5.1-10. Commercial Fishing Landings of Federally Permitted Vessels in the SFWF Lease Area and MWA by Species (2008–2019)

Species	Peak Annual Landings in the SFWF Lease Area (pounds)	Average Annual Landings in the SFWF Lease Area (pounds)	Average Annual Landings in the SFWF Lease Area as a Percentage of Total Landings from the Mid-Atlantic and New England Regions	Average Annual Landings in the MWA (pounds)
American lobster	9,136	4,938	0.03%	6,240
Atlantic herring	95,695	38,672	0.02%	44,463
Bluefish	818	458	0.03%	568
Jonah crab	8,596	3,356	0.03%	4,170
Atlantic mackerel	59,686	5,926	0.03%	7,458
Butterfish	2,401	1,263	0.04%	1,632
Loligo squid	23,157	7,406	0.03%	9,439
Monkfish	55,923	19,642	0.20%	23,557
Striped bass	260	68	0.01%	88
Cod	6,942	2,318	0.03%	2,824
Winter flounder	2,151	838	0.02%	1,071
Yellowtail flounder	8,892	1,971	0.09%	2,507
Red hake	4,211	2,063	0.15%	2,664
Silver hake	25,985	10,162	0.07%	13,059
Sea scallops	10,765	2,793	0.01%	3,973
Skates	70,426	49,784	0.23%	62,710
Spiny dogfish	14,461	6,190	0.05%	7,903
Black sea bass	2,149	858	0.05%	1,041
Scup	10,648	5,951	0.05%	7,511
Summer flounder	5,856	2,260	0.02%	2,759

Source: Developed using data from NMFS (2021a).

To analyze differences in the economic importance of fishing grounds in the SFWF Lease Area across the commercial fishing fleet, information was obtained from NMFS (2021a) that summarized the number of federally permitted commercial fishing vessels fishing in the Lease Area each year during the 2008–2019 period and the percentage of each vessel's annual total fishing revenue that came from within the area. The complete analysis of differences in economic dependency on the Lease Area across vessels is provided in Appendix F. As shown in the appendix, the vessel-level annual revenue percentages were divided into quartiles, which were created by ordering the data from the lowest to highest percentage and then dividing the data into four groups of equal size. The 1st quartile represents the lowest 25% of ranked percentages, while the 4th quartile represents the highest 25%. In addition, NMFS (2021a) reported the number of "outlier" vessels in the distribution of percentage of revenue. In the context of this analysis, an outlier is a vessel that derived an exceptionally high proportion of its annual revenue from the Lease Area in comparison to other vessels that fished in the area.[18]

[18] Technically, an outlier in a boxplot distribution is an observation that is more than 1.5 times the length of the box away from either the 1st quartile (Q1) or 3rd quartile (Q3). Specifically, if an observation is less than Q1 – (1.5 × IQR) or greater than Q3 + (1.5 × IQR), it is an outlier; where IQR = interquartile range = Q3 – Q1.

As shown in Table F-6 in Appendix F, from 2008 through 2019, an average of 249 vessels per year fished in the Lease Area, with a high of 284 vessels in 2008 and a low of 213 vessels in 2019. The average annual number of outliers was 37 (15% of all vessels), with a high of 49 outliers in 2014 (18% of all vessels) and a low of 21 outliers in 2019 (9% of all vessels).

Three-quarters of the vessels that fished in the Lease Area derived less than 0.2% of their total annual revenue from the area (NMFS 2021f). The highest percentage of total annual revenue coming from within the Lease Area by an outlier varied from year to year, ranging from 39% in 2016 to 5% in 2012 (NMFS 2021f). Over the 2008–2019 period as a whole, the average maximum revenue percentage among outliers was 24% (NMFS 2021f). Although outliers derived a high proportion of their annual revenue from the Lease Area in comparison to other vessels that fished in the area, Figure F-1 in Appendix F shows that in any given year, the revenue percentage for the majority of outliers was below 5%. From 2008 through 2019, the average percentage of all vessels fishing in the Lease Area that derived 5% or more of their total fishing income from the Lease Area was around 2%. During any given year, the highest percentage, which occurred in 2008, was 5%, while the lowest was less than 1%. In short, some vessels depended heavily on the Lease Area, but most vessels derived a small percentage of their total annual revenue from the area.

In addition to assessing the differences in the level of economic dependency on fishing grounds in the Lease Area across vessels, the analysis examined the relationship between vessels' average annual percentage of total revenue inside the area and their average annual total fishing revenue during the 2008–2019 period. As shown in Table F-7 in Appendix F, average annual total revenue per vessel was negatively correlated with average annual revenue percentage. Vessels in the 4th quartile (i.e., vessels with a higher level of economic dependence on fishing grounds in the Lease Area) tended to have lower total commercial fishing incomes. In short, the Lease Area generally accounted for a higher proportion of the revenue of vessels that had lower total commercial fishing revenue.

Table F-7 in Appendix F also shows the average annual revenue per vessel in the Lease Area and the Mid-Atlantic and New England regions as a whole. The highest average annual revenue per vessel in the Mid-Atlantic and New England regions are from vessels in the first quartile; annual average revenue per vessel declines with each successive quartile. Average annual revenue per vessel in the Mid-Atlantic and New England regions in the 4th quartile ($219,899) was 22% of the annual average revenue per vessel in the 1st quartile ($1,009,953). Average annual revenue per vessel within the Lease Area shows an opposite trend across quartiles. The highest average annual revenue per vessel from the Lease Area was among outliers. The average vessel in the 4th quartile Lease Area had an average annual revenue of around $2,175. This was 1% of the 4th quartile annual average revenue per vessel in the Mid-Atlantic and New England region as a whole. In other words, if the average vessel in the 4th quartile was displaced from the Lease Area, on average they would likely need to increase their revenue in other fishing areas by 1% to maintain their level of annual fishing income. Vessels that were outliers on average earned $3,208 per year from the Lease Area. Sufficient information was not available for this analysis to calculate the percentage of revenue needed to maintain current levels of fishing revenue if outlier vessels are displaced from the Lease Area.

Table 3.5.1-11 provides the average annual revenue in the Lease Area and MWA by gear type for the 2008–2019 period. Together, gillnet-sink, bottom trawl, and pot-other gear accounted for approximately 69% of the revenue generated by commercial fishing activity in the Lease Area. The area accounted for about 0.15% of the gillnet-sink gear's total revenue in the Mid-Atlantic and New England regions.

Table 3.5.1-11. Commercial Fishing Revenue of Federally Permitted Vessels in the SFWF Lease Area and MWA by Gear Type (2008–2019)

Gear Type	Peak Annual Revenue in the SFWF Lease Area ($1,000s)	Average Annual Revenue in the SFWF Lease Area ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions in the SFWF Lease Area	Average Annual Revenue in the MWA ($1,000s)
Dredge-clam	NA	NA	NA	*NA*
Dredge-scallop	$897.0	$26.1	0.01%	$36.9
Gillnet-sink	$313.8	$46.5	0.15%	$56.0
Handline	$24.6	$1.6	0.03%	$1.8
Pot-other	$187.2	$39.3	0.03%	$48.4
Trawl-bottom	$800.2	$43.6	0.02%	$55.4
Trawl-midwater	*$118.9*	*$4.5*	*0.02%*	*$5.2*
All other gear*	$596.1	$24.0	0.05%	$28.7
All gear types	**$292.7**	**$185.5**	**0.02%**	**$232.3**

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the All gear types row. Gear types shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. NA indicates that the number cannot be calculated with the available data.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear, for years when they cannot be disclosed (NA).

Table 3.5.1-12 shows the ports at which fish and shellfish caught in the Lease Area and MWA during the 2008–2019 period were landed. Together, Point Judith, New Bedford, Little Compton, and Newport accounted for approximately 68% of the revenue generated by commercial fishing activity in the Lease Area. Little Compton and Westport were the ports most dependent on the Lease Area, with 1.3% and 0.8%, respectively, of their total commercial fishing revenue in the Mid-Atlantic and New England regions derived from the area.

Table 3.5.1-12. Commercial Fishing Revenue of Federally Permitted Vessels in the SFWF Lease Area and MWA by Port (2008–2019)

Port and State	Peak Annual Revenue in the SFWF Lease Area ($1,000s)	Average Annual Revenue in the SFWF Lease Area ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions in the SFWF Lease Area	Average Annual Revenue in the MWA ($1,000s)
Chilmark/Menemsha, MA	$3.8	$0.9	0.18%	$1.2
Fairhaven, MA	*$4.9*	*$1.3*	*0.01%*	*$1.7*
New Bedford, MA	$68.1	$43.7	0.01%	$55.7
Fall River, MA	*NA*	*NA*	*NA*	*NA*
Westport, MA	$19.6	$9.9	0.76%	$13.2
New Shoreham, RI	*$0.1*	*$0.1*	*0.08%*	*$0.1*
Tiverton, RI	*$6.5*	*$4.0*	*0.35%*	*$3.6*
Little Compton, RI	$53.9	$25.3	1.27%	$31.5
Newport, RI	$34.4	$16.2	0.18%	$18.6
Point Judith, RI	$100.3	$59.0	0.13%	$76.8
New London, CT	*$3.0*	*$1.1*	*0.02%*	*$1.4*
Stonington, CT	*$2.9*	*$1.1*	*0.01%*	*$1.4*

Port and State	Peak Annual Revenue in the SFWF Lease Area ($1,000s)	Average Annual Revenue in the SFWF Lease Area ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions in the SFWF Lease Area	Average Annual Revenue in the MWA ($1,000s)
Montauk, NY	$13.2	$4.6	0.03%	$5.3
Shinnecock/Hampton Bays, NY	*NA*	*NA*	*NA*	*NA*
Cape May, NJ	*NA*	*NA*	*NA*	*NA*
Point Pleasant, NJ	*$1.6*	*$0.5*	*0.00%*	*$0.7*
Hampton, VA	*$1.9*	*$0.6*	*0.00%*	*$0.8*
Newport News, VA	*$1.6*	*$0.4*	*0.00%*	*$0.5*
Beaufort, NC	*$0.9*	*$0.4*	*0.02%*	*$0.5*
Other ports*	$94.5	$19.4	0.01%	$22.6
All New England/ Mid-Atlantic ports	**$292.7**	**$188.6**	**0.02%**	**$235.4**

Source: Developed using data from NMFS (2021a).

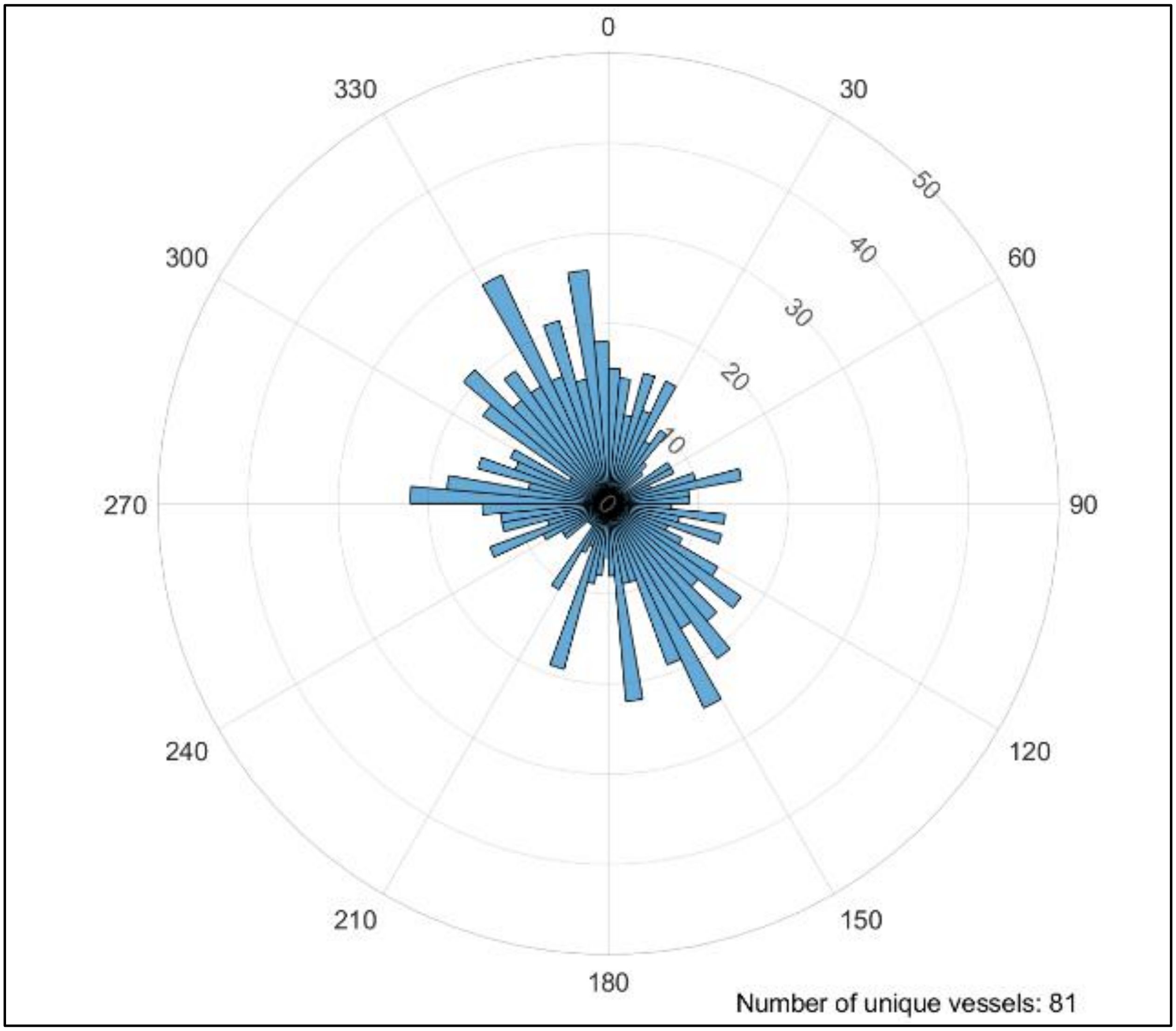
Notes: Revenue is adjusted for inflation to 2019 dollars. Ports shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data. NA indicates that the number cannot be calculated with the available data.

* Includes ports with NA in the table and other unlisted ports that had landings from federally permitted vessels fishing from these areas in 2008–2019.

As in the RI-MA WEAs, the NMFS VMS data are a good source for understanding the spatial distribution of fishing vessels in the MWA. During the 2017–2019 period, an average of 16 (5%) of the 340 VMS-enabled vessels operating in Atlantic WEAs fished in the MWA, including an average of two vessels fishing for monkfish; one vessel fishing for multispecies (groundfish); and two vessels fishing for sea scallops (NMFS 2019).

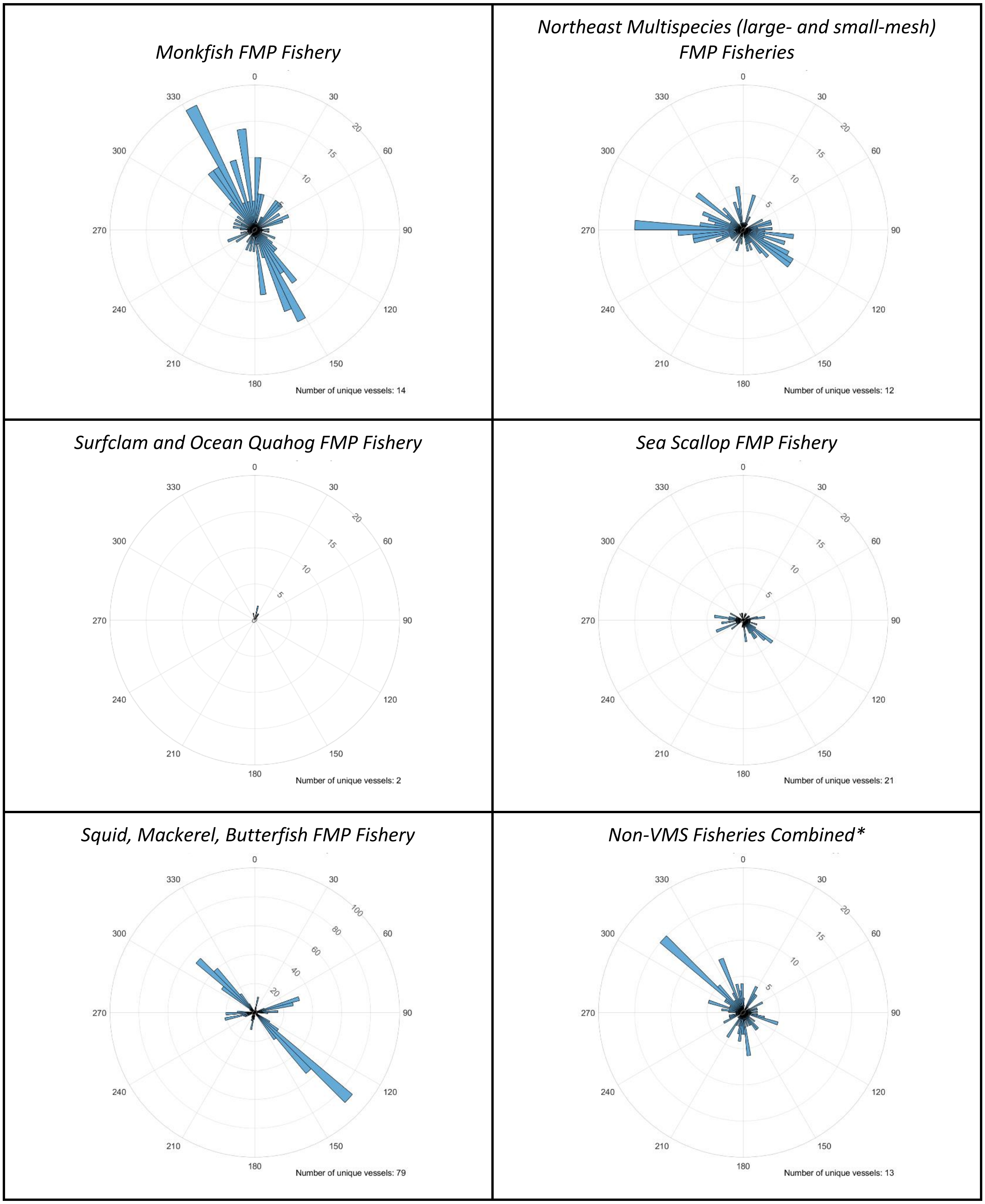
Polar histograms (Figure 3.5.1-3 and Figure 3.5.1-4) showing the directionality of VMS-enabled fishing vessels operating in the MWA were developed using the same methodology described above. Figure 3.5.1-3 shows that most of the 81 unique vessels operating in the Lease Area followed a slightly northwest–southeast fishing pattern.

Figure 3.5.1-4 shows that the orientation of vessels fishing within the MWA varied by FMP fishery, but in most fisheries, vessels followed a northwest–southeast fishing pattern.



Source: Developed by BOEM using VMS data provided by NMFS (2019).

Figure 3.5.1-3. VMS bearings of vessels actively fishing within the MWA, all FMP fisheries combined, January 2014–August 2019.



* These are fishing vessels that are transmitting VMS data after having declared themselves as participating in a non-VMS fishery—e.g. lobster, Jonah crab, river herring, etc.

Source: Developed by BOEM using VMS data provided by NMFS (2019).

Figure 3.5.1-4. VMS bearings of vessels actively fishing within the MWA by FMP fishery, January 2014–August 2019.

Table 3.5.1-13 presents the average annual revenue in the 2-km zone around the offshore SFEC by FMP fishery for the 2008–2019 period, assuming the SFEC would come ashore at Beach Lane. The Beach Lane route is the longer of the two SFEC options; based on data from BOEM (2020a), the average annual catch revenue for the Hither Hills route was estimated to be about 91% of that for the Beach Lane route. As noted above, the available data suggest that the offshore SFEC crosses an area of relatively high intensity of revenue from sea scallop fishing. On average, federally permitted commercial fishing activity in the offshore SFEC area annually generated $1.28 million in revenue, with the Sea Scallop FMP fishery accounting for 33% of the total. The Summer Flounder, Scup, Black Sea Bass FMP fishery accounted for 15% of the total while the Monkfish FMP and Northeast Multispecies (large-mesh) FMP fisheries each accounted for 10% of the total revenue. In terms of the percentage of each FMP fishery's total revenue in the Mid-Atlantic and New England regions that came from the offshore SFEC area during the 2008–2019 period, the area accounted for about 1.01% of the Skate FMP fishery's total revenue, 0.73% of the Bluefish FMP fishery's total revenue, and 0.61% of the Monkfish FMP fishery's total revenue. In total, the offshore SFEC area accounted for approximately 0.13% of the total revenue across all FMP fisheries in the Mid-Atlantic and New England regions (see Table 3.5.1-1).

Table 3.5.1-13. Commercial Fishing Revenue of Federally Permitted Vessels in the Offshore SFEC with Beach Lane Landing Site by FMP Fishery (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
American Lobster	$71.6	$33.9	0.04%
Atlantic Herring	$89.8	$32.0	0.12%
Bluefish	$26.4	$9.3	0.73%
Golden and Blueline Tilefish	$36.3	$9.8	0.18%
Highly Migratory Species	$1.1	$0.3	0.01%
Jonah Crab	$9.5	$5.0	0.05%
Mackerel, Squid, and Butterfish	$251.3	$90.5	0.17%
Monkfish	$192.1	$125.6	0.61%
Northeast Multispecies (large-mesh)	$196.4	$115.3	0.16%
Sea Scallop	$899.7	$413.9	0.08%
Skate	$115.6	$74.9	1.01%
Northeast Multispecies (small-mesh)	$47.5	$25.7	0.23%
Spiny Dogfish	$10.1	$3.5	0.12%
Summer Flounder, Scup, Black Sea Bass	$258.4	$187.2	0.47%
Other FMPs, non-disclosed species, and non-FMP fisheries*	$328.2	$130.9	0.15%
All FMP and non-FMP fisheries	$1,766.3	$1,257.9	0.13%

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the All FMP and non-FMP fisheries row.

* Includes revenue from federal FMPs that are not listed, from species that were not disclosed within listed FMPs, and harvests from species in non-FMP fisheries harvested by federally permitted vessels.

In terms of pounds landed, the top species harvested along the offshore SFEC were Atlantic herring and skates (Table 3.5.1-14).

Table 3.5.1-14. Commercial Fishing Landings of Federally Permitted Vessels in the Offshore SFEC by Species (2008–2019)

Species	FMP	Peak Annual Landings (pounds)	Average Annual Landings (pounds)	Average Annual Landings as a Percentage of Total Landings from the Mid-Atlantic and New England Regions
American lobster	American Lobster	12,565	6,376	0.03%
Atlantic herring	Atlantic Herring	777,251	234,645	0.15%
Bluefish	Bluefish	29,995	11,648	0.64%
Jonah crab	Jonah Crab	11,776	6,411	0.05%
Atlantic mackerel	Mackerel, Squid, and Butterfish	171,753	29,951	0.16%
Butterfish	Mackerel, Squid, and Butterfish	12,997	7,934	0.24%
Loligo squid	Mackerel, Squid, and Butterfish	183,515	60,245	0.24%
Monkfish	Monkfish	105,685	79,498	0.82%
Striped bass	No Federal FMP	11,442	6,714	1.25%
Cod	Northeast Multispecies (large-mesh)	28,643	12,889	0.17%
Winter flounder	Northeast Multispecies (large-mesh)	38,468	14,685	0.40%
Yellowtail flounder	Northeast Multispecies (large-mesh)	51,255	20,350	0.94%
Red hake	Northeast Multispecies (small-mesh)	16,323	10,444	0.77%
Silver hake	Northeast Multispecies (small-mesh)	61,981	32,810	0.23%
Sea scallops	Sea Scallop	84,124	37,851	0.08%
Skates	Skate	572,624	326,497	1.53%
Spiny dogfish	Spiny Dogfish	44,886	17,755	0.13%
Black sea bass	Summer Flounder, Scup, Black Sea Bass	10,776	5,462	0.30%
Scup	Summer Flounder, Scup, Black Sea Bass	145,722	82,150	0.76%
Summer flounder	Summer Flounder, Scup, Black Sea Bass	45,874	27,704	0.30%

Source: Developed using data from NMFS (2021a).

Table 3.5.1-15 provides the average annual revenue in the offshore SFEC area by gear type for the 2008–2019 period. Together, scallop dredge, bottom trawl and gillnet-sink gear types accounted for approximately 80% of the revenue generated by commercial fishing activity in the offshore SFEC area. The area accounted for about 0.60% of gillnet-sink gear total revenue in the Mid-Atlantic and New England regions, and 0.32% of handline gear total revenue.

Table 3.5.1-15. Commercial Fishing Revenue of Federally Permitted Vessels in the Offshore SFEC with Beach Lane Landing Site by Gear Type (2008–2019)

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
Dredge-clam	*$277.2*	*$89.2*	*0.15%*
Dredge-scallop	$861.2	$395.2	0.08%
Gillnet-sink	$255.3	$181.3	0.60%
Handline	$21.6	$15.4	0.32%
Pot-other	$85.9	$57.0	0.05%

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
Trawl-bottom	$735.9	$469.1	0.25%
Trawl-midwater	*$103.7*	*$27.2*	*0.14%*
All other gear*	$248.9	$70.0	0.15%
All gear types	$1,766.9	$1,304.4	0.14%

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars. Gear types shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear, for years when they cannot be disclosed.

Table 3.5.1-16 shows the ports at which fish and shellfish caught in the 2-km zone around the offshore SFEC during the 2008–2019 period were landed, assuming the SFEC came ashore at Beach Lane. Together, Point Judith, New Bedford, and Montauk accounted for approximately 76% of the revenue generated by commercial fishing activity in the offshore SFEC area. New Shoreham and Tiverton were the ports most dependent on the offshore SFEC area, with 3.6% and 2.0%, respectively, of their total commercial fishing revenue in the Mid-Atlantic and New England regions derived from the area.

Table 3.5.1-16. Commercial Fishing Revenue of Federally Permitted Vessels in the Offshore SFEC with Beach Lane Landing Site by Port (2008–2019)

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
Chilmark/Menemsha, MA	$0.5	$0.1	0.02%
Fairhaven, MA	*$33.4*	*$6.8*	*0.06%*
New Bedford, MA	$570.2	$325.1	0.09%
Fall River, MA	*$4.6*	*$2.7*	*0.23%*
Westport, MA	$6.7	$2.3	0.18%
New Shoreham, RI	*$9.7*	*$3.6*	*3.57%*
Tiverton, RI	*$42.2*	*$22.9*	*2.00%*
Little Compton, RI	$70.7	$28.7	1.44%
Newport, RI	$76.5	$51.2	0.58%
Point Judith, RI	$541.9	$398.0	0.86%
New London, CT	$92.0	$32.0	0.48%
Stonington, CT	$56.4	$32.2	0.31%
Montauk, NY	$355.5	$256.4	1.39%
Shinnecock/Hampton Bays, NY	$85.3	$46.5	0.68%
Cape May, NJ	*$29.2*	*$8.6*	*0.01%*
Point Pleasant, NJ	$46.3	$18.4	0.06%
Hampton, VA	*$6.5*	*$3.9*	*0.03%*

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
Newport News, VA	*$5.7*	*$1.7*	*0.01%*
Beaufort, NC	*$7.9*	*$2.4*	*0.09%*
Other ports*	$74.0	$41.8	0.01%
All New England/Mid-Atlantic ports	$1,787.6	$1,285.2	**0.13%**

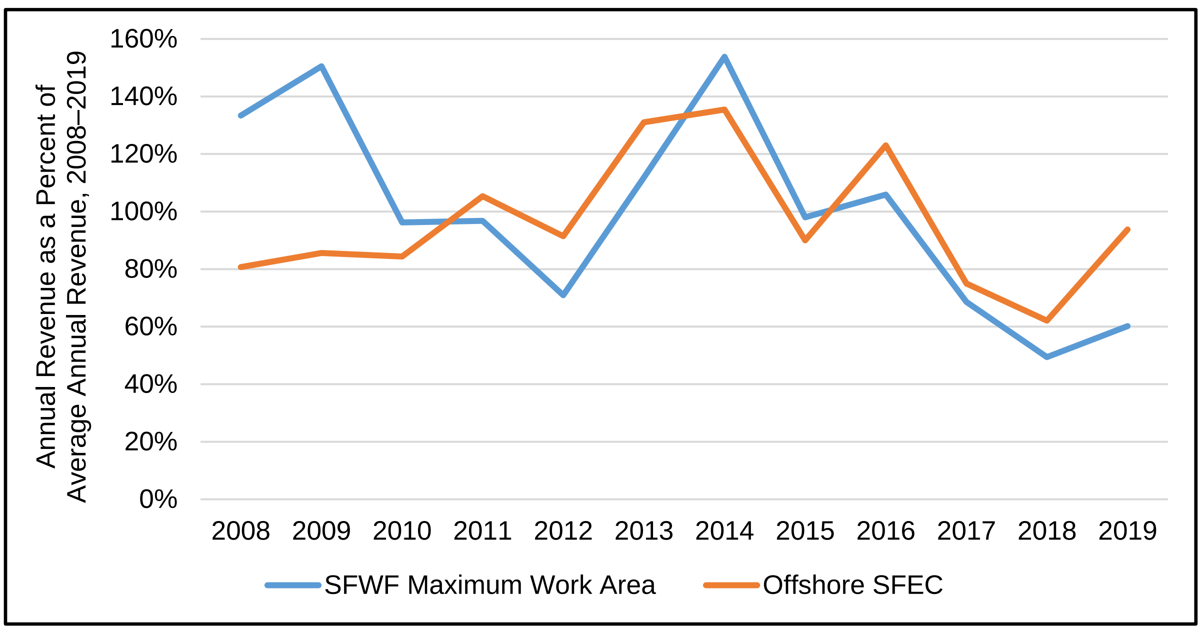
Source: Developed using data from NMFS 2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars. Ports shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes ports with NA in the table and unlisted ports that had landings from federally permitted vessels fishing in the offshore SFEC in the period 2008–2019.

VTR data describe most commercial fishing activity in both state and federal waters by vessels that have a federal permit or a state and federal fishing permit. However, those vessels with only state permits are not included in the VTR data set. Nevertheless, state permit holders must report their catch to state agencies, including the statistical area within which fishing occurred. Based on commercial fishing data collected by the NYSDEC, CH2M HILL (2018) estimated catches of New York State–permitted fishermen in statistical areas 167 and 168. These two areas encompass the state fishery fishing grounds that could be affected by the offshore SFEC. Together, the two statistical areas represent important state fishing grounds for a variety of species. The greatest average pounds landed for the years 2007 to 2016 in these statistical areas included striped bass (total approximately 205,000 pounds), longfin inshore squid (approximately 43,000 pounds), skate (approximately 26,000 pounds), bluefish (about 23,000 pounds), and lobster (approximately 13,000 pounds). The top ports where fishermen landed their catch after fishing in the two areas were Moriches, Shinnecock Indian Reservation, and Montauk, New York (CH2M HILL 2018).

Figure 3.5.1-5 shows that there was considerable interannual variability in commercial fishing revenue in the SFWF MWA and offshore SFEC in the period 2008–2018.



Source: Developed using data from NMFS (2021a).

Figure 3.5.1-5. Interannual variability of commercial fishing revenue of federally permitted vessels in the SFWF MWA and offshore SFEC, 2008–2019.

3.5.1.1.2 FOR-HIRE RECREATIONAL FISHING

For-hire recreational fishing boats are operated by licensed captains for businesses that sell recreational fishing trips to anglers. These boats include both party (head) boats, defined as boats on which fishing space and privileges are provided for a fee, and charter boats, defined as boats operating under charter for a price, time, etc. and the participants are part of a preformed group of anglers (NMFS 2021g). A comprehensive list of species that are targeted by for-hire boats within the Rhode Island Ocean Special Management Plan area was developed through an iterative process, using catch data and correspondence with recreational charter boat captains (State of Rhode Island Coastal Resources Management Council 2010). As shown in Table 3.5.1-17, for-hire boats target a wide range of pelagic, highly migratory, and demersal species.

Table 3.5.1-17. Species Targeted by For-Hire Recreational Fishing Boats in the Rhode Island Ocean Special Management Plan Area

Column 1 of 4	Column 2 of 4	Column 3 of 4	Column 4 of 4
Atlantic bonito	False albacore	Blue shark	Tautog
Atlantic cod	Pollock	Thresher shark	Bluefin tuna
Black sea bass	Scup	Striped bass	Yellowfin tuna
Bluefish	Shortfin mako	Summer flounder	Winter flounder

Source: State of Rhode Island Coastal Resources Management Council (2010).

Recreational fishing in the region occurs year-round but is most intensive from April through November (Tetra Tech 2016). Early in spring, most of the Rhode Island–based party and charter boats target the migratory stocks of the Mid-Atlantic such as striped bass, summer flounder, and black sea bass. During late spring, party and charter boats are almost exclusively targeting cod, with most of the cod fishing occurring on Cox Ledge and south of Block Island (State of Rhode Island Coastal Resources Management Council 2010). Cod fishing on Cox Ledge is also popular in the summer as the water warms and cod start to congregate on the ledge (Plaia 2009). However, most summer recreational fishing is focused on striped bass and bluefish, with some boats targeting summer flounder closer to shore. Later in the summer, some of the boats move farther offshore to target sharks, which are generally caught anywhere from 20 to 50 miles offshore. Sharks targeted include blue, mako, and thresher sharks, with most shark fishing being catch and release. Some tuna fishing also takes place in an area east of Block Island and northwest of Cox Ledge known as the Mud Hole or Deep Hole. Starting in September, much of the fishing switches to sea bass and scup around Block Island or to striped bass closer to shore (State of Rhode Island Coastal Resources Management Council 2010). Many recreational fishermen participate in organized sportfishing tournaments during the year. For example, the Rhode Island Saltwater Anglers Association sponsors 15 tournaments per year as well as a “Yearlong Tournament” targeting the majority of recreational species in the Rhode Island Ocean Special Management Plan Area (State of Rhode Island Coastal Resources Management Council 2010).

As shown in Figure C-6 in Appendix C, which presents spatial data indicating the relative intensity of charter fishing activity, the number of charter fishing trips is fairly low in the RI-MA WEAs but comparatively high along much of the offshore SFEC route.

Most for-hire boats fishing near the RI-MA WEAs are based in Rhode Island. However, party and charter boats from New York, Connecticut, and Massachusetts also regularly fish in or near the RI-MA WEAs. For-hire recreational fishing is an integral part of each of these states’ coastal tourism industries. During the 2007–2012 period, annual for-hire boat revenue averaged $15.6 million in Rhode Island, $86.2 million in New York, $14.5 million in Connecticut, and $62.4 million in Massachusetts. However, of the 16,569 average annual for-hire boat trips that left from ports in the four states each year during the 2007–2012 period, only 0.9% occurred in or near the RI-MA WEAs (Kirkpatrick et al. 2017).

The 70 square miles of Cox Ledge excluded from the RI-MA WEAs is important to for-hire recreational fishing as well as commercial fisheries. Table 3.5.1-18 presents data on party/charter recreational fishing reported on Cox Ledge during various time periods. The data suggest that a small number of for-hire recreational fishing businesses fish relatively intensively on Cox Ledge, with each individual business generating on the order of $9,400/year in the area. The revenue reported on Cox Ledge is consistently high across all time periods studied (NEFMC and NMFS 2016).

Table 3.5.1-18. For-Hire Recreational Fishing Activity on the Portion of Cox Ledge Excluded from Wind Energy Development by Time Period

Time Period	Average Annual Revenue	Average Revenue Per Trip	Average Annual Number of Permit Holders	Average Annual Number of Anglers
2006–2014	$95,911	$2,385	10	887
2010–2014	$88,928	$2,257	9	816
2012–2014	$64,696	$2,521	6	587

Source: NEFMC and NMFS (2016).

The following two tables focus on for-hire recreational fishing catch and effort in the SFWF using VTR data provided by NMFS.[19] To understand the relative importance of the SFWF Lease Area to regional for-hire recreational fishing, Table 3.5.1-19 compares the landings reported in the Lease Area to the total for-hire recreational fishing landings in the New England and Mid-Atlantic regions during the 2008–2018 period. For all species, the Lease Area accounted for a small percentage (≤ 0.01%) of the total landings in the for-hire recreational fishery.

Table 3.5.1-19. Average Annual For-Hire Recreational Fishing Landings in the Mid-Atlantic and New England Regions and SFWF Lease Area by Top Species (2008–2018)

Area	Black Sea Bass	Bluefish	Atlantic Cod	Cunner	Scup	Striped Bass	Summer Flounder	Spiny Dogfish	All Others
Landings in New England and Mid-Atlantic regions (number of fish)	336,280	243,599	119,341	4,806	606,230	44,107	76,384	7,205	762,662
Landings in SFWF Lease Area (number of fish)	17	2	11	0	1	4	0	0	177
SFWF Lease Area landings as a percentage of total New England and Mid-Atlantic landings	0.01%	0.00%	0.01%	0.00%	0.00%	0.01%	0.00%	0.00%	0.02%

Source: Developed using data from NMFS (2021a).

Notes: Landings are reported in number of fish kept on party/charter trips. Only species that were landed in the SFWF Lease Area are included in the table.

Table 3.5.1-20 compares the angler trips reported in the Lease Area to the total angler trips for the New England and mid-Atlantic regions. Over the 2008–2018 period, the Lease Area accounted for relatively few angler trips across all states.

[19] NMFS requires all federally permitted party and charter boats with a permit to fish for Atlantic bluefish, black sea bass, scup, summer flounder, tilefish, Atlantic mackerel, squid, and/or butterfish to submit a VTR for every fishing trip (50 CFR 648.7).

Table 3.5.1-20. For-Hire Recreational Fishing Effort in Mid-Atlantic and New England Ports and SFWF Lease Area by Port State (2008-2018)

Year	All New York Ports	All Rhode Island Ports	All Connecticut Ports	All Massachusetts Ports	All NY, RI, CT, MA Ports
New England and Mid-Atlantic Regions (number of angler trips)					
2008	91,970	24,050	19,112	57,121	192,253
2009	130,928	21,660	17,889	47,387	217,864
2010	167,230	23,566	18,516	60,127	269,439
2011	168,969	24,866	13,230	53,867	260,932
2012	171,237	24,558	15,885	52,063	263,743
2013	174,419	22,953	15,321	46,918	259,611
2014	171,736	24,944	20,681	40,230	257,591
2015	172,937	24,509	21,209	28,475	247,130
2016	173,236	23,903	20,959	28,605	246,703
2017	163,422	18,088	15,610	27,920	225,040
2018	121,959	19,572	16,957	21,332	179,820
SFWF Lease Area (number of angler trips)					
2008	37	9	0	0	46
2009	0	6	0	0	6
2010	0	0	7	0	7
2011	30	21	0	0	51
2012	18	0	0	0	18
2013	22	0	0	0	22
2014	6	3	0	0	9
2015	5	91	0	12	108
2016	38	0	0	0	38
2017	51	23	0	0	74
2018	8	10	0	0	18

Source: Developed using data from NMFS (2021a).

Notes: The term "angler trips" refers to the number of reported passengers on party/charter VTRs. Only port states that reported angler trips in the SFWF Lease Area are included in the table.

3.5.1.2 Environmental Consequences

3.5.1.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.5.1-21 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for the final EIS.

Table 3.5.1-21. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Commercial Fisheries and For-Hire Recreational Fishing

<table>
<tr><th>Issue</th><th>Impact Indicator</th><th>Significance Criteria</th></tr>
<tr><td>Port access</td><td>Vessel traffic congestion and reduced access to high-demand port services</td><td rowspan="4">Negligible: No measurable impacts would occur.
Minor: Adverse impacts to the affected activity or community could be avoided with EPMs and impacts would not disrupt the normal or routine functions of the affected activity or community. Once the impacting agent is eliminated, the affected activity or community would return to a condition with no measurable effects.
Moderate: Impacts to the affected activity or community are unavoidable, but EPMs would reduce impacts substantially during the life of the Project. The affected activity or community would have to adjust somewhat to account for disruptions due to impacts of the Project, or, once the impacting agent is eliminated, the affected activity or community would return to a condition with no measurable effects if proper remedial action is taken.
Major: The affected activity or community would experience substantial disruptions, and, once the impacting agent is eliminated, the affected activity or community could retain measurable effects indefinitely, even if remedial action is taken.</td></tr>
<tr><td>Fishing access</td><td>Increased operating costs (e.g., additional fuel to arrive at more distant locations; additional crew compensation due to more days at sea); lower revenue (e.g., less-productive area; less-valuable species); increased conflict among fishermen; avoidance of area by fishermen because of safety concerns</td></tr>
<tr><td>Loss of or damage to fishing gear</td><td>Costs of gear repair or replacement; lost fishing revenue while gear is being repaired or replaced</td></tr>
<tr><td>Change in catch of target species</td><td>Change in revenue due to change in catch</td></tr>
</table>

3.5.1.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing commercial fisheries and for-hire recreational fishing occurring in the geographic analysis area and describes trends in conditions, including the effects of past and present activities. Attachment 3 in Appendix E provides additional information regarding past and present activities contributing to current conditions in the geographic area. Attachment 3 in Appendix E also discloses future non-offshore wind activities and associated commercial fisheries and for-hire recreational fishing impacts. Impacts associated with future offshore wind activities are described below.

Future Activities (without the Proposed Action)

Future offshore wind facilities in the New England and Mid-Atlantic regions could increase the magnitude, geographic extent, duration, and frequency of the impacts to commercial fisheries and for-hire recreational fishing caused by ongoing and future non-offshore wind activities. Two sources of assumptions are used with respect to future offshore wind development: Table E-4 in Attachment 4 of Appendix E is used for forecasts of project footprint acres and lengths of inter-array and export cables, and Table E-4 in Appendix E provides updated forecasts of numbers of wind turbine foundations.

Port utilization and traffic: Construction of offshore wind energy projects would require port facilities for staging and installation vessels, including crew transfer, dredging, cable lay, pile driving, survey vessels, and, potentially, feeder lift barges and heavy lift barges. All of these vessels would add traffic to port facilities and would require berthing. The additional vessel volume in construction ports could cause vessel traffic congestion, difficulties with navigating, and an increased risk for collisions, together with reduced access to high-demand port services (e.g., fueling and provisioning) by existing port users, including commercial fishing vessels. These potential adverse impacts could cause some vessel operators to change routes or use an alternative port. However, future offshore wind projects are expected to result in only a small incremental increase in vessel traffic, with a peak of 379 vessels during Project construction over a 10-year time frame (see Section 3.5.6.2.2 [No Action Alternative] for additional details).

The installation of offshore components for offshore wind energy projects and the presence of construction vessels could also temporarily restrict fishing vessel movement and thus transit and harvesting activities within lease areas. To safeguard mariners from the hazards associated with installation of these offshore components, it is expected that most, if not all, offshore wind energy projects would create safety zones around construction areas. When safety zones are in effect, fishing vessels could either forfeit fishing revenue or relocate to other fishing locations and continue to earn revenue. However, vessels that chose to relocate could incur increased operating costs (e.g., additional fuel to arrive at more distant locations; additional crew compensation due to more days at sea) and/or lower revenue (e.g., less-productive area; less-valuable species).

Once offshore wind projects are completed, some commercial fishermen may avoid the lease areas if large numbers of recreational fishermen are drawn to the areas by the prospect of higher catches. WTG foundations and associated scour protection may produce an artificial reef effect, potentially increasing fish and invertebrate abundance within a facility's footprint (see Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish]). According to ten Brink and Dalton (2018), the influx of recreational fishermen into the BIWF caused some commercial fishermen to cease fishing in the area because of vessel congestion and gear conflict concerns. If these concerns cause commercial fishermen to shift their fishing effort to areas not routinely fished, conflict with existing users could increase as other areas are encroached. In general, the potential for conflict among commercial fishermen due to fishing displacement may be higher for fishermen engaged in fisheries that have regulations that constrain where fishermen can fish, such as the lobster fishery. However, the potential for vessel congestion and gear conflict may also increase if mobile species targeted by commercial fishermen, such as Atlantic herring, Atlantic mackerel, squid, tuna, and groundfish, are attracted to offshore wind energy facilities by the artificial reef effect, and fishermen targeting these species concentrate their fishing effort in offshore wind farm lease areas as a result. Overall, the adverse effects of offshore wind energy-related port expansion and traffic on commercial and for-hire fishing vessels are expected to be long term and moderate.

Anchoring: BOEM estimates approximately 1,627 acres of seabed would be disturbed by anchoring associated with offshore wind activities. Anchoring vessels used in the construction of offshore wind energy projects would pose a navigational hazard to fishing vessels. All impacts would be localized (within a few hundred meters of anchored vessel) and temporary (hours to days). Although anchoring impacts would occur primarily during Project construction, some impacts could also occur during O&M and conceptual decommissioning. Therefore, the adverse effects of offshore wind energy–related anchoring on commercial fisheries and for-hire recreational fishing are expected to be long term and moderate.

Presence of structures: The presence of structures can lead to impacts on commercial fisheries and for-hire recreational fishing through allisions, entanglement or gear loss/damage, fish aggregation, habitat conversion, navigation hazards (including transmission cable infrastructure), and space use conflicts. These impacts may arise from buoys, met towers, foundations, scour/cable protection, and transmission cable infrastructure. Using the assumptions in Appendix E Attachment 4, future offshore wind energy projects under the No Action alternative would include 2,547 foundations, 2,815 acres of seabed disturbance due to foundation and scour protection, and 2,292 acres of new hard protection atop cables. Projects may also install more buoys and met towers. BOEM anticipates that structures would be added intermittently over an assumed 10-year period and that they would remain until conceptual decommissioning of each facility is complete.

The presence of the WTG foundations and associated scour protection would convert existing sand or sand with mobile gravel habitat to hard bottom, which in turn would reduce the habitat for target species that prefer soft-bottom habitat (e.g., squid, summer flounder, and surfclams) and increase the habitat for target species that prefer hard-bottom habitat (e.g., lobster, striped bass, black sea bass, and cod). Where

WTG foundations and associated scour protection produce an artificial reef effect and attract finfish and invertebrates, the aggregation of species could increase the catchability of target species (Kirkpatrick et al. 2017). Although species that rely on soft-bottom habitat would experience a reduction in favorable conditions, the impacts from structures are not expected to result in population-level impacts (see Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish]). Overall, localized adverse or beneficial impacts on target species populations from habitat alteration would have a negligible to minor effect on the catch of for-hire recreational and commercial fisheries.

The USCG has stated that it does not plan to create exclusionary zones around offshore wind facilities during their operation (BOEM 2018). However, because of the height of wind turbines above the ocean surface, they would be visually detectable at a considerable distance during the day and easily detected by vessels equipped with radar regardless of the time of day. To further ensure navigational safety, all structures would have appropriate markings and lighting in accordance with USCG and International Association of Marine Aids to Navigation and Lighthouse Authorities guidelines, and NOAA would chart wind turbine locations and could include a physical or virtual automatic identification system (AIS) at each turbine. Some fishing vessels operating in or near offshore wind facilities may experience radar clutter and shadowing. Most instances of interference can be mitigated through the proper use of radar gain controls (DNV-GL 2021). See also Section 3.5.6 [Navigation and Vessel Traffic].

Notwithstanding these safety measures, some fishermen have commented that because of safety considerations, they would not enter an offshore wind array during inclement weather, especially during low-visibility events (Kirkpatrick et al. 2017). Moreover, mechanical problems, such as loss of steerage, could result in an allision with a WTG as the vessel drifts during repair (DNV-GL 2021).

In addition, a potential effect of the presence of the offshore cables and wind turbines associated with offshore wind energy development is the entanglement and damage or loss of commercial and recreational fishing gear. Cable protection in the form of rock placement, concrete mattresses, or half-shell could cause a potential safety hazard should gear snag or hook on these seabed structures. Economic impacts to fishing operations associated with gear damage or loss include the costs of gear repair or replacement, together with the fishing revenue lost while gear is being repaired or replaced. In addition, comments from the fishing industry have included concerns that fishing vessel insurance companies may not cover claims for incidents within a wind energy facility resulting in gear damage or loss, or they may increase premiums for vessels that operate within wind farm areas.

Given that mobile fishing gear is actively pulled by a vessel over the seafloor, the chance of snagging this gear type on Project infrastructure is much greater than if—as in the case of fixed gear—the gear was set on the infrastructure or waves or currents pushed the gear into the infrastructure. The risk of damage or loss of deployed gear as a result of offshore wind development could impact mobile and fixed-gear commercial fisheries and for-hire recreational fishing. Inter-array and export cables would be buried below the seabed approximately 5 to 8 feet; however, BOEM assumes that no more than 10% of the cables may not achieve the proper burial depth and would require cable protection in the form of rock placement, concrete mattresses, or half-shell. Mobile bottom-tending gear (trawl and dredge gear) could get hung up on these cable protection measures, and the cost of these impacts would vary depending on the extent of damage to the fishing gear.

With respect to fishing vessel maneuverability restrictions (including risk of allisions) within WDAs, fishermen have expressed specific concerns about fishing vessels operating trawl gear that may not be able to safely deploy gear and operate in a WDA given the size of the gear, the spacing between the WTGs, and the space required to safely navigate, especially with other vessels present and during poor weather conditions. Trawl and dredge vessel operators have commented that less than 1-nm spacing between WTGs may not be enough to operate safely due to maneuverability of fishing gear and gear not directly following in line with vessel orientation, Clam industry representatives state that their operations require a minimum distance of 2 nm between WTGs, in alignment with the bottom contours, for safe operations (BOEM 2021). Navigating through the WDAs would not be as problematic for for-hire recreational fishing vessels, which tend to be smaller than commercial vessels and do not use large external fishing gear (other than hook and line) that makes maneuverability difficult. However, trolling for highly migratory species (e.g., bluefin tuna, swordfish) may involve deploying many feet of lines and hooks behind the vessel and then following large pelagic fish once they are hooked, which pose additional navigational and maneuverability challenges around WTGs (BOEM 2021).

Fishing vessel operators unwilling or unable to travel through areas where offshore wind facilities are located or deploy fishing gear in those areas may be able to find suitable alternative fishing locations and continue to earn revenue. This could result in increased operating costs (e.g., additional fuel to arrive at more distant locations; additional crew compensation due to more days at sea) and/or lower revenue (e.g., fishing in a less-productive area or for a less-valuable species). However, if, at times, a fishery resource is only available within the wind facility, some fishermen, primarily those using mobile gear, may lose the revenue from that resource for the time the resource is inaccessible. These impacts could remain until conceptual decommissioning of each facility is complete, although the magnitude of the impacts would diminish over time if fishing practices adapt to the presence of structures.

An accurate assessment of the extent of the effects of planned offshore wind energy projects on commercial fisheries and for-hire recreational fishing would depend on project-specific information that is unknown at this time, such as the actual location of offshore activities with lease areas and the arrangement of WTGs. However, it is possible to estimate the amount of commercial fishing revenue that would be “exposed” as a result of offshore wind energy development. Estimates of revenue exposure quantify the value of fishing that occurs in the footprint areas of individual offshore wind farms. Therefore, these estimates represent the fishing revenue that would be foregone if fishing vessel operators opt to no longer fish in these areas and cannot capture that revenue in a different location. Revenue exposure estimates should not be interpreted as measures of actual economic impact. Actual economic impact would depend on many factors—foremost, the potential for continued fishing to occur within the footprint of the wind farm, together with the ecological impact on target species residing within the project areas. Economic impacts also depend on a vessel’s ability to adapt to changing where it fishes. For example, if alternative fishing grounds are available nearby and could be fished at no additional cost, the economic impact would be lower. In addition, it is important to note that there may be cultural and traditional values to fishermen from fishing in certain areas that go beyond expected profit. For example, some fishermen may gain utility from being able to fish in locations that are known to them and also fished by their peers; the presence of other boats in the area can contribute to the fishermen’s sense of safety.

Table 3.5.1-22 shows the annual commercial fishing revenue exposed to offshore wind energy development in the New England and Mid-Atlantic regions by FMP fishery from 2020 through 2030. The amount of revenue at risk increases as proposed offshore wind energy projects are constructed and come online according to the timeline set forth in Table E-4 of Appendix E. The largest impacts in terms of exposed revenue are expected to be in the Sea Scallop, Surfclam/Ocean Quahog, and Mackerel/Squid/Butterfish FMP fisheries. The total average annual exposed revenue over the 2020–2030 period represents around 6% of the total average annual revenue of the FMP fisheries in the New England and Mid-Atlantic regions during the 2008–2019 period (see Table 3.5.1-1). The maximum exposed revenue—which is projected to occur as early as 2026 when construction on the last of the foreseeable projects could begin—represents about 1.0% of the total regional revenue. In general, fisheries do not have high relative revenue intensity within the lease areas compared with nearby waters because lease areas were chosen to reduce potential use conflicts between the wind energy industry and fishermen (Ecology and Environment, Inc. 2013).

With respect to impacts to individual fishing operations, those vessels that derive a small percentage of their total revenue from areas where offshore wind facilities would be located or are able to find suitable alternative fishing locations would likely experience long-term, minor adverse impacts. For those fishing vessels that derive a large percentage of their total revenue from areas where offshore wind facilities would be located, choose to avoid these areas once the facilities become operational, and are unable to find suitable alternative fishing locations, the adverse impacts would be long term and moderate to major. NMFS (2021f) determined for each federally permitted commercial fishing vessel that fished in New England/Mid-Atlantic offshore wind energy development lease areas the percentage of the vessel's total fishing revenue that came from within each area during the 2008–2019 period. It is estimated that over that period, only 0.9% of the vessels that fished in one or more of the lease areas generated more than 50% of their total fishing revenue for the year from one or more of the areas. According to the data presented, in each lease area there was one or more vessels that earned a substantial (> 5%) portion of their revenue from fishing in the area. Some vessels derived more than half of their revenue from fishing in a particular lease area. However, 75% of the vessels fishing in any given lease area derived less than 0.9% of their total revenue from the area. Given that a majority of fishing vessels derive a small percentage of their total revenue from any one lease area or would be able to relocate to other fishing locations, the overall adverse impact of offshore wind energy development on fishing access by commercial fishing vessels is expected to be long term and moderate.

New cable emplacement/maintenance: BOEM estimated that offshore export and inter-array cable emplacements for offshore wind facilities could result in temporary displacement of fishing vessels and disruption of fishing activities in up to 8,603 acres (see Appendix E, Attachment 4). Installation of offshore cables for each offshore wind energy facility would require temporary rerouting of all vessels, including commercial and for-hire recreational fishing vessels, away from areas of active construction.

Construction activities related to offshore wind energy development that disturb the seabed, together with activities that reduce water quality, increase underwater noise, or introduce artificial lighting, could result in a behavioral response from some target species. In turn, these responses could decrease catchability for a fishery, such as fish not biting at hooks or changed swim height. For any given offshore wind energy project, the impacts of behavioral responses on target species catch in commercial and for-hire recreational fisheries are expected to be confined to a small area, and they are expected to end shortly after construction activities end. Details regarding potential lighting and noise impacts to finfish, invertebrates, and EFH are described in Section 3.4.2.2.2 (No Action Alternative).

Table 3.5.1-22. Annual Commercial Fishing Revenue Exposed to Offshore Wind Energy Development in the New England and Mid-Atlantic Regions under the No Action Alternative by FMP Fishery

FMP Fishery ($1,000s)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
American Lobster	$0.0	$0.0	$0.0	$217.3	$333.9	$355.8	$420.1	$420.1	$420.1	$420.1	$420.1
Atlantic Herring	–	–	–	$53.2	$91.5	$115.7	$136.7	$136.7	$136.7	$136.7	$136.7
Bluefish	$0.0	$0.0	$0.0	$3.4	$7.9	$9.8	$13.3	$13.3	$13.3	$13.3	$13.3
Golden and Blueline Tilefish	–	–	–	$2.9	$37.6	$48.6	$59.9	$59.9	$59.9	$59.9	$59.9
Highly Migratory Species	$0.0	$0.0	$0.0	$0.4	$0.7	$1.0	$1.5	$1.5	$1.5	$1.5	$1.5
Jonah Crab	$0.0	$0.0	$0.0	$31.9	$148.5	$183.6	$245.3	$245.3	$245.3	$245.3	$245.3
Mackerel, Squid, and Butterfish	$0.1	$0.1	$0.1	$303.4	$591.5	$720.4	$927.6	$927.6	$927.6	$927.6	$927.6
Monkfish	$0.0	$0.0	$0.0	$121.4	$366.3	$413.6	$474.4	$474.4	$474.4	$474.4	$474.4
Northeast Multispecies (large-mesh)	–	–	–	$51.9	$135.3	$139.2	$167.8	$167.8	$167.8	$167.8	$167.8
Sea Scallop	$0.0	$0.0	$0.0	$89.4	$189.1	$234.8	$271.1	$271.1	$271.1	$271.1	$271.1
Skate	$0.0	$0.0	$0.0	$281.1	$952.0	$2,647.2	$3,046.4	$3,046.4	$3,046.4	$3,046.4	$3,046.4
Northeast Multispecies (small-mesh)	–	–	–	$102.3	$231.8	$249.7	$296.1	$296.1	$296.1	$296.1	$296.1
Spiny Dogfish	–	–	–	$9.8	$24.3	$25.8	$30.3	$30.3	$30.3	$30.3	$30.3
Summer Flounder, Scup, Black Sea Bass	$0.2	$0.2	$0.2	$167.2	$423.7	$525.1	$623.3	$623.3	$623.3	$623.3	$623.3
Surfclam/Ocean Quahog	–	–	–	$133.5	$167.6	$248.8	$1,404.0	$1,404.0	$1,404.0	$1,404.0	$1,404.0
Other FMPs, non-disclosed species, and non-FMP fisheries*	$0.4	$0.4	$0.4	$271.0	$626.5	$678.5	$943.9	$943.9	$943.9	$943.9	$943.9
All revenues of federally permitted vessels	$0.7	$0.7	$0.7	$1,840.1	$4,328.2	$6,597.7	$9,061.7	$9,061.7	$9,061.7	$9,061.7	$9,061.7

Sources: Developed using data from Table E-3 in Appendix E and data from NMFS (2021e).

Notes: Revenue is adjusted for inflation to 2019 dollars and is estimated based on the annual average revenue by FMP from 2008 through2019. “–“ indicates the value is zero; “$0” indicates the value is positive but less than $500.

* Includes revenues from all FMPs that did not have more than 5 years of data in the period (2008–2019) within a given WEA. Also includes all species not assigned to an FMP, as listed in the table.

Fishermen have raised concerns regarding the behavioral impacts of EMF generated by submarine cables on target fish and invertebrates. In particular, there is apprehension that EMF could slow or deviate migratory species from their intended routes, with subsequent potential problems for populations if they do not reach essential feeding, spawning, or nursery grounds (Kirkpatrick et al. 2017). To date, however, effects on representative sensitive species indicate that although some marine species are observed to respond to EMF, the responses have not risen to the level at which critical impacts on marine organism behavior are reported (BOEM 2018) (see also Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish]). There is no evidence to indicate that EMF from undersea AC power cables adversely affects commercially and recreationally important fish species within the southern New England area (CSA Ocean Sciences Inc. and Exponent 2019).

In addition, as discussed above, a potential effect of the presence of the offshore cables associated with offshore wind energy development is the entanglement and damage or loss of commercial and recreational fishing gear. Economic impacts to fishing operations associated with gear damage or loss include the costs of gear repair or replacement, plus the fishing revenue lost while gear is being repaired or replaced. To avoid these economic impacts, some vessel operators may not trawl or dredge over inter-array or export cables, but this could result in increased operating costs (e.g., additional fuel to arrive at more distant locations; additional crew compensation due to more days at sea) or lower revenue (e.g., fishing in a less-productive area or for a less-valuable species). Overall, the adverse effects to commercial and for-hire fishing vessels as a result of new cable emplacement/maintenance associated with offshore wind energy development are expected to be long term and moderate.

Regulated fishing effort: Regulated fishing effort refers to fishery management measures necessary to maintain maximum sustainable yield under the Magnuson-Stevens Fishery Conservation and Management Act. This includes quota and effort allocation management measures. Offshore wind development could influence regulated fishing effort through two primary pathways: by changing fishing behavior to such an extent that overall harvest levels are not as predicted and by impacting NMFS's scientific surveys on which management measures are based. If NMFS's scientific survey methodologies are not adapted to sample within wind energy facilities, then there could be increased uncertainty in scientific survey results, which would increase uncertainty in stock assessments and quota setting processes (see Section 3.5.7 [Navigation and Vessel Traffic] for additional details). Future spatial management measures may change in response to changes in fishing behavior due to the presence of structures. Impacts on management processes would in turn have short-term or long-term impacts on commercial and for-hire recreational fisheries' operations.

Other offshore wind projects could also require implementation of mitigation and monitoring measures identified in records of decision. Identification and analysis of specific measures is speculative at this time; however, these measures could further impact NMFS's continuing ongoing scientific research surveys or protected species surveys due to increased vessel activity and/or in-water structures. Overall, changes in fishery management measures due to offshore wind energy development are expected to have short-term or long-term, minor to moderate adverse effects to commercial fisheries and for-hire recreational fishing.

Climate change: Impacts on commercial fisheries and for-hire recreational fishing are expected to result from climate change events such as increased magnitude or frequency of storms, shoreline changes, ocean acidification, and water temperature changes. Risks to fisheries associated with these events include habitat or distribution shifts, disease incidence, and risk of invasive species. If these risk factors result in a decrease in catch or increase in fishing costs (e.g., transiting time), the profitability of businesses engaged in commercial fisheries and for-hire recreational fishing would be adversely affected. The catch potential for the temperate Northeast Atlantic is projected to decrease between now and the 2050s (Barange et al. 2018). Hare et al. (2016) predict that climate change would affect northeast fishery species differently. For approximately half of the 82 species assessed, the authors report that overall climate vulnerability is high to very high; diadromous fish and benthic invertebrate species exhibit the greatest vulnerability. In addition, most species included in the assessment have a high potential for a change in distribution in response to projected changes in climate. Adverse effects of climate change are expected for approximately half of the species assessed, but some species are expected to be beneficially affected (e.g., increase in stock distribution or productivity). The intensity of the impacts of climate change to commercial fisheries and for-hire recreational fishing is anticipated to qualify as minor to major for those fishing operations targeting species adversely affected by climate change, and the beneficial impacts are anticipated to qualify as minor to major for those fishing operations targeting species beneficially affected by climate change.

The economies of communities reliant on marine species that are vulnerable to the effects of climate change could be adversely affected. If the distribution of important fish stocks changes, it could affect where commercial and for-hire recreational fisheries are located. Furthermore, coastal communities with fishing businesses that have infrastructure near the shore could be adversely affected by sea level rise (Colburn et al. 2016; Rogers at al. 2019). Because future offshore wind facilities would produce less GHG emissions than fossil fuel–powered generating facilities with similar capacities, the reduction in GHG emissions from the Proposed Action when combined with other future offshore wind projects (or avoidance of increased GHG emissions from equivalent fossil fuel–powered energy production) would result in long-term beneficial impacts to fishing operations that target species adversely affected by climate change. However, the benefits would not be measurable. Section 3.3.1 (Air Quality) describes the expected contribution of offshore wind to climate change.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on commercial fisheries and for-hire recreational fishing associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on commercial fisheries and for-hire recreational fishing, primarily through climate change, fisheries management, other offshore development and vessel activity, and port use.

BOEM anticipates that reasonably foreseeable offshore wind activities would have long-term, moderate to major adverse impacts on commercial fisheries and minor to moderate adverse impacts on for-hire recreational fishing. These impacts would occur due to the increased presence of offshore structures (cable protection measures and foundations) that could reduce fishing access and increase the risk of fishing gear damage/loss. The extent of adverse impacts would vary by fishery and fishing operation due to differences in target species, gear type, and predominant location of fishing activity. The impacts could also include long-term beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect. With mitigation measures implemented across all offshore wind projects, including WTG spacing and orientation measures, offshore cable burial, and financial compensation programs for fishing interests, the **moderate** to **major** impact rating for commercial fisheries could decrease to **moderate**.

As described in Appendix E, Attachment 3, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be **moderate** to **major**. The **major** impact rating for some fisheries and fishing operations is primarily driven by regulated fishing effort and climate change.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in an overall **major** adverse impact because some commercial fisheries and fishing operations would experience substantial disruptions indefinitely even if remedial action is taken. This impact rating is primarily driven by climate change, regulated fishing effort, and the presence of offshore structures. **Moderate** impacts on for-hire recreational fishing would occur due to the presence of structures (gear loss, navigational hazard, and space use conflicts). The majority of offshore structures in the geographic analysis area would be attributable to the offshore wind industry. However, given the array of measures available to mitigate impacts of offshore wind projects to commercial fisheries and for-hire recreational fishing, BOEM expects that regulated fishing effort and climate change will continue to be the most impactful IPFs controlling the sustainability of commercial and for-hire recreational fisheries in the area.

3.5.1.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Potential Impacts to Port Access

The COP considers several port facilities located in New York, Rhode Island, Massachusetts, and Connecticut for offshore Project construction, staging, and fabrication as well as crew transfer and logistics support. Construction of the Project would require a range of vessels, including vessels for transferring crew, transporting heavy cargo, and conducting heavy lifts as well as multipurpose vessels and barges (Jacobs 2021). Although final port selection has not been determined at this time, the list of affected commercial ports could include ports used by commercial fishing vessels and for-hire recreational fishing vessels. For example, fishing ports that could be used during construction, O&M, or conceptual decommissioning of the SFWF or offshore SFEC include Montauk, New London, Point Judith, and New Bedford (Jacobs 2021). During the facility design report phase, SFW would finalize commercial ports to be used to support offshore installation activities for the SFWF and offshore SFEC.

If SFW used multiple ports to support Project construction activities, related congestion impacts in any one port would be reduced. Moreover, SFW would establish a marine coordination center to harmonize Project vessel movements with non-Project vessels and implement communication protocols to minimize adverse impacts on other users of a construction port. As a result, the adverse impact on commercial fisheries and for-hire recreational fishing would be temporary and minor.

Anchoring vessels used in the construction of the Project would pose a navigational hazard to fishing vessels. All impacts would be localized (within a few hundred meters of an anchored vessel) and temporary (hours to days). While anchoring impacts would occur primarily during Project construction, some impacts could also occur during O&M and conceptual decommissioning. Anchoring would lead to temporary and minor impacts to commercial fisheries and for-hire recreational fishing.

Potential Impacts to Fishing Access

The installation of offshore Project components and the presence of construction vessels could temporarily restrict vessel movement and thus transit and harvesting activities in the SFWF and along the offshore SFEC. To safeguard mariners from the hazards associated with construction of the Project, SFW would establish any necessary safety zones during construction around each location where the WTG towers and subsea cables would be installed in navigable waters via consultation under the navigational risk assessment (see Table G-1 in Appendix G). Non-construction vessels would be prohibited from entering into, transiting through, mooring in, or anchoring within the safety zones while construction vessels and associated equipment are working on-site. Non-construction vessels would be able to safely transit around these safety zones. The safety zones implementation dates are pending and would depend on the SFWF Project schedule and duration of the expected construction phase. To allow fishing vessels to alter their plans if needed to avoid impacted areas, SFW would publicize safety zones in advance via a local notice to mariners. In addition, SFW would communicate in advance where and when construction activities are scheduled to take place.

When safety zones are in effect, fishing vessels could either forfeit fishing revenue or relocate to other fishing locations and continue to earn revenue. However, vessels that chose to relocate could incur increased operating costs (e.g., additional fuel to arrive at more distant locations; additional crew compensation due to more days at sea) or lower revenue (e.g., less-productive area, less-valuable species). In addition, if the fishing effort is shifted to areas not routinely fished, conflict with existing users could increase as other areas are encroached. The competition would be higher for fishermen engaged in fisheries with regulations that constrain where fishermen can fish, such as the lobster fishery. The potential for conflict due to fishing displacement is lower among fishermen targeting mobile species such as Atlantic herring, Atlantic mackerel, squid, tuna, and groundfish. In a given year, however, it is possible that the center of the exploitable biomass, or the portion of a fish population available to fishing gear, of one or more of these species would occur within the SFWF or along the offshore SFEC during construction. During these occurrences, fishermen could be adversely impacted because of restricted access to the available fish population within the Project construction area. Given the small size of the offshore areas affected during construction, the likelihood of this co-occurrence in time and space is low, as is the likelihood of increased conflict and competition from a temporary displacement of fishing activities.

It is difficult to predict the ability of fishing operations displaced by Project construction activities to locate alternative fishing grounds that would allow them to maintain revenue targets while continuing to minimize costs. However, the available data suggest the presence of alternative productive fishing grounds in close proximity to the SFWF and offshore SFEC. As described in Section 3.5.1.1.1, Figures C-7 to C-17 in Appendix C show that for many FMP fisheries, the revenue intensity levels in large expanses of ocean within 20 nm of the Lease Area and offshore SFEC corridor are comparable to or higher than those within the two areas.

Based on data presented in Table 3.5.1-9 through Table 3.5.1-16, it is possible to calculate the amount of commercial fishing revenue that would be exposed as a result of construction activities in the SFWF MWA and along the offshore SFEC, assuming that it would come ashore at Beach Lane (the longer of the two SFEC options). As discussed in Section 3.5.1.2.2 (No Action Alternative), estimates of revenue exposure represent the fishing revenue that would be foregone if fishing vessel operators cannot capture that revenue in a different location. Table 3.5.1-23 and Table 3.5.1-24 show the annual revenue at risk in the SFWF MWA and along the offshore SFEC during each year of the 2-year (2021–2022) Project construction phase by FMP fishery and gear type, respectively. The largest impacts in terms of exposed revenue as a percentage of total revenue in the New England and Mid-Atlantic regions would be in the Skate, Bluefish, and Monkfish FMP fisheries. Gillnet-sink, handline, and bottom trawl gear would be the gear types most affected in terms of exposed revenue as a percentage of total revenue in the New England and Mid-Atlantic regions. The annual exposed revenue represents approaches 0.16% of the total average annual revenue of the FMP fisheries in the New England and Mid-Atlantic regions during the 2008–2019 period, as reported in Table 3.5.1-1. The amount of commercial fishing revenue that would be exposed assuming the offshore SFEC comes ashore at Hither Hills was estimated to be $1.37 million across all FMP fisheries, or 7.7% lower than under the Beach Lane option.

Table 3.5.1-23. Annual Commercial Fishing Revenue Exposed in the MWA and Offshore SFEC with Beach Lane Landing during Project Construction by FMP Fishery (2008–2019)

FMP Fishery	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
American Lobster	$132.0	$65.5	0.07%
Atlantic Herring	$103.2	$37.9	0.15%
Bluefish	$26.7	$9.6	0.76%
Golden and Blueline Tilefish	$36.5	$10.0	0.18%
Highly Migratory Species	$14.7	$2.3	0.10%
Jonah Crab	$15.4	$8.3	0.09%
Mackerel, Squid, and Butterfish	$292.9	$104.9	0.20%
Monkfish	$249.4	$161.8	0.79%
Northeast Multispecies (large-mesh)	$235.2	$131.6	0.18%
Sea Scallop	$935.9	$452.6	0.09%
Skate	$156.3	$95.1	1.28%
Northeast Multispecies (small-mesh)	$54.9	$34.1	0.30%
Spiny Dogfish	$12.4	$5.1	0.17%
Summer Flounder, Scup, Black Sea Bass	$274.7	$206.0	0.52%
Other FMPs, non-disclosed species, and non-FMP fisheries*	$342.6	$164.6	0.19%
All FMP and non-FMP fisheries	$2,123.1	$1,489.3	0.16%

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the All FMP and non-FMP fisheries row.

* Includes revenue from FMP fisheries that are not listed, from species that were not disclosed within listed FMP fisheries, and from species in non-FMP fisheries harvested by federally permitted vessels.

Table 3.5.1-24. Annual Commercial Fishing Revenue Exposed in the MWA and Offshore SFEC with Beach Lane Landing during Project Construction by Gear

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
Dredge-clam	*$290.7*	*$98.8*	*0.16%*
Dredge-scallop	$897.0	$432.1	0.09%
Gillnet-sink	$313.8	$237.3	0.79%
Handline	$26.3	$17.2	0.36%
Pot-other	$187.2	$105.5	0.09%
Trawl-bottom	$818.6	$524.5	0.28%

Gear Type	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
Trawl-midwater	*$118.9*	*$32.4*	*0.17%*
All other gear*	$305.3	$80.6	0.17%
All gear types	$2,124.1	$1,528.3	0.16%

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the All gear types row.

Gear types shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes revenue from federally permitted vessels using longline gear, seine gear, other gillnet gear, and unspecified gear, as well as listed gear, for years when they cannot be disclosed.

Table 3.5.1-25 shows the annual revenue at risk in the SFWF MWA and along the offshore SFEC (with the Beach Lane landing) during the Project construction phase by port based on data presented in Tables Table 3.5.1-12 through Table 3.5.1-16. The largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the Mid-Atlantic and New England regions would be in the ports of New Shoreham (3.6%), Little Compton (2.8%), and Tiverton (2.2%). As shown in Table 3.5.1-4, the communities in which these ports are located have a low to medium dependence on commercial fishing.

Table 3.5.1-25. Annual Commercial Fishing Revenue Exposed in the MWA and Offshore SFEC with Beach Lane Landing during Project Construction by Port

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
Chilmark/Menemsha, MA	$5.6	$1.3	0.27%
Fairhaven, MA	*$38.5*	*$8.2*	*0.07%*
New Bedford, MA	$645.7	$377.3	0.10%
Fall River, MA	*$5.6*	*$3.1*	*0.28%*
Westport, MA	$30.7	$15.0	1.15%
New Shoreham, RI	*$9.8*	*$3.6*	*3.62%*
Tiverton, RI	*$42.2*	*$25.4*	*2.21%*
Little Compton, RI	$102.8	$56.6	2.84%
Newport, RI	$109.6	$68.3	0.77%
Point Judith, RI	$640.8	$469.1	1.02%
New London, CT	$95.4	$32.9	0.50%
Stonington, CT	$56.7	$33.4	0.32%
Montauk, NY	$358.6	$261.3	1.41%
Shinnecock/Hampton Bays, NY	$85.4	$46.5	0.68%
Cape May, NJ	*$29.3*	*$8.6*	*0.01%*
Point Pleasant, NJ	$48.2	$18.8	0.06%
Hampton, VA	*$7.2*	*$4.7*	*0.03%*
Newport News, VA	*$6.1*	*$2.1*	*0.01%*

Port and State	Peak Annual Revenue ($1,000s)	Average Annual Revenue ($1,000s)	Average Annual Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions
Beaufort, NC	*$8.6*	*$2.9*	*0.11%*
Other ports*	$175.8	$62.1	0.02%
All New England/Mid-Atlantic ports	$2,124.1	$1,501.2	0.16%

Source: Developed using data from NMFS (2021a).

Notes: Revenue is adjusted for inflation to 2019 dollars. Peak annual revenue is calculated independently for all rows, including the All New England/Mid-Atlantic ports row.

Ports shown in *italics* indicate that fewer than 12 years but more than 5 years of data were used to calculate the estimates. Otherwise, estimates are based on 12 years of data.

* Includes unlisted ports that had landings and data from non-disclosed years from listed ports harvested by federally permitted vessels fishing in the offshore SFEC or in the MWA.

Revenue exposure estimates should not be interpreted as measures of actual economic impact. Actual economic impact would depend on many factors—foremost, the ability of vessels to adapt to changing where they fish, together with the ecological impact on target species residing within the project areas (see Potential Impacts to Target Species Catch below). Fishing vessel operators may be able to find suitable alternative fishing locations and continue to earn revenue. However, as noted above, this shift in fishing effort could result in increased operating costs and/or lower revenue.

As described in Section 3.5.1.2.2 (No Action Alternative), it is also important to note that there may be cultural and traditional values to fishermen from fishing in certain areas that go beyond expected profit. For instance, some fishermen may gain utility from being able to fish in locations that are known to them and also fished by their peers; the presence of other boats in the area can contribute to the fishermen's sense of safety.

The amount of fishing activity that could be affected during Project construction as a result of reduced fishing access is a small fraction of the amount of fishing activity in the New England and Mid-Atlantic regions as a whole. As described above, the annual exposed revenue represents about 0.16% of the total average annual revenue of the FMP fisheries in the New England and Mid-Atlantic regions during the 2008–2019 period. Nevertheless, some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts as a result of reduced fishing access. For those fishing vessels that choose to avoid areas closed by safety zones during Project construction, historically derived a large percentage of their total revenue from these areas, and are unable to find suitable alternative fishing locations, the adverse impacts on any given fishing operation would be temporary and major.

As discussed in the description of the SFWF Lease Area and offshore SFEC in Section 3.5.1.1.1, an average of 249 vessels per year fished in the SFWF Lease Area over the 2008–2019 period. Three quarters of the vessels that fished in the Lease Area derived less than 0.2% of their total annual fishing revenue from the area. From 2008 through 2019, the average percentage of vessels that derived 5% or more of their total fishing income from the Lease Area was around 2%. During any given year, the highest percentage of vessels that derived 5% or more of their revenue was 5%, while the lowest was less than 1%. In short, some vessels depended heavily on the Lease Area, but most vessels derived a small percentage of their total annual revenue from the area.

Those fishing vessels that derive a small percentage of their total revenue from areas where safety zones would be in effect or are able to relocate to other fishing locations and continue to earn revenue would experience temporary, minor adverse impacts. Given that these vessels would likely constitute a large majority of affected vessels during Project construction, the adverse impact on fishing access by commercial fishing vessels would be temporary and moderate.

It is estimated that during Project construction, the revenue exposure for any given port would not exceed 3.62% of its total revenue from the mid-Atlantic and New England regions (Table 3.5.1-25). Considering this low revenue of risk across ports, together with the small number of vessels that depend heavily on the Lease Area, the impacts to other fishing industry sectors, including seafood processors and distributors and shoreside support services, are expected to be temporary and minor to moderate.

Potential Impacts to Fishing Gear

As discussed above, non-construction vessels would be prohibited from entering into, transiting through, mooring in, or anchoring within the safety zones while construction vessels and associated equipment are working on- site. As described in Appendix B (South Fork Wind Farm Fisheries Communication and Outreach Plan) of Jacobs (2021), SFW has developed a financial compensation policy to be used when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing gear. The use of this policy for qualifying gear interactions that may occur during construction is considered part of the Proposed Action and would reduce any adverse impacts to temporary, negligible to minor.

Potential Impacts to Target Species Catch

During Project construction, temporary or permanent habitat alterations could occur, but the impact of these alterations on invertebrate and fish populations would be negligible to minor (see Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish]). Construction activities that disturb the seabed could result in the injury or mortality of sedentary species such as sea scallops and surfclams. Given that the area affected by seafloor disturbance would be a small fraction of the available habitat, the impact to sedentary species habitat would not be measurably altered compared to the environmental baseline. Therefore, the number of individual organisms affected would also be limited. Moreover, the populations of these species are expected to recover quickly through migration and recolonization from adjacent, undisturbed habitat. Therefore, the adverse impacts to fisheries that target these species would be negligible to minor.

Construction activities that disturb the seabed, together with activities that reduce water quality, increase underwater noise, or introduce artificial lighting, could result in a behavioral response from some target species (see Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish]). In turn, these responses could decrease catchability for a fishery, such as fish not biting at hooks or changing swimming behaviors. The impacts of these behavioral responses on target species catch are expected to be confined to a small area, and they are expected to end shortly after construction activities end. Other impacts, such as vessel and pile-driving noise, could cause some target species to temporarily move away from the source and disperse to other areas. These species are expected to return to the area after the construction phase. Given the short-term impact and relatively small area involved, behavioral responses that could change target species catchability are expected to have a minor adverse impact on commercial fisheries and for-hire recreational fishing.

Construction activities could overlap with the spawning habitat and/or spawning season of a number of target species, leading to potential short-term or long-term adverse impacts to the productivity/recruitment success of these species (see Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish]). Therefore, the adverse impact on the catch of commercial and for-hire recreational fisheries targeting these affected species would be short term or long term and moderate.

Operations and Maintenance

Potential Impacts to Port Access

In comparison to the construction phase, the O&M of the Project would require a more limited number of vessels (approximately six) (Jacobs 2021), with most vessels used for routine O&M. Given the relatively low number of Project vessel trips anticipated during operations, the increase in vessel traffic in ports during operation would be small. Therefore, the adverse impacts on the accessibility of port facilities by commercial fishing vessels and for-hire recreational fishing vessels would be long term but negligible.

Potential Impacts to Fishing Access

Under current regulations, the USCG is responsible for determining any type of safety or exclusionary zone around any structure placed in the open ocean. The USCG has stated that it does not plan to create exclusionary zones around offshore wind facilities, with the exception of safety zones during construction and conceptual decommissioning (BOEM 2018). However, the presence of the SFWF WTGs could result in de facto exclusion if fishing vessel operators are not—or perceive that they are not—able to safely navigate the area around the wind turbines.

The navigational safety risk assessment prepared for the Project indicates that it is technically possible to fish and transit through the SFWF (DNV-GL 2021). The WTG layout at the SFWF is designed to provide at least 1 nm of sea room between WTGs which provides sufficient room for most vessels to transit through and safely maneuver within the SFWF (DNV-GL 2021). However, BOEM is cognizant that maneuverability within the SFWF may vary depending on factors such as vessel size, fishing gear or method used, or environmental conditions. In addition, operating within the SFWF when other vessels and gear types are present may restrict vessel maneuverability.

Because of the height of wind turbines above the ocean surface, they would be visually detectable at a considerable distance during the day and easily detected by vessels equipped with radar regardless of the time of day. To further ensure navigational safety, all structures would have appropriate markings and lighting in accordance with USCG and International Association of Marine Aids to Navigation and Lighthouse Authorities guidelines, and wind turbine locations would be charted by NOAA and could include physical or virtual AIS at each turbine. Some fishing vessels operating in or near the SFWF may experience radar clutter and shadowing. Most instances of interference can be mitigated through the proper use of radar gain controls (DNV-GL 2021). See also Section 3.5.6 (Navigation and Vessel Traffic).

Notwithstanding these safety measures, some fishermen have commented that because of safety considerations, they would not enter an offshore wind array during inclement weather, especially during low-visibility events (Kirkpatrick et al. 2017). Moreover, mechanical problems, such as loss of steerage, could result in an allision with a WTG as the vessel drifts during repair (DNV-GL 2021). Aside from these potential navigational issues, some commercial fishermen may avoid the SFWF if large numbers of recreational fishermen are drawn to the area by the prospect of higher catches. According to ten Brink and Dalton (2018), the influx of recreational fishermen into the BIWF caused some commercial fishermen to cease fishing in the area because of vessel congestion and gear conflict concerns. In addition, if these concerns cause commercial fishermen to shift their fishing effort to areas not routinely fished, conflict with existing users could increase as other areas are encroached. In general, the potential for conflict among commercial fishermen due to fishing displacement may be higher for fishermen engaged in fisheries that have regulations that constrain where fishermen can fish, such as the lobster fishery. However, the potential for vessel congestion and gear conflict may also increase if mobile species targeted by commercial fishermen, such as Atlantic herring, Atlantic mackerel, squid, tuna, and groundfish, are attracted to the SFWF, and fishermen targeting these species concentrate their fishing effort in offshore wind farm lease areas as a result.

It is also important to note that there are also cultural and traditional values to fishermen from fishing that go beyond expected profit. For example, it is advantageous for fishermen to be able to fish in locations that are known to them and also fished by their peers. Also, the presence of other boats in the area can contribute to the fishermen's sense of safety. Some fishermen may choose to not fish in the area due to their perception of risk. Impacts on commercial fisheries may affect the economic health, as well as the cultural identity and values and therefore the well-being, of individuals and communities that identify as "fishing" communities. Impacts to cultural and traditional values are not quantifiable but are qualitatively considered when assessing the impacts of the Proposed Action.

Based on data presented in Table 3.5.1-9 through Table 3.5.1-12, it is possible to calculate the amount of commercial fishing revenue that would be exposed as a result of O&M activities in the SFWF. The impacts to fishing access in the offshore SFEC area during O&M are expected to be negligible because SFW would bury all cables to a target depth of 4 to 6 feet beneath the seabed (Jacobs 2021:3-34). The largest impacts in terms of exposed revenue as a percentage of total revenue in the New England and Mid-Atlantic regions would be in the Skate FMP and Monkfish FMP fisheries. The annual exposed revenue represents about 0.02% of the total average annual revenue of the FMP fisheries in the New England and Mid-Atlantic regions during the 2008–2019 period, as reported in Table 3.5.1-1. Gillnet-sink gear would be the gear type most affected in terms of exposed revenue as a percentage of total revenue in the New England and Mid-Atlantic regions. With respect to ports, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the Mid-Atlantic and New England regions would be in the ports of Little Compton (1.3%) and Westport (0.8%). As shown in Table 3.5.1-4, the communities in which these ports are located have a low to medium dependence on commercial fishing. As discussed above, revenue exposure estimates should not be interpreted as measures of actual economic impact. The actual economic impact to commercial fisheries during Project O&M would depend on many factors—foremost, the potential for continued fishing to occur in the SFWF. Fishing vessel operators unwilling or unable to travel through the SFWF or deploy fishing gear in the area may be able to find suitable alternative fishing locations and continue to earn revenue. However, this shift in fishing effort could result in increased operating costs (e.g., additional fuel to arrive at more distant locations; additional crew compensation due to more days at sea) or lower revenue (e.g., fishing in a less-productive area or for a less-valuable species).

It is difficult to predict the ability of fishing operations displaced by Project O&M activities to locate alternative fishing grounds that would allow them to maintain revenue targets while continuing to minimize costs. However, the available data suggest the presence of alternative productive fishing grounds in close proximity to the SFWF and offshore SFEC. As described in Section 3.5.1.1.1, Figures C-7 to C-17 in Appendix C show that for many FMP fisheries, the revenue intensity levels in large expanses of ocean within 20 nm of the Lease Area and offshore SFEC corridor are comparable to or higher than those within the two areas.

As described above, the amount of fishing activity that could be affected during Project O&M is a small fraction of the amount of fishing activity in the New England and Mid-Atlantic regions as a whole. However, for those fishing vessels that choose to avoid the SFWF, historically derived a large percentage of their total revenue from the area, and are unable to find suitable alternative fishing locations, the adverse impacts would be long term and major. While a small number of commercial fishing vessels fish heavily in the Lease Area, three quarters of the vessels fishing in the area derived less than 0.2% of their total revenue from the area during the 2008–2019 period (see description of SFWF Lease Area and Offshore SFEC in Section 3.5.1.1.1). From 2008 through 2019, the average percentage of vessels that derived 5% or more of their total fishing income from the Lease Area was around 2%. During any given year, the highest percentage of vessels that derived 5% or more of their revenue was 5%, while the lowest was less than 1%. In short, some vessels depended heavily on the Lease Area, but most vessels derived a small percentage of their total annual revenue from the area. Therefore, during Project O&M the adverse impact on fishing access by commercial fishing vessels would be long term and moderate overall but up to major for a relatively small number of vessels.

It is estimated that during Project O&M, the revenue exposure for any given port would not exceed 1.3% of its total commercial fishing revenue from the mid-Atlantic and New England regions (Table 3.5.1-12). Considering this low revenue of risk across ports, together with the small amount of vessels and fishing activity that would be affected during Project O&M, the impacts to other fishing industry sectors, including seafood processors and distributors and shoreside support services, would be long term **minor** to **moderate**.

Potential Impacts to Fishing Gear

A potential effect of the offshore cables and wind turbines is the entanglement and damage or loss of commercial and recreational fishing gear. Economic impacts to fishing operations associated with gear damage or loss include the costs of gear repair or replacement, together with the fishing revenue lost while gear is being repaired or replaced.

The Project would result in the installation of 139 miles (224 km) of offshore export cable and 28 miles (45 km) of inter-array cable. SFW would reduce the occurrence of accidental snagging of fishing gear by burying all cables to a target depth of 4 to 6 feet beneath the seabed (Jacobs 2021:3-34). In areas where seabed conditions might not allow for cable burial, other methods of cable protection would be employed, such as articulated concrete mattresses or rock placement. This additional cable protection would be used for up to 2% of the offshore SFEC, where burial depth may be less than 4 feet, and for seven locations where the offshore SFEC would cross utility crossings (Jacobs 2021). Although it is possible that cables could become uncovered during extreme storm events or other natural occurrences, burial to target depth would minimize the risk of exposure and potential damage. SFW would also conduct remote surveys of cable placements to confirm cables remain buried and that rock placement and concrete mattresses remain secured and undamaged. Surveys would be conducted by SFW annually along all cable placements for the first 3 years and biennially thereafter. This survey would identify the need for any remedial action by SFW to re-secure cables. SFW would provide BOEM with cable monitoring reports within 45 calendar days following inspection as well as after major storm events.

Long-term, minor to moderate adverse impacts to some commercial fishing operations—in particular, operations that employ mobile bottom-tending gear (such as bottom trawl or dredge)—are expected because of the potential for gear damage or loss from the Project. Given the small offshore footprint of the SFWF and offshore SFEC, the number of adversely affected fishing operations would be small. Additionally, the WTGs would be laid out in rows that run from east to west in order to 1) avoid gear conflict between fishermen who use mobile gear and those who use fixed gear, and 2) create predictable lanes within which boats with mobile gear can fish. As stated in Table G-2 in Appendix G, SFW is committed to a spacing of approximately 1.15 miles (1.8 km), or 1 nm, between turbines. In addition, as described in Appendix B (South Fork Wind Farm Fisheries Communication and Outreach Plan) of Jacobs (2021), SFW has developed a financial compensation policy for use when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing gear. The use of this financial compensation program for damage to or loss of fishing gear during operation would reduce any moderate impacts to negligible or minor levels.

Potential Impacts to Target Species Catch

During Project O&M, temporary or permanent habitat alterations could occur (see Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish]). The presence of the WTG foundations and associated scour protection would convert existing sand or sand with mobile gravel habitat to hard bottom, which in turn would reduce the habitat for target species that prefer soft-bottom habitat (e.g., squid, summer flounder, and surfclams). In total, the Project would result in an estimated 203 acres (0.82 km^2) of seabed disturbance as a result of the addition of scour protection and installation of offshore export and inter-array cables. Given the small footprint of the SFWF and offshore SFEC, any localized adverse impacts on target species populations from habitat alteration would have a negligible to minor effect on the catch of for-hire recreational and commercial fisheries.

The WTG foundations and associated scour protection could also produce an artificial reef effect and attract finfish and invertebrates, thereby providing new opportunity for for-hire recreational fishing businesses and certain types of commercial fishing. Considering the addition of scour protection, the maximum footprint of each foundation would be approximately 49,087 square feet (Jacobs 2021). Although the effects of artificial reefs on species abundance are uncertain, aggregation of species could increase the catchability of target species (Kirkpatrick et al. 2017). Smythe et al. (2021) found that the enhanced fishing experience created by the BIWF led to the establishment of new for-hire recreational fishing businesses and benefited existing ones. With respect to the Project, it is expected that the reef effect of the WTG foundations would have long-term, negligible to minor beneficial impacts to commercial fisheries and for-hire recreational fishing, depending on the extent to which the foundations attract targeted species. Additionally, species may alter their migratory behaviors due to the presence of food or shelter associated with the structures. The potential for disruption of inshore to offshore migratory patterns of important species like lobster and black sea bass has been identified as a topic of concern (see Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish]). This potential effect would have long-term, negligible to minor adverse impacts to commercial fisheries and for-hire recreational fishing, depending on the extent to which the foundations alter the migratory behaviors of targeted species.

Fishermen have raised concerns regarding the behavioral impacts of EMF generated by submarine cables on target fish and invertebrates. In particular, there is apprehension that EMF could slow or deviate migratory species from their intended routes, with subsequent potential problems for populations if they do not reach essential feeding, spawning, or nursery grounds (Kirkpatrick et al. 2017). To date, however, effects on representative sensitive species indicate that although some marine species are observed to respond to EMF, the responses have not risen to the level at which critical impacts on marine organism behavior are reported (BOEM 2018). No evidence indicates that EMF from undersea AC power cables adversely affects commercially and recreationally important fish species within the southern New England area (CSA Ocean Sciences Inc. and Exponent 2019). To mitigate any possible effects on target fish and invertebrates, all cables would be wrapped in a sheath that eliminates direct electric fields and reduces magnetic and induced-electric fields (Jacobs 2021). Consequently, EMF from Project cables are expected to have long-term, negligible to minor impacts on commercial and for-hire recreational fisheries (see also Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish]).

Noise caused by vessels during SFWF maintenance could have temporary and minor adverse impacts on commercial fisheries and for-hire recreational fishing similar to the noise effects described for the construction phase.

Conceptual Decommissioning

Conceptual decommissioning of the SFWF and offshore SFEC would have similar impacts on commercial fisheries and for-hire recreational fishing as construction. Within 2 years of cancellation, expiration, or other termination of the Lease, the lessee would remove or decommission all facilities, projects, cables, pipelines, and obstructions and clear the seabed of all obstructions created by activities on the leased area (Jacobs 2021:1-19). Any cut and cleared cables would typically have the exposed ends weighted with clump anchors so that the cables cannot be snagged by fishing gear. Removal of structures that produce an artificial reef effect would result in loss of any beneficial fishing impacts that could have occurred during O&M.

Cumulative Impacts

Port utilization and traffic: The Project would add vessel traffic in ports and resulting delays or restrictions in access to ports due to increased vessel use to conditions under the No Action alternative. This would result in localized, short-term, minor incremental impacts on commercial fisheries and for-hire recreational fisheries. BOEM estimates a peak of 379 vessels due to offshore wind project construction and operations over a 10-year time frame, plus an additional 13 vessels from the Proposed

Action. However, future offshore wind projects would result in only a small increase in vessel traffic and the risk of vessel collisions is expected to remain low. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be minor.

Impacts associated with noise and fish populations are discussed in Section 3.4.2.2.3 (Proposed Action Alternative).

Anchoring: The Proposed Action would incrementally add 821 acres of anchoring/mooring to conditions under the No Action alternative. This would result in localized, temporary, minor incremental impacts on commercial fisheries and for-hire recreational fisheries. BOEM estimates a total of 2,448 acres of anchoring and mooring-related disturbance for the Proposed Action plus all other future offshore wind projects. All impacts would be localized (within a few hundred meters of an anchored vessel) and temporary (hours to days). Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable future activities would result in minor impacts to commercial fisheries and for-hire recreational fishing.

Presence of structures and new cable emplacement/maintenance: As summarized in Table E-4 in Appendix E and discussed in Section 3.5.1.2.2 (No Action Alternative), offshore wind energy development could result in the construction of 1,869 additional offshore foundations through 2030. The Project would account for up to 16 of these structures (15 WTGs and one OSS). In addition, up to 6,266 miles (8,311 acres of seabed disturbance) of offshore export and inter-array cables could be installed to support future offshore wind projects (see Appendix E Attachment 4). The Project would add an additional 82.5–86.9 miles of cable (913 acres) to this total. Installation of offshore cables would require temporary rerouting of all vessels, including commercial and for-hire recreational fishing vessels, away from areas of active construction.

As a result of the addition of these new structures and cables in the Lease Area and offshore SFEC, the Proposed Action could result in localized, temporary impacts to commercial fisheries and for-hire recreational fishing due to potential increased space use conflicts, navigational hazards, entanglement, and gear loss/damage.

Fishing revenue would be foregone if these impacts cause fishing vessel operators to no longer fish in these areas, and they cannot capture that revenue in a different location. If the Project is not included, the total commercial fishing revenue exposed at the end of the Project development timeline for all planned offshore wind energy lease areas in the New England and Mid-Atlantic regions is estimated to be about $9.06 million per year by 2026 (Table 3.5.1-22). Based on the data in Table 3.5.1-9, the Proposed Action would increase the commercial fishing revenue at risk to $9.25 million per year, an increase of approximately 2.0%, which represents a minor, incremental impact.

Construction activities that disturb the seabed, together with activities that reduce water quality, increase underwater noise, or introduce artificial lighting, could result in a behavioral response from some target species. In turn, these responses could decrease catchability for a fishery, such as fish not biting at hooks or changed swim height. For any given offshore wind energy project, the impacts of behavioral responses on target species catch in commercial and for-hire recreational fisheries are expected to be confined to a small area, and they are expected to end shortly after construction activities end.

Temporary or permanent habitat alterations could also occur during offshore wind farm operation. The presence of the WTG foundations and associated scour protection would convert existing sand or sand with mobile gravel habitat to hard bottom, which in turn would reduce the habitat for target species that prefer soft-bottom habitat (e.g., squid, summer flounder, and surfclams) and increase the habitat for target species that prefer hard-bottom habitat (e.g., lobster, striped bass, black sea bass, and cod). Where WTG foundations and associated scour protection produce an artificial reef effect and attract finfish and invertebrates, the aggregation of species could increase the catchability of target species (Kirkpatrick et al. 2017).

Regulated fishing effort: The cumulative impacts of regulation of fishing effort to commercial fisheries and for-hire recreational fishing would be the same as under the No Action alternative (see Table 3.11-1 in Attachment 3 of Appendix E). The Proposed Action would not alter these impacts.

Climate change: The types of impacts from global climate change to commercial fisheries and for-hire recreational fishing described for the No Action alternative would occur under the Proposed Action (see Table 3.11-1 in Attachment 3 of Appendix E), but the Proposed Action could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable, but would be expected to help reduce climate change impacts, resulting in a minor to moderate incremental impact.

Conclusions

Project construction and installation, O&M, and conceptual decommissioning could alter port and fishing access, as well as affect transit and harvesting activities, fishing gear interactions, and target species catch. BOEM anticipates that the adverse impacts of the Proposed Action on commercial fisheries and for-hire recreational fishing would vary by fishery and fishing operation due to differences in target species, gear type, and predominant location of fishing activity. It is conceivable that some of the small number of fishing operations that derive a large percentage of their total revenue from areas where Project facilities would be located will choose to avoid these areas once the facilities become operational. In the event that these fishing operations are unable to find suitable alternative fishing locations, they could experience long-term, substantial disruptions. However, it is estimated that the majority of vessels would only have to adjust somewhat to account for disruptions due to impacts. In addition, the impacts of the Proposed Action could include long-term, **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect. Therefore, BOEM expects that the impacts resulting from the Proposed Action alone would be **negligible** to **major**, depending on the fishery and fishing operation, with the overall impact to commercial fisheries and for-hire recreational fishing being **moderate**.

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in an overall **major** adverse impact because some commercial and for-hire recreational fisheries and fishing operations would experience substantial disruptions indefinitely even if remedial action is taken. This impact rating is primarily driven by climate change, regulated fishing effort, and the presence of offshore structures. The majority of offshore structures in the geographic analysis area would be attributable to the offshore wind industry. However, given the array of measures available to mitigate impacts of offshore wind projects to commercial fisheries and for-hire recreational fishing, BOEM expects that regulated fishing effort and climate change will continue to be the most impactful IPFs controlling the sustainability of commercial and for-hire recreational fisheries in the area.

3.5.1.2.4 VESSEL TRANSIT LANE ALTERNATIVE

The overall effect of elimination of WTGs within a 4-nm-wide vessel transit lane would be a lower estimated exposed commercial fishing revenue during Project construction and operations in comparison to the Proposed Action. Based on data from NMFS (2021a), it is estimated that the revenue at risk under the Transit alternative across all FMP fisheries during the construction phase would be about 5% lower than under the Proposed Action. During O&M, the revenue at risk would be around 45% lower than under the Proposed Action.

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, BOEM expects that the impacts resulting from the alternative alone would be negligible to major, depending on the fishery and fishing operation, with the overall impact to commercial fisheries and for-hire recreational fishing being moderate. In addition, the alternative could include long-term, minor beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect.

Cumulative Impacts

If the Transit alternative is implemented, impacts related to allision and collision risk could be reduced throughout all lease areas. However, some commercial and recreational fishing and boating could still occur within the transit lanes, and recreational fishing vessels could congregate alongside the transit lanes, possibly increasing risks of collisions and allisions in these areas. Additionally, implementation of all recommended transit lanes could require offshore wind developers to alter their site plans to accommodate the six transit corridors, thereby potentially causing construction delays. These delays could create increased adverse cumulative effects to commercial fisheries and for-hire recreational fishing if they result in an increased level of overlapping construction activities. However, because the impacts to commercial fisheries and for-hire recreational fishing due to climate change, regulated fishing effort, and the presence of structures would not be measurably different under the Transit alternative, the cumulative impacts to commercial fisheries and for-hire recreational fishing would be major.

Conclusions

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action: **negligible** to **major**, depending on the fishery and fishing operation, with the overall impact to commercial fisheries and for-hire recreational fishing being **moderate**.

The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **major**.

3.5.1.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

Because it would reduce the number of WTG sites, the Habitat alternative under either layout option would improve the ability of commercial fishing vessels to access the waters around the Lease Area relative to the Proposed Action. Consequently, the level of commercial fishing revenue exposed to offshore wind energy development would be less than under the Proposed Action.

The Habitat alternative under either layout option is not anticipated to lead to a measurable change in impacts to invertebrates and finfish targeted by commercial fisheries and for-hire recreational fishing compared to impacts under the Proposed Action (see Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish]). A reduction in the number of WTGs would diminish the artificial reef effect of Project structures during O&M, but the decrease in these beneficial effects to for-hire recreational fishing would likely be negligible. Therefore, the impact to commercial fisheries and for-hire recreational fishing would not be measurably different than under the Proposed Action: negligible to major, depending on the fishery and fishing operation, with the overall impact to commercial fisheries and for-hire recreational fishing being moderate. In addition, the alternative could include long-term, minor beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect.

Cumulative Impacts

As noted above, the Habitat alternative under either layout option would result in incremental impacts to commercial fisheries and for-hire recreational fishing at quantities and durations similar to, or slightly reduced from, the Proposed Action. Therefore, the cumulative impacts to commercial fisheries and for-hire recreational fishing would be similar: major.

Conclusions

Although the Habitat alternative under either layout option would reduce the number of WTGs and their associated inter-array cables, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action: **negligible** to **major**, depending on the fishery and fishing operation, with the overall impact to commercial fisheries and for-hire recreational fishing being **moderate**. In addition, the alternative could include long-term, **minor** beneficial impacts for some for-hire recreational fishing operations due to the artificial reef effect.

The overall impacts of the Habitat alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **major**.

3.5.1.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, BOEM expects that the overall impact to commercial fisheries and for-hire recreational fishing would be **moderate** for all action alternatives. This impact rating is driven mostly by changes to fish distribution/availability due to ongoing climate change, reduced stock levels due to ongoing fishing mortality, and permanent impacts due to the presence of structures (cable protection measures and foundations).

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar. Therefore, the overall impact of any action alternative to commercial fisheries and for-hire recreational fishing when combined with past, present, and reasonably foreseeable activities would be **major**, because the fishing industry would experience unavoidable disruptions beyond what is normally acceptable, but mitigation, including financial compensation and uniform spacing and layout across adjacent projects, could reduce impacts if adopted for future offshore wind projects.

3.5.1.4 Mitigation

Monitoring of the SFEC cable and cable protection, where applicable, would further reduce the expected negligible to moderate impacts on commercial fisheries by ensuring that the cable remains buried and that cable protection is intact, thereby reducing the potential for mobile fishing gear hangs. See Table G-2 in Appendix G for details. In addition, as described in Appendix B (South Fork Wind Farm Fisheries Communication and Outreach Plan) of Jacobs (2021), SFW has also developed a financial compensation policy for use when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing gear.

3.5.2 Cultural Resources

The Cultural Resources section addresses marine and terrestrial archaeological and other visually sensitive cultural resources located within the viewshed of Project elements, also referred to as viewshed resources. All other visual resources are addressed in the Visual Resources section (Section 3.5.9).

3.5.2.1 Affected Environment

3.5.2.1.1 MARINE RESOURCES

BOEM defines the area of potential effects (APE) for the marine resources geographic analysis area (or APE for marine resources) as the depth and breadth of the seabed potentially impacted by bottom-disturbing activities within the SFWF and associated MWA and the offshore SFEC corridor (Figure E-11). A phase I marine archaeological survey and assessment of the marine resources geographic analysis area was conducted between 2017 and 2020 (Gray & Pape 2020, 2021). The investigation included a high-resolution geophysical marine survey using a magnetometer/gradiometer, a side-scan sonar, a multibeam echo-sounder, and both shallow and medium penetration sub-bottom profilers followed by an archaeological vibracoring and geoarchaeological analysis. Four shipwreck archaeological sites were identified during the survey within the SFWF MWA (Gray & Pape 2020, 2021; Table 3.5.2-1). No historic period marine archaeological resources were identified within the SFEC. The survey additionally identified eight ancient submerged landform features (Table 3.5.2-2). Three of those features are located within the SFWF MWA and five are located within the SFEC.

These ancient submerged landform features are discrete and discontinuous locations that may contain preserved evidence of formerly terrestrial landscape features that have survived erosion during marine transgression. Although these features exhibit high archaeological potential, no evidence of human occupation associated with the ancient submerged landform features was identified in core samples taken during the submerged cultural resources investigation (Gray & Pape 2020:6-5). These features may derive their significance from reasons other than their archaeological potential, however, such as their potential contribution to a broader culturally significant landscape.

Table 3.5.2-1. Shipwreck Archaeological Sites Identified within the Marine Resources Geographic Analysis Area

Contact Number	Location	Site Dimensions (feet)	Description
Contact 28	SFWF MWA	16.0 × 5.5 × 4.5	An apparent bow and wheelhouse area
Contact 32	SFWF MWA	30.0 × 7.5 × 2.8	A well contained and articulated vessel
Contact 30	SFWF MWA	33.6 × 22.0 × 1.0	Debris scatter with linear and rectangle components
Contact 112	SFWF MWA	15.3 × 11.8 × 1.8	Apparent wreck scatter; "appears unnatural due to its linearity"

Source: Gray & Pape (2020:Table 5-1; Table 5-2; Table 6-1; pp. 5-10, 5-12, 6-1).

Table 3.5.2-2. Ancient Submerged Landform Features Identified within the Marine Resources Geographic Analysis Area

Designation	Location	Description
SFEC-CF-13	SFEC MWA	Ancient submerged landform; "single paleo-stream valley"
SFEC-CF-9	SFEC MWA	Ancient submerged landform; "single paleo-stream valley"
SFEC-CF-7	SFEC MWA	Ancient submerged landform; "single paleo-stream valley"
SFEC-CF-5	SFEC MWA	Ancient submerged landform; "two paleo-stream valleys"
SFEC-CF-3	SFEC MWA	Ancient submerged landform; "two similar sized paleo-stream valleys"
SFWF-PL-1	SFWF MWA	Ancient submerged landform; intact terrestrial surface underlying a marsh and or estuary deposit"

Designation	Location	Description
SFWF-PL-2	SFWF MWA	Ancient submerged landform; intact terrestrial surface underlying a marsh and or estuary deposit
SFWF-PL-3	SFWF MWA	Ancient submerged landform: “oxbow cut-off stream”

Source: Gray & Pape (2020:Table 5-7, Table 5-12; Table 5-15; Table 6-2; Table 6-3; Table 6-4; pp. 5-34, 5-35, 5-36, 5-37, 5-74, 5-75, 5-76, 5-77, 5-80, 6-3, 6-5, 6-7).

3.5.2.1.2 TERRESTRIAL RESOURCES

A phase I terrestrial archaeological survey was conducted within the SFEC corridor, SFEC landfall locations, and interconnection facility, whereas a Phase IA desktop assessment was completed for the O&M facility locations (EDR 2020a, 2020b; Jacobs 2021). BOEM defines the APE for terrestrial resources by the depth and breadth of terrestrial areas potentially impacted by any ground-disturbing activities within the footprint of the export cable landings, SFEC onshore corridor, interconnection facility, and O&M facilities (see Table 2.1.1-1, Table 2.1.1-2, and Table 2.1.1-3).

The Phase I archaeological survey conducted for the onshore interconnection facility, SFEC corridor, and SFEC landfall locations resulted in the identification of no potential archaeological resources. The archaeological survey within the SFEC onshore corridor determined that portions of the analysis area that fall within the LIRR ROW were previously disturbed from railroad construction activities and landscape modification. Because of this, these areas are determined to have low archaeological potential and no additional investigations are recommended. Discrete portions of the SFEC onshore corridor within public road ROWs may have experienced minimal excavation during the roadway construction (EDR 2020b). As a result, a Phase IB supplemental archaeological survey for these discrete sections of paved road ROWs was completed by EDR in 2020, including hand excavation of shovel test pits within the grassy and unpaved portions of the road ROWs adjacent to the pavement (i.e., with no disturbance of roadways) (EDR 2020c). EDR’s approach included systematic shovel tests for a portion of Beach Lane – Route A and a portion of Hither Hills – Route B (as recommended by EDR 2020b). Additional systematic shovel tests were also conducted by EDR at the interconnection facility. None of the testing efforts resulted in the identification of any potential archaeological resources.

SFW is considering three onshore sites for the proposed O&M facility. Two are at the Quonset Business Park/Quonset Point, North Kingston, Rhode Island, and one is at Montauk Harbor, East Hampton, New York.

The Quonset Point O&M facility site falls within the Quonset Business Park, which includes a NRHP-eligible historic property within its property boundaries: the Quonset Point Naval Air Station. The Quonset Point Naval Air Station currently serves as a Rhode Island Air National Guard Base. The Air National Guard Base is an active military base with modern structures and equipment (EDR 2020a). As a result of land development since the mid-twentieth century, the Quonset Point O&M facility site possesses low potential for intact or undisturbed archaeological resources (EDR 2020a). The Quonset Business Park/Quonset Point site was intermittently settled until it was developed as a U.S. Naval Reservation and construction battalion center in the 1940s and 1950s, wherein the property was extensively disturbed and the shoreline was extended (human-made land) to create the pieces of land that are proposed for the O&M facility components (EDR 2020a). Therefore, although the proposed construction site falls within a known NRHP-eligible historic property, the potential for ground-disturbing activities to affect buried cultural resources is low because the area of proposed construction has been previously disturbed or is fill material.

The Montauk Harbor O&M facility site has no previously identified archaeological resources (EDR 2020a). The Montauk Harbor site was developed in the mid-twentieth century as a working harbor and seafood operation and is currently occupied by a small commercial fishing and packing operation. As a result of the use of dredge fill in some portions and land development from the mid- through late twentieth century overall, this site possesses low potential for archaeological resources, as does the adjacent seabed where additional dredging is proposed; therefore, no additional archaeological investigations are recommended (EDR 2020a).

3.5.2.1.3 VIEWSHED RESOURCES

This section addresses visually sensitive cultural resources located within the viewshed of Project elements, referred to as *viewshed resources*. All other visual resources are addressed in the Visual Resources section (Section 3.5.9).

BOEM defines the APE for visual impact analysis, hereafter the APE for viewshed resources, as the geographic areas from which the offshore and onshore Project components could be seen. Onshore components (e.g., interconnection facility and O&M facilities) have a viewshed radius of 1 mile around the facility. Offshore components (e.g., WTGs) have a viewshed radius of 40 miles around the edge of the WMA (Figure E-10). The 1-mile and 40-mile radiuses represent the maximum limit of theoretical visibility for each respective Project component. Within these radiuses, the APE for viewshed resources includes only those geographic areas with potential visibility and excludes areas with obstructed views of Project facilities within those respective limits, as assessed through a viewshed analysis (EDR 2020d, 2021). Viewshed analysis applied GIS modeling to take into account the true visibility of the Project (e.g., visual barriers such as topography, vegetation, and non-historic structures that obstruct the visibility of the Project) (EDR 2018, 2019).

For the onshore components viewshed, the historic architectural resources survey identified four historic architectural properties within the APE for viewshed resources. These comprise three at the Montauk Harbor O&M facility site, one at the Quonset Business Park/Quonset Point O&M facility site, and none at the SFEC landfall locations and interconnection facility (EDR 2018, 2019). The following summarizes the results from the historic architectural resources survey of the onshore components viewshed:

- At the SFEC landfall locations and interconnection facility, no historic properties were identified within the APE for viewshed resources.
- At the Montauk Harbor O&M facility site, three historic properties were identified in the APE for viewshed resources (one that is NRHP-listed and two that are NRHP eligible).
- At the Quonset Business Park/Quonset Point O&M facility site, one historic property was identified within the APE for viewshed resources and is NRHP eligible.

The Historic Resources Visual Effects Analysis (HRVEA) for the WTGs and OSS identified 113 historic sites and districts in the APE for viewshed resources. This analysis assessed the visibility of a WTG from the water level to the tip of an upright rotor blade at a height of 840 feet and further considered how distance and curvature of the Earth affect visibility as space between the viewing point and WTGs increases.[20] Of the 113 historic sites and districts in the APE that could be susceptible to visual impacts from the Project, 39 are listed on the NRHP (seven of which are National Historic Landmarks). The remaining 74 are considered eligible for the NRHP and, of these, 33 are in Rhode Island and 41 are in Massachusetts. Examples of these include the following:

- National Historic Landmarks, e.g., Block Island Southeast Lighthouse National Historic Landmark
- NRHP-listed districts, e.g., Old Harbor Historic District in Block Island

[20] The PDE presented in the COP indicates a maximum WTG height of 840 feet from sea level to blade tip for the Proposed Action. Additional cumulative visual simulations conducted by EDR (2020c) and appended to the *Cumulative Historic Resources Visual Effects Analysis* (SWCA 2021) are based on WTG blade tip height of 873 feet for modeling potential future blade tip heights of reasonably foreseeable future offshore WTGs constructed in the geographic analysis area.

- NRHP-listed properties, e.g., Gay Head Light
- Those considered NRHP eligible based on state-level documentation, e.g., Gay Head - Aquinnah Shops (historic district), Vaill Cottage, Spring House Hotel in the Old Harbor Historic District, Spring House Hotel Cottage, the Spring Street Historic District, and the Capt. Mark L. Potter House within that district

Additionally, three of the 74 are considered Traditional Cultural Properties (TCPs) (EDR 2021). These are the Nantucket Sound TCP, the Chappaquiddick Island TCP, and the Vineyard Sound and Moshup's Bridge TCP, all of which are represented by broad, complex cultural landscapes and connected seascapes.

3.5.2.2 Environmental Consequences

3.5.2.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.5.2-3 lists the issues identified for cultural resources and the indicators and significance criteria used to assess impacts for the final EIS. The final EIS incorporates the criteria for assessing adverse effects under Section 106 of the National Historic Preservation Act (NHPA), including the special requirements for protecting National Historic Landmarks. These criteria and requirements are listed and described in 36 CFR 800.5(a) and 36 CFR 800.10. Cultural resources included on, or eligible for, the NRHP are defined as *historic properties* (54 USC 300308; 36 CFR 800.16(l)). National Historic Landmarks are designated by the Secretary of the Interior in recognition of their national significance and are NRHP-listed historic properties (pursuant to 36 CFR 65). An impact would adversely affect cultural resources and be significant if the impact alters any characteristic of a historic property that qualify the property for NRHP inclusion in a manner that would diminish its historic integrity.

Table 3.5.2-3. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Cultural Resources

Issue	Impact Indicator	Significance Criteria
Seabed disturbance and potential marine resource damage	Qualitative analysis of pre-contact sites/cultural materials impacted Qualitative analysis of known or potential shipwrecks impacted Qualitative analysis of landforms with high archaeological sensitivity impacted	Across all Issues and Indicators Negligible: No significant impacts would occur (i.e., effects on historic properties pursuant to 36 CFR part 800 would not rise to the level of being adverse effects). Minor: Significant impacts to NRHP characteristics could be avoided with environmental protection measures (i.e., with use of EPMs, no adverse effect would result). Moderate: EPMs would minimize, but not fully resolve, significant impacts to NRHP characteristics (i.e., alteration diminishing important historic property characteristics, yet the adversely affected property remains NRHP eligible). Major: Significant impacts to NRHP characteristics are unavoidable even with EPMs (i.e., alteration or loss of an important characteristic to an extent that it no longer supports the adversely affected property's NRHP eligibility).
Terrestrial ground disturbance: potential damage to cultural resources	Qualitative discussion of potential for impacts to unknown resources	
Viewshed disturbance: potential impact to identified historic properties	Qualitative assessment of NRHP-listed/eligible sites (historic properties) within view of Project	
Nighttime lighting: potential impact to identified historic properties	Qualitative assessment of NRHP-listed/eligible sites (historic properties) within view of Project	

3.5.2.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing cultural resources, including within the context of trends in past and present activities where pertinent. Attachment 3 in Appendix E also provides additional information regarding past and present activities and associated cultural resource impacts. Future, non-Project actions include proposed offshore wind energy development activities, undersea transmission lines and pipelines, dredging and port improvements, and onshore wind energy developments. Attachment 3, also in Appendix E, discloses future non-offshore wind activities and associated cultural resources impacts. Impacts associated with future onshore and future offshore wind activities are described below.

Future Activities

Marine Resources

Under the No Action alternative, construction and installation, O&M, and conceptual decommissioning activities of reasonably foreseeable offshore projects could adversely impact potentially significant submerged cultural resources. However, federal law requires that offshore energy developers submit archaeological survey results and assessment of seafloor impacts to potential submerged cultural resources when bottom-disturbing activities are planned (Evans 2009:44). Submerged cultural resource surveys identify significant resources and support a determination of their NRHP eligibility. Based on the results of those surveys and assessments, future offshore wind activities could be designed to avoid impacting known submerged cultural resources or minimize impacts to varying degrees. Repeated or multiple impacts from a combination of reasonably foreseeable offshore projects to submerged cultural resources, or the larger submerged landforms within which they are identified, would result in cumulative impacts to these resources. Within its EPMs, SFW prioritizes the avoidance of ancient submerged landforms; however, avoidance may not be feasible everywhere, particularly along the export cable. The SFWF and SFEC are estimated to result in 913 acres of cabling-related seabed disturbance, and BOEM estimates an additional 10,131 acres of cabling-related disturbance for all other future offshore wind projects. The amount of seabed disturbance provides a relative indicator of the potential for ancient submerged landform impacts; as seabed disturbance area increases, the likelihood of unavoidable impacts to ancient submerged landscapes increases. Combined, other reasonably foreseeable offshore wind projects would result in over 90% of the cabling-related seabed disturbance, and the SFWF and SFEC would result in less than 10% of the disturbance. Therefore, other reasonably foreseeable offshore wind projects combined would result proportionately in nearly 10 times the additional impact risk to ancient submerged landforms over that of the SFWF and SFEC. Where impacts to potentially significant submerged cultural resources cannot be avoided, other measures to minimize and mitigate impacts would be required. Under the No Action alternative, reasonably foreseeable future projects could result in minor to major and cumulative impacts to these marine resources.

<u>Accidental releases</u>: The accidental release of hazardous materials and any associated cleanup could impact submerged cultural resources. However, most releases would not measurably contribute to resource impacts because of the low probability of occurrence, low persistence time, and EPMs implemented to prevent releases (see Section 3.3.2.2.2 [No Action Alternative] for details). Although not expected, a large-scale accidental release and associated cleanup could result in permanent, geographically extensive, and large-scale impacts on marine resources.

<u>Anchoring</u>: Anchoring, gear use, and dredging associated with ongoing commercial or recreational marine activities and development of offshore wind projects could cause adverse impacts on submerged cultural resources. BOEM estimates that up to 4 acres of anchoring could occur under the No Action alternative within the APE for marine resources. Deploying and repositioning anchors and seafloor gear

with associated wire rope, cable, and chain could impact the bottom surface and potentially disturb shipwrecks and other marine archaeological resources resulting in the irreversible loss of historical and archaeological data. Although BOEM would be able to add mitigation measures for future offshore wind projects, the potential for permanent, minor to major impacts on submerged cultural resources to result from future commercial and/or recreational activities remains.

New cable emplacement/maintenance and presence of structures: New offshore cable placement could also occur, as described in Attachment 4 in Appendix E and discussed under the Marine Resources section of Section 3.5.2.2.2. In addition to general horizontal acreage of seabed disturbance, the extent of potential impacts to marine resources increases with depth of disturbance into the seabed. New offshore cabling could result in up to 359 acres of seabed disturbance from cable trenching in the greater BOEM Lease Area OCS-A 0486 surrounding the SFWF. Additionally, reasonably foreseeable offshore wind projects located in BOEM Lease Area OCS-A 0486 would add an estimated 102 in-water structures with foundations in the seabed. As described in Section 3.5.2.1 and Appendix E, the Lease Area and the APE for marine resources contain a number of shipwrecks, related debris fields, and ancient submerged landform features, which future offshore construction activities could impact. BOEM and relevant State Historic Preservation Officers would require projects to avoid known resources through the creation of avoidance buffers around identified shipwrecks or remote-sensing magnetic anomalies or acoustic targets that could represent shipwreck resources. These measures would avoid or minimize impacts to submerged cultural resources. However, in some cases, the number, extent, and dispersed character of ancient submerged landform features could make avoidance impossible. Consequently, offshore construction could result in permanent, minor to major impacts on sensitive ancient submerged landform features, if present.

Climate change: Factors related to climate change, including sea level rise, increased storm severity/frequency, increased sedimentation and erosion, and ocean acidification, could also result in long-term and permanent impacts on cultural resources. Some archaeological sites on the OCS have already experienced the effects of climate change because they were inundated when the last ice age ended (BOEM 2012:3-423). Contemporary federal studies on the adverse effects of climate change on shallow water shipwrecks point to accelerated decomposition (National Ocean Service 2020). Conversely, the incremental contribution of offshore wind energy projects on reducing global warming and climate change–related impacts could help minimize these climate change impacts.

Terrestrial Resources

Under the No Action alternative, reasonably foreseeable onshore projects could impact two aboveground historic resources (the East Hampton Railroad Station and the Montauk Lighthouse) through physical disturbance that could affect the setting or character of a site that make it eligible for NRHP listing. Depending on the degree of disturbance, future onshore projects could result in negligible to moderate impacts to aboveground historic resources.

Ground disturbance: Reasonably foreseeable onshore activities could physically disturb archaeological sites. However, surveys have identified no archaeological sites in the APE for terrestrial resources, and analysis shows that most of the APE for terrestrial resources has been previously disturbed; therefore, the risk of potentially encountering undisturbed archaeological deposits or previously unidentified cultural resources is low. For this reason, potential impacts from ground-disturbing activities would be limited to previously undocumented cultural resources, if present. Reasonably foreseeable projects that are subject to federal laws and regulations would also require the identification of cultural resources, an assessment of Project impacts, and the address of significant impacts (or adverse effects under 36 CFR part 800) to historic properties before proceeding. If BOEM selects the No Action alternative, reasonably foreseeable future cumulative impacts to terrestrial cultural resources could range from negligible to long term and major, depending on whether resources are absent or alternatively are present and adversely impacted. These resources include aboveground historic buildings or structures and unidentified archaeological sites.

Accidental releases: Construction of reasonably foreseeable onshore projects could result in the accidental release of hazardous materials or debris; however, releases would generally be short term, localized, and in limited amounts (see Section 3.3.2.2.2 [No Action Alternative]). Such an accidental release could result in impacts to terrestrial cultural resources associated with the cleanup of contaminated soils. Indirect physical impacts would be long term and negligible to major depending on the nature and size of the accidental release, its spatial relationship to the cultural resource impacted, and the extent and intensity of cleanup activities required. Archaeological resources are more likely to experience indirect physical impacts through damage to or destruction of cultural materials during the removal of contaminated soils than are aboveground standing structures. Other indirect but primarily short-term impacts could include noise, vibration, and dust as well as visual impacts associated with cleanup activity. These short-term impacts are expected to be negligible to minor and minimized or avoided through application of state and local laws and regulations regarding air quality (see Section 3.3.1.2.2 [No Action Alternative]). Noise levels would be consistent with existing ambient noise conditions. Overall, impacts to terrestrial cultural resources from construction-related activities would be expected to be limited because of the low probability of an accidental release occurrence, the low volumes of material typically released in individual incidents, EPMs used to prevent release, and the localized nature of such events (see Table G-1 in Appendix G).

Climate change: As noted in marine resources, climate change could result in long-term and permanent impacts on terrestrial resources. Sea level rise could lead to the inundation of historic standing structures and increased storm severity and frequency would be expected to increase the severity and frequency of damage to coastal historic standing structures. A number of historic lighthouses in the viewshed resources APE, including Block Island Southeast Lighthouse and Gay Head Light, have already been moved to set them back farther from coastal erosion (EDR 2021). Increased erosion along coastlines could lead to the collapse of coastal historic architectural properties as erosion undermines structural integrity. Ocean acidification could impact traditional uses of the Vineyard Sound and Moshup's Bridge TCP. However, the incremental contribution of offshore wind energy projects on slowing or arresting global warming and climate change–related impacts could help minimize these potential adverse impacts. In addition, no known archaeological sites are present in the APE for terrestrial resources, which is also heavily disturbed, and therefore potential adverse impacts from climate change are unlikely and would be limited to previously undocumented resources.

Viewshed Resources

Light: Reasonably foreseeable future offshore wind projects would also impact viewshed resources from navigational and aviation lighting. Impacts from lighting would be most visible at night and from cultural resources that are along shorelines or on elevated locations with unobstructed views. A limited number of cultural resources would be affected and would include those for which the nighttime sky is a contributing element to historic integrity, such as resources on the shores of Martha's Vineyard and Block Island. Reasonably foreseeable offshore wind projects could locate WTGs a minimum of 12 miles from shore at Nomans Land Island and from 19 to 20 miles from Block Island and Martha's Vineyard. These distances between the areas with viewshed resources and the nearest SFWF lighting sources would limit the intensity of lighting impacts. The intensity of lighting impacts would also be limited by the number, luminosity, and proximity of existing light sources near the resources (building and street lights, onshore vehicle and offshore vessel lights). The intensity of lighting impacts would further be limited by atmospheric and environmental conditions (clouds, fog, and waves) that could partially or completely obscure or diffuse sources of light from offshore and onshore wind projects. Construction lighting and conceptual decommissioning lighting associated with both onshore and offshore wind facilities would have temporary, intermittent, and localized impacts, whereas operations lighting would have longer term, continuous, and localized impacts, where not adequately obscured or diffused. Implementing EPMs could reduce impacts from lighting (see Table G-1 in Appendix G). Under the No Action alternative, reasonably foreseeable future projects would have negligible to moderate, short-term to long-term cumulative impacts on viewshed resources.

Presence of structures: For the onshore viewshed, if BOEM selects the No Action alternative, the construction and installation, O&M, and conceptual decommissioning of reasonably foreseeable onshore infrastructure would introduce new elements to the viewshed that could compromise the historic integrity of known historic properties. These known resources are introduced within the Affected Environment for Viewshed Resources in Section 3.5.2.1.3 and also include the SFEC landfall locations and interconnection facility and the three potential O&M facility locations. For the offshore viewshed, if BOEM selects the No Action alternative, the construction and installation, O&M, and conceptual decommissioning of reasonably foreseeable offshore wind projects could locate WTGs beginning approximately 12 miles from shore, resulting in visual impacts to historic properties that would be long term, continuous from minor to major, and minimized with distance. The cumulative HRVEA presents models of the visibility for WTG construction at 1,038 potential locations for reasonably foreseeable future projects in the RI/MA WEA (SWCA 2021), although an estimated 1,294 WTGs and OSS would be constructed across these locations (see Attachment 4 in Appendix E). From all modelled WTG locations for other reasonably foreseeable future projects, up to 546 WTGs would be visible from viewshed resources at risk of significant visual impacts within the APE (SWCA 2021). Proportionately, the combined full build-out of other reasonably foreseeable offshore wind projects would construct 97% of WTGs visible from affected historic properties in the APE, with SFWF contributing only 3% of the WTGs. As a result, other reasonably foreseeable offshore wind projects would add over 30 times the visible WTGs over the number of WTGs that the SFWF would introduce by itself (SWCA 2021). Even without the SFWF or the full build-out of all other reasonably foreseeable offshore wind projects, the introduction of offshore WTGs would result in long-term cumulative visual impacts to cultural resources, where sea views that are important to the historic setting or feeling and NRHP eligibility of the historic property are significantly altered by WTGs.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on cultural resources associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on cultural resources, primarily through construction-related activities.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities would be **negligible to major**, depending on the scale and extent of impacts and the unique characteristics of the resource. Examples of individual resources are paleolandforms, terrestrial archaeological sites, historic standing structures, and TCPs. Impacts vary widely because the impacts are dependent on the unique characteristics of the individual resources. As described in Appendix E Attachment 3, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be **negligible to major**, for similar reasons.

Considering all IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the APE combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor to major** impacts because if avoided the overall effect would be small, but if not avoided the overall effect would be large and the resource would not be recoverable.

3.5.2.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Marine Resources

If practicable, BOEM would require SFW to avoid potential impacts to the four identified potential shipwreck archaeological resources, which SFW has indicated may be feasible through Project design and engineering.[21] Based on the potential seabed-disturbing activities proposed, SFW has indicated that it may not be feasible to avoid impacts to all of the identified ancient submerged landform features and SFW is currently considering design and engineering options to avoid or minimize impacts to these resources. SFW anticipates that it will not be able to fully avoid five ancient submerged landforms during export cable installation (SFEC-CF-3, SFEC-CF-5, SFEC-CF-7, SFEC-CF-9, and SFEC-CF-13) (Gray & Pape Inc 2021).

The final impact level for marine resources is dependent on avoidance, minimization, or mitigation of adverse effects that would be determined in a memorandum of agreement (MOA) developed through BOEM's NHPA Section 106 review process and included as conditions of approval of the COP by BOEM[22]. Where marine resources are reliably identified and avoided, then impacts during construction of the SFWF and SFEC would be long term and negligible to minor. Where marine resources are identified as historic properties and not avoided, but adverse effects would not result in the resource becoming ineligible for the NRHP, then impacts to marine resources during construction of the SFWF and SFEC could be long term and minor to moderate. Where impacts would render a marine resource ineligible for the NRHP even with mitigation, impacts during construction would be long term and major. If Project construction results in the unanticipated discovery of previously unknown historic property requiring mitigation through the Section 106 consultation process, then the resultant physical impacts could be long term and minor to major (MMS 2007). BOEM would require a post-review discovery plan that would include stop-work and notification procedures to be followed if a cultural resource is encountered during construction and installation, O&M, and conceptual decommissioning.

For any unavoidable ancient submerged landform features corresponding to the time of human occupation, BOEM would consider additional investigations or other measures to resolve adverse effects and, as required, mitigations to be stipulated in the MOA for the Project, prepared pursuant to the NHPA Section 106 consultation process (36 CFR part 800). The MOA would contain measures to reduce, avoid, or mitigate adverse effects on unavoidable ancient submerged landform features. Implementation of an MOA and subsequent treatment plan, agreed to by all consulting parties participating in the NHPA Section 106 consultation process, would be expected to reduce the magnitude of impacts on ancient submerged landform features from moderate or major to minor or moderate. The exception is where impacts would render a marine resource ineligible for the NRHP even with mitigation of impacts, in which case the impact on the ancient submerged landform would remain major.

[21] Specific to Section 106 consultation, BOEM's archaeological guidelines define the marine APE to include the following geographic areas:

- The depth and breadth of the seabed potentially impacted by any bottom-disturbing activities
- The depth and breadth of terrestrial areas potentially impacted by any ground disturbing activities
- The viewshed from which renewable energy structures, whether located offshore or onshore, would be visible
- Any temporary or permanent construction or staging areas, both onshore and offshore

For the purposes of the marine archaeological assessment, SFW identified all areas of potential Project-related seabed disturbance to develop a preliminary APE for BOEM's consideration. In accordance with 36 CFR 800.4(a), BOEM would determine the APE for the Project following the agency's analyses and state historic preservation office consultations.

[22] Appendix A provides a discussion of BOEM's determination that the approval of the Project COP is subject to the Section 106 consultation process under the NHPA. Any mitigation measures identified through the Section 106 process would be required to be included as mitigation measures in the COP prior to its approval by BOEM. The Section 106 consultation process has been initiated and is ongoing at the time of this EIS.

Terrestrial Resources

Construction of onshore Project components (onshore SFEC, interconnection facility, and O&M facility) could affect cultural resources through physical disturbance.

The route selected for the SFEC onshore would minimize impacts to, or avoid, potential terrestrial archeological resources, to the extent practicable. Analysis shows that most of the SFEC onshore route has been previously disturbed; therefore, the risk of potentially encountering undisturbed archaeological deposits is minimized in these areas. Results of the additional Phase IB survey of potentially undisturbed, buried portions of the SFEC route and interconnection facility by EDR (2020c) resulted in the identification of no potential archaeological resources. Surveys conducted to date have not identified subsurface or aboveground cultural resources within the onshore Project components. However, should Project construction result in the discovery of previously unidentified cultural resources requiring mitigation through the Section 106 consultation process, the resultant physical impacts could be long term and minor to major (MMS 2007).

Construction of the O&M facility would not require the demolition or physical alteration of any aboveground historic properties (EDR 2019) at either the Quonset Business Park/Quonset Point or Montauk O&M facility sites; however, construction would either replace existing buildings that are not historic properties or would introduce new buildings to the active commercial waterfront.

Ground-disturbing activities proposed for the Quonset Business Park/Quonset Point O&M facility are minor surface improvements for paving and parking lots. SFW would construct slab-on-grade foundations for buildings and support structures. SFW would use existing docks and proposes no in-water work (EDR 2020a). As a result, BOEM anticipates that the Quonset Business Park/Quonset Point O&M facility would result in long-term, negligible to minor impacts to any unknown buried cultural resources, should they be discovered.

Ground-disturbing activities proposed for the Montauk O&M facility are minor surface improvements for paving and parking lots, footers for the office space and storage structures (because of the poor quality of the soil, including beach or fill land or dredged material), quayside reinforcement or rehabilitation, and initial and maintenance dredging (EDR 2020a). Additionally, because of the previous site disturbance, unstable soils, the presence of significant fill or dredged materials, and the lack of reported shipwrecks or other archaeological resources within the proposed dredging areas (Gray & Pape 2020), no archaeological survey was recommended at the Montauk Harbor site. The Montauk Harbor site possesses relatively low sensitivity for the presence of archaeological resources and Project construction is anticipated to result in long-term, negligible impacts to buried cultural resources. Alternatively, if Project construction results in discovery of previously unidentified historic property requiring mitigation through the Section 106 process, then the resultant physical impacts could be long term and minor to major (MMS 2007).

As noted in the COP, Native American tribes were involved, and would continue to be involved, in interpretation of the results. A post-review discovery plan would be implemented that would include stop-work and BOEM notification procedures to be followed if a cultural resource is encountered during installation and O&M.

Viewshed Resources

Based on a field review of the viewshed analyses, the interconnection facility would not be readily visible from historic properties because of the dense, mature evergreen and deciduous forest surrounding the site and the densely situated buildings and houses in the villages and surrounding area (EDR 2018). The COP EPMs note that the interconnection facility would be located adjacent to an existing substation on a land parcel zoned for commercial and industrial/utility use and that mature trees currently screen the land parcel. The COP EPMs also note that after construction, additional screening would be considered to further reduce potential visibility and visual impact (see Appendix G). When topography, vegetation, and structures are all included in the viewshed analysis, approximately 2% of the visual analysis area has possible visibility of the interconnection facility see (EDR 2018). Thus, visual impacts to NRHP-listed and NRHP-eligible resource settings during construction of the interconnection facility would be long term if visible and short term (if screened by vegetation), with the potential to be negligible (if fully shielded) to major (if obtrusively visible) (MMS 2007). COP analysis of field studies found no historic properties from which the interconnection could be viewed, and non-historic properties within viewing distance were found to be shielded from view. Additionally, the onshore SFEC would be buried, therefore eliminating potential visual impacts to aboveground historic properties.

The viewshed analysis for the Quonset Business Park/Quonset Point O&M facility indicates that the site would be located within, and visible within, the Quonset Business Park and Quonset Point Naval Air Station, which itself is a historic property (NRHP eligible). The Quonset Point Naval Air Station is an approximately 974-acre World War II–era naval training facility improved with industrial buildings and parking lots and currently serves as a Rhode Island Air National Guard Base (EDR 2020a). The new O&M facility would be in scale and character with the existing development and use of the property. As a result, the Quonset Business Park/Quonset Point O&M facility would not result in significant impacts on the NRHP-eligible Quonset Point Naval Air Station (EDR 2020a); the potential visual impacts to historic properties are anticipated to be long term but negligible to minor.

The viewshed analysis for the Montauk Harbor O&M facility indicates that one NRHP-listed property (Caleb Bragg Estate) and two NRHP-eligible properties (Montauk USCG Station Building and Montauk USCG Engineering/Boat Maintenance Building) are located within the APE for viewshed resources (EDR 2019c). However, the Caleb Bragg Estate is screened by vegetation from the proposed O&M facility and its integrity of setting beyond the historic property boundary is absent due to other existing non-historic development (EDR 2019). Although Montauk USCG Station Building and Montauk USCG Engineering/Boat Maintenance Building would have direct views of the O&M facility, their integrities of setting beyond each historic property are also absent due to other existing non-historic development (EDR 2019). As a result, the Montauk Harbor O&M facility would not have significant impacts on historic properties; the potential visual impacts to historic properties are anticipated to be long term but negligible.

The construction of the offshore Project components would also result in modification to the existing viewshed within the terrestrial resources analysis area because SFWF WTGs would be visible on the horizon from the shore (see Section 3.5.9 Visual Resources for further discussion). During construction and conceptual decommissioning, lighting associated with the Project would have temporary, intermittent, and localized impacts, whereas operations lighting would have longer term, continuous, and localized impacts, where not adequately obscured or diffused. Most of the historic properties within the APE for viewshed resources would have limited views because of screening by topography, vegetation, and other buildings/structures and would be located approximately 18 to 34 miles away from the SFWF work area (EDR 2021). Only historic properties with open ocean views along coastlines and raised coastal bluffs have potentially unobscured lines of sight and the potential to be prominently within the viewshed (within approximately 20 miles) of SFWF WTGs (see Figure E-10). The WTGs would have a uniform design, speed, height, and rotor diameter, which contribute to a homogeneous view of wind farms on the horizon. The color of the SFWF (less than 5% gray tone) generally blends well with the sky at the horizon and eliminates the need for daytime lights or red paint marking the blade tips. As discussed in Section 3.5.9 Visual Resources, because of FAA and USCG WTG lighting guidelines, adverse impacts to the seaward viewing experience would be potentially greater in nighttime than in daytime. For historic properties located on the waterfront, the WTGs would be a new feature in the visual setting. Because of their scale and form, WTGs are expected to begin to attract viewer attention under ideal lighting and atmospheric distances beginning under 18 miles from a historic property (EDR 2021; Sullivan et al. 2012). Based on visual simulations of the Project, WTGs would be visible in the distant background only on clear days (EDR 2020d; Jacobs 2021) beginning at 19 miles and ranging to 35 miles from historic properties (EDR 2021). As a result, an offshore wind farm with the size and design of WTGs planned for the SFWF would have the potential for moderate to major impacts to historic properties in its viewshed within approximately 20 miles, minor visual impacts beyond 20 miles, and negligible impacts beyond 25 miles (EDR 2021).

Of the 113 historic properties with potential views of the Project, and therefore determined to be in the APE for the Project, 10 would be along the coastline or bluffs with open ocean views, within approximately 20 miles of the SFWF. These 10 historic properties are anticipated to experience moderate visual impacts (daytime and nighttime) from the WTGs or OSS. The 10 historic properties are all coastline properties and include historic districts that may encompass a range of historic resources. The 10 historic properties are as follows:

- Gay Head Light
- Gay Head - Aquinnah Shops (a Historic District)
- Vineyard Sound and Moshup's Bridge TCP on Martha's Vineyard, Massachusetts
- Block Island Southeast Lighthouse National Historic Landmark
- Old Harbor Historic District
- Spring House Hotel within the Old Harbor Historic District
- Spring Street Historic District
- Capt. Mark L. Potter House within the Spring Street Historic District
- Spring House Hotel Cottage
- Vaill Cottage on Block Island, Rhode Island

BOEM remains in consultation with Native American tribes and other consulting parties under NHPA Section 106 on identified historic properties, adverse effects, and the resolution of adverse effects (per 36 CFR part 800).

Operations and Maintenance and Conceptual Decommissioning

Marine Resources

Offshore, O&M of the SFWF and offshore SFEC could impact unknown submerged marine resources. For example, vessels conducting O&M activities could inadvertently damage avoidance-buffered or unknown resources. However, SFW could conduct O&M activities on equipment in areas that previously experienced disturbance during construction. Therefore, impacts to confirmed submerged cultural resources and identified ancient submerged landform features during O&M could be long term but negligible. During conceptual decommissioning activities impacts to confirmed submerged cultural resources and identified ancient submerged landform features could be temporary and negligible to minor so long as they are avoided. For example, seafloor disturbance associated with future anchoring/mooring and jack-up vessels could be relatively similar to impacts identified for construction activities.

Terrestrial Resources

Onshore, based on surveys conducted, Project O&M would have no physical impacts to terrestrial resources. SFW could remove the onshore cables during conceptual decommissioning. Conceptual decommissioning of the SFWF and offshore SFEC would result in similar, or potentially reduced impacts, as those discussed above in construction. If conceptual decommissioning activities disturb an area larger than the area originally disturbed during construction, these activities could impact previously unknown archaeological resources. However, the likelihood of this would be low, and therefore impacts would be long term and negligible to minor.

Viewshed Resources

As discussed above, any viewshed changes associated with the onshore facilities (the interconnection and the O&M facility) would persist for the duration of the Project but result in no impact or negligible visual impacts to viewshed resources.

For offshore WTGS, if BOEM requires SFW to install Aircraft Detection Lighting System (ADLS) technology, nighttime visual impacts (and, to a lesser degree, daytime visual impacts) to historic properties would be reduced although not eliminated, adding negligible to moderate, long-term impacts during O&M. Without ADLS, visual impacts from nighttime lighting and daytime visibility of SFWF WTGs on historic properties in the viewshed resources APE would remain negligible to moderate for the duration of the Project, depending on the significance of viewshed in their historical setting and character and the scale of impact (EDR 2021; MMS 2007). O&M would not add further to these impacts; however, conceptual decommissioning would provide a remedy to previous visual impacts created by WTG construction.

Cumulative Impacts

Marine Resources

Offshore impacts would predominately be associated with changes in anchoring, cabling, structures, and accidental spills.

<u>Accidental releases</u>: The Proposed Action could incrementally contribute accidental releases of fuel, fluids, or hazardous material; sediment; and trash and debris to conditions under the No Action alternative. The risk would be increased primarily during construction but also would be present during operations and conceptual decommissioning. The contribution from the Proposed Action would be a low percentage of the overall spill risk from ongoing and future activities, as described in detail in Section 3.3.2.2. All vessels would comply with USCG requirements for the prevention and control of oil and fuel spills. Proper vessel regulations and operating procedures would minimize effects resulting from the release of debris, fuel, hazardous material or waste on marine resources (BOEM 2012). Additionally, required training and awareness of best management practices proposed for waste management and mitigation of marine debris for SFWF Project personnel would reduce the likelihood of occurrence to a very low risk. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects localized and temporary negligible Project impacts on cultural resources. Cumulatively, the Proposed Action when combined with past, present, and reasonably foreseeable activities would have minor, short-term impacts to marine resources.

<u>Anchoring, new cable emplacement/maintenance, and presence of structures</u>: Seafloor disturbance activities (temporary and long term) proposed for the Project include clearing or leveling of the seafloor, pile driving, monopile foundation (and associated cable protection) construction, vessel anchoring or mooring, export cable installation, and inter-array cable installation (preparation, trenching, burial, maintenance, replacement, etc.). SFW may elect to use a mechanical cutter, mechanical plow, or jet plow to install cable at the target burial depth; those methods would reduce the amount of seabed impact relative to mechanical dredging.

As noted for the No Action alternative, repeated or multiple impacts from a combination of reasonably foreseeable offshore projects to submerged cultural resources, or the larger submerged landforms within which they are identified, would result in cumulative impacts to these resources. Within its EPMs, SFW would prioritize the avoidance of ancient submerged landforms; however, avoidance may not be feasible everywhere, particularly along the export cable. The SFWF and SFEC are estimated to result in 913 acres of cabling-related seabed disturbance, and BOEM estimates an additional 10,131 acres of cabling-related disturbance for all other future offshore wind projects. The amount of seabed disturbance provides a relative indicator of the potential for ancient submerged landform impacts; as seabed disturbance area increases, the likelihood of unavoidable impacts to ancient submerged landscapes increases. Combined, other reasonably foreseeable offshore wind projects would result in over 90% of the cabling-related seabed disturbance, and the SFWF and SFEC would result in less than 10% of the cabling-related seabed disturbance. Therefore, other reasonably foreseeable offshore wind projects combined would result proportionately in approximately 10 times the additional impact risk to ancient submerged landforms over that of the SFWF and SFEC. Additionally, reasonably foreseeable offshore wind projects in BOEM Lease Area OCS-A 0486 surrounding the SFWF would add an estimated 102 in-water structures with foundations in the seabed. The cumulative impacts on marine resources, related to seabed disturbance associated with the Proposed Action, when combined with past, present, and reasonably foreseeable activities would be long term, localized, and minor to moderate, unless previously historic properties are identified and cannot be avoided and then impacts would be long term, localized and minor to major.

For any unavoidable ancient submerged landform features corresponding to the time of human occupation, BOEM would specify additional investigations or other measures to aid in resolving adverse effects, pursuant to its compliance responsibilities under the NHPA Section 106 process (36 CFR 800). BOEM requirements with COP approval would stipulate measures to reduce, avoid or mitigate adverse effects on unavoidable ancient submerged landform features. Implementation of these measures would be expected to reduce the magnitude of impacts on ancient submerged landform features from moderate or major to minor or moderate.

Climate change: The cumulative impacts from global climate change for the Proposed Action would be the same as those described for the No Action alternative. The overall magnitude of potential impacts resulting from climate change are uncertain but are anticipated to qualify as negligible to minor and long term.

Terrestrial Resources

Onshore impacts to terrestrial resources would predominately be associated with changes in ground disturbance. Onshore construction associated with the Proposed Action would incrementally add to land disturbance when compared to No Action alternative through the removal of 2.4 acres of undeveloped land for the interconnection facility and a small area (0.1 acre) of developed land at the selected O&M facility. These onshore activities could incrementally add to the physical disturbance of archaeological sites that could occur under the No Action alternative, should unanticipated discoveries of archaeological resources result from the Project during onshore construction. Otherwise, terrestrial surveys for the Project have identified no significant archaeological materials, and analysis shows that most of the APE for terrestrial resources has been previously disturbed; therefore, the risk of potentially encountering undisturbed archaeological deposits or previously undocumented cultural resources is negligible.

As described under marine resources, the Proposed Action could incrementally contribute construction-related accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions under the No Action alternative. The contribution from the Proposed Action would be a low percentage of the overall spill risk from ongoing and future activities, as described in detail in Section 3.3.2.2. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects localized and temporary, negligible Project impacts on cultural resources.

Based on above findings, the Proposed Action when combined with reasonably foreseeable onshore projects could result in short-term, negligible to minor cumulative impacts to terrestrial resources from construction and O&M land-based activities.

Climate change: See marine resources for analysis.

Viewshed Resources

Offshore impacts would predominately be associated with changes in in-water structures.

Light: The Proposed Action would incrementally add offshore lighting impacts from navigational and aviation hazard lighting systems on the WTGs and OSS. The incremental addition would include up to 15 WTGs with red aviation hazard flashing lights and up to 15 WTGs and one OSS with marine navigation lighting consisting of flashing yellow lights, compared to a future potential of up to 1,032 WTGs and OSS in the RI/MA WEA (including SFWF), as evaluated in the cumulative HRVEA. Of the potential 1,032 WTGs and OSS, up to 546 WTGs from other reasonably foreseeable projects would be visible from viewshed resources at risk of significant visual impacts from SFWF WTGs (SWCA 2021). As discussed under the No Action alternative, at-risk viewshed resources tend to be limited to those historic properties at shorelines within 20 miles from the SFWF due to screening by topography, vegetation, other buildings/structures, and WTG distance from shore. Although the visual impacts on viewshed resources from SFWF WTGs alone would be significant, as discussed above for the Proposed Action, incremental lighting impacts from the up to 15 SFWF WTGs would be approximately 3% of the cumulative total that would result from the build-out of WTGs for all reasonably foreseeable future offshore wind projects in the RI/MA WEA. Cumulatively, the Proposed Action when combined with past, present, and reasonably foreseeable activities could have intermittent, short-term to long-term, negligible to moderate impacts on viewshed resources.

Presence of structures: The Proposed Action would add up to 15 additional WTGs and one OSS to the condition of the No Action alternative within the viewshed resources APE. The Project would introduce new elements to the viewshed that could compromise the historic integrity of known historic properties. However, the Proposed Action would account for 3% (up to 15 WTGs) of the total future RI/MA WEA WTG locations potentially visible from the nearest affected historic property in the APE. Proportionately, 97% of the total (up to 546 WTGs) in the APE for viewshed resources would be associated with other future offshore wind development (EDR 2020e; SWCA 2021). Reasonably foreseeable future wind projects and the existing BIWF are considered in this cumulative impacts analysis (EDR 2021; SWCA 2021). Additionally, the Proposed Action would locate WTGs no closer than approximately 13.2 miles from the nearest offshore historic property boundary (Vineyard Sound and Moshup's Bridge TCP) and more than 19 miles from the nearest historic properties onshore, where setting and feeling are important to their NRHP eligibility (SWCA 2021). Incremental visual impacts to sensitive receptors from the Project would be long term and negligible to major, minimized with distance and obstructions. Cumulatively, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term, negligible to moderate cumulative impacts on historic properties in the viewshed. Specifically, the Vineyard Sound and Moshup's Bridge TCP, Block Island Southeast Lighthouse National Historic Landmark, Old Harbor Historic District, Spring Street Historic District, Capt. Mark L. Potter House, Spring House Hotel, Spring House Hotel Cottage, Vaill Cottage, Gay Head Light, and Gay Head - Aquinnah Shops would receive moderate cumulative visual impacts to their historic settings (SWCA 2021).

Conclusions

Under the Proposed Action, the construction and installation of offshore components, as well as their O&M, would have **negligible to major** impacts on cultural resources. Major impacts would be limited to unavoidable impacts that would result in substantial loss of qualifying characteristics of a historic property for NRHP inclusion. Major impacts from the Proposed Action would result from the physical disturbance or damage of all or part of a historic property. Although these impacts could occur at the portions of ancient submerged landform features that SFW is unable to avoid during SFEC installation, the final magnitude of these impacts is expected to be minor to moderate. Measures agreed to by SFW, BOEM, and the NHPA Section 106 consulting parties to avoid, minimize, and/or mitigate adverse effects on historic properties would reduce the level of impact. The exception is where impacts would render a cultural resource ineligible for the NRHP even with mitigation of impacts, in which case the impact on the ancient submerged landform would remain major. Also, impacts to previously undiscovered historic properties identified during implementation of the Proposed Action could be major. However, BOEM would require a post-review discovery plan that would include stop-work and notification procedures to be followed if a cultural resource is encountered during construction and installation, O&M, and conceptual decommissioning. This plan would serve to reduce the level of impact to previously undiscovered historic properties to **moderate** or even lower levels of impact (minor or negligible) where possible.

The construction and installation of offshore components, as well as their O&M, would have **minor to moderate** impacts to viewshed resources, depending on whether impacts could affect the setting and/or character of a site, as at the Vineyard Sound and Moshup's Bridge TCP, Block Island Southeast Lighthouse National Historic Landmark, Old Harbor Historic District, Spring Street Historic District, Capt. Mark L. Potter House, Spring House Hotel, Spring House Hotel Cottage, Vaill Cottage, Gay Head Light, and Gay Head - Aquinnah Shops.

Consequently, BOEM expects the overall impact on cultural resources from the Proposed Action alone to be **moderate** because the overall impact would vary and can depend on whether resources are unavoidable or discovered during Project activities or have unobscured views of Project structures. Historic properties, if adversely affected, would be mitigated through the Section 106 process.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible to moderate** where historic properties remain NRHP-eligible to major where impacts make a historic property ineligible for the NRHP. Specifically for cultural resources, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would also result in **negligible to major** impacts. BOEM made this determination because overall adverse effects to cultural resources could be mitigated through the Section 106 process; however, this might not stop the loss of NRHP eligibility for all historic properties.

3.5.2.2.4 VESSEL TRANSIT LANE ALTERNATIVE

Marine Resources

The Transit alternative would involve the same types or numbers of submerged historic and prehistoric resources at the SFWF and SFEC offshore development areas. However, the Transit alternative could decrease the risk of marine resource damage or destruction to unknown submerged cultural resources because the number of constructed WTG foundations would be reduced and associated inter-array cable trenching could also decrease, resulting in greater Project flexibility for avoiding ancient submerged landforms at the SFWF. The construction and installation of offshore components, as well as their O&M, might be able to avoid impacts to more marine sources under the Transit alternative; however, where impacts are not avoidable, this alternative would have the same potential for negligible to major impacts on these resources as the Proposed Action. Also, if previously undiscovered historic properties are identified and cannot be avoided, impacts would be long term, localized, and minor to major under the Transit alternative (the same as under the Proposed Action).

Terrestrial Resources

The onshore activities proposed under the Transit alternative are the same as those of the Proposed Action. Therefore, impacts to terrestrial resources would be negligible to moderate, the same as those of the Proposed Action. Also, if previously undiscovered historic properties are identified and cannot be avoided, impacts would be long term, localized, and minor to major.

Viewshed Resources

The Transit alternative could decrease impacts to viewshed resources because the number of constructed turbines and their viewshed would be reduced. Although slightly reduced, the layout modification and construction activities proposed under this alternative would still include the same historic properties visually impacted under the Proposed Action and the same potential for impacts to these properties. Therefore, the construction and installation of offshore components, as well as their O&M, would have negligible to major impacts to viewshed resources under the Transit alternative, similar to those of the Proposed Action.

Cumulative Impacts

Marine Resources

The layout modification and construction activities proposed under the Transit alternative, although increasing flexibility for avoiding submerged cultural resources in the SFWF, would have the same limits to avoiding ancient submerged landforms at the proposed SFEC location. The cumulative impacts associated with the Transit alternative when combined with past, present, and reasonably foreseeable activities would be short to long term, localized, and negligible to major. If previously undiscovered historic properties are identified and cannot be avoided, impacts to these resources would also be long term, localized, and minor to major.

Terrestrial Resources

The Transit alternative would not affect Project onshore activities. Therefore, impacts under the Transit alternative when combined with past, present, and reasonably foreseeable activities would be negligible to moderate (the same as the Proposed Action) unless previously undiscovered historic properties are identified and cannot be avoided. If previously undiscovered historic properties are identified and cannot be avoided, impacts to these resources would be long term, localized, and minor to major.

Viewshed Resources

The layout modification and construction activities proposed under the Transit alternative would incrementally reduce the number of WTGs for the SFWF; however, the same historic properties would continue to be adversely affected under this alternative as the Proposed Action. The cumulative visual impacts on historic properties in the APE for viewshed resources and associated with the Transit alternative when combined with past, present, and reasonably foreseeable activities would be long term and negligible to moderate.

Conclusions

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in seabed and viewshed disturbance, BOEM expects that the impacts to cultural resources resulting from the Transit alternative would be similar to the Proposed Action. The construction and installation of offshore components, as well as their O&M, would have negligible to major impacts to cultural resources under either of these action alternatives. This includes if previously undiscovered historic properties are identified and cannot be avoided, where impacts would be long term, localized, and **minor to major**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative's incremental impacts would be similar to the Proposed Action. The visual impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would be negligible to moderate (the same as the Proposed Action). Similarly, if previously undiscovered historic properties are identified and cannot be avoided, impacts would be long term, localized, and **minor to major.**

3.5.2.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

Marine Resources

The Habitat alternative under either layout option would involve the same types or numbers of submerged historic and prehistoric resources at the SFWF and SFEC offshore development areas as under the Proposed Action. However, the Habitat alternative under either layout option could decrease the risk of marine resource damage or destruction to unknown submerged cultural resources because the number of constructed turbines would be reduced and associated inter-array cable trenching would also decrease, resulting in greater Project flexibility for avoiding ancient submerged landforms at the SFWF. The construction and installation of offshore components, as well as their O&M, could avoid impacts to more marine resources under the Habitat alternative. Where impacts are not avoidable, the construction and installation of offshore components, as well as their O&M, would have the same potential for negligible to major impacts on these resources as the Proposed Action. Also, if previously undiscovered historic properties are identified and cannot be avoided, impacts would be long term, localized, and minor to major under the Habitat alternative for either layout option, the same as under the Proposed Action.

Terrestrial Resources

The onshore activities proposed under the Habitat alternative for either layout option would be the same as those under the Proposed Action. Therefore, impacts to terrestrial resources would be negligible to moderate (the same as the Proposed Action). Also, if previously undiscovered historic properties are identified and cannot be avoided, impacts would be long term, localized, and minor to major.

Viewshed Resources

The Habitat alternative under either layout option could decrease impacts to viewshed resources because the number of constructed turbines and their viewshed would be reduced. Although slightly reduced, the layout modification and construction activities proposed under this alternative would still include the same historic properties visually impacted under the Proposed Action and the same potential for impacts to these properties. Therefore, the construction and installation of offshore components, as well as their O&M, would have negligible to major impacts to viewshed resources under the Transit alternative, similar to those of the Proposed Action.

Cumulative Impacts

Marine Resources

The layout modification and construction activities proposed under the Habitat alternative for either layout option, although increasing flexibility for avoiding submerged cultural resources in the SFWF, would have the same limits to avoiding ancient submerged landforms at the proposed SFEC location. The cumulative impacts associated with the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would be short to long term, localized, and negligible to major. This includes if previously undiscovered historic properties are identified and cannot be avoided, where impacts would be long term, localized, and minor to major.

Terrestrial Resources

The Habitat alternative under either layout option would not affect Project onshore activities. Therefore, impacts under the Habitat alternative when combined with past, present, and reasonably foreseeable activities would be negligible to moderate (the same as the Proposed Action), unless previously undiscovered historic properties are identified and cannot be avoided; then, impacts would be long term, localized, and minor to major.

Viewshed Resources

The layout modification and construction activities proposed under the Habitat alternative for either layout option would incrementally reduce the number of WTGs for the SFWF; however, the same historic properties would continue to be adversely affected under this alternative as the Proposed Action. The cumulative visual impacts on historic properties in the APE for viewshed resources and associated with the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would be long term and negligible to moderate.

Conclusions

Although the Habitat alternative under either layout option would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in seabed and viewshed disturbance, BOEM expects that the impacts to cultural resources resulting from the Habitat alternative would be similar to the Proposed Action. The construction and installation of offshore components, as well as their O&M, would have negligible to major impacts to cultural resources under either of these action alternatives. If previously undiscovered historic properties are identified and cannot be avoided, impacts to these resources would also be long term, localized, and **minor to major**.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative’s incremental impacts would be similar to the Proposed Action. The visual impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would be negligible to moderate (the same as the Proposed Action). Similarly, if previously undiscovered historic properties are identified and cannot be avoided, impacts would be long term, localized, and **minor to major**.

3.5.2.3 Action Alternative Comparison

As discussed above, the impacts associated with the Proposed Action alone do not change substantially under the other action alternatives. Although the number of WTGs and their associated inter-array cables vary slightly, BOEM expects that impacts to cultural resources would continue to range from negligible to moderate for all action alternatives, and the same historic properties identified would be adversely affected under any of the action alternatives. If previously undiscovered historic properties are identified and cannot be avoided, where impacts would be long term, localized, and **minor to major**.

In the context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives’ incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from negligible to moderate. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **negligible to moderate** unless previously undiscovered historic are identified and cannot be avoided; then, impacts would be long term, localized, and minor to major. However, BOEM would require a post-review discovery plan that would serve to reduce the level of impact to previously undiscovered historic properties to **moderate** or even lower levels of impact (minor to negligible) where possible.

Consequently, BOEM expects the overall impact on cultural resources from any action alternative to be moderate. The overall impact would vary and can depend on whether resources are unavoidable or discovered during Project activities or have unobscured views of Project structures; however, historic properties, if adversely affected, would be mitigated and thereby moderated through the Section 106 process. The exception is where impacts would render a cultural resource ineligible for the NRHP even with mitigation of impacts, in which case the impact on the ancient submerged landform would remain **major**.

3.5.2.4 Mitigation

BOEM could reduce potential impacts to cultural resources from construction and installation, O&M, and conceptual decommissioning activities by requiring the following conditions of COP approval:

- Avoid potential physical impacts to marine resources and identified historic properties through implementation of a required avoidance area around each, where practicable.
- If a resource is discovered after COP approval or is a marine resource that cannot be avoided by SFW, specify additional investigation or other measures to aid the resolution of adverse effects to the resource.
- If impacts on historic properties cannot be avoided, develop additional mitigation measures through execution of an MOA by BOEM and required signatories to resolve adverse effects under Section 106 of the NHPA.
- Require a post-review discovery plan that SFW would implement during Project construction and O&M to ensure that impacts to unanticipated cultural resources are considered.

If BOEM requires the avoidance and mitigation measures outlined above for cultural resources, then significant impacts to cultural resources would be further reduced; although, the range of potential impacts would still be identified as negligible to moderate or potentially major in the case of unavoidable impacts to marine resource and previously undiscovered historic properties.

Additionally, if BOEM requires the installation of ADLS technology on WTGs, then long-term, negligible to major visual impacts to historic properties would be further reduced by reducing the amount of time WTGs would be visible at night. The short-duration synchronized flashing of the ADLS would have effectively less visual impact at night than the standard continuous, medium-intensity red strobe light aircraft warning systems.

3.5.3 Demographics, Employment, and Economics

3.5.3.1 Affected Environment

In the COP, SFW does not indicate that any single state or county would be the primary recipient of the Project's economic impacts, adverse or beneficial. SFW indicates that as various regional ports could be used for fabrication, assembly, storage, or deployment of materials and crew during development, construction, and conceptual decommissioning of the Project. Table 3.5.3-1. documents the ports, communities, counties, and states that could be directly or indirectly affected by the Project. The list includes ports and communities that the COP indicates could be used for 1) fabrication, assembly, and deployment; 2) crew transfers, logistics, and storage; or 3) landing sites and the interconnection facility. The COP also indicates that the Port of Sheet Harbour in Nova Scotia, Canada, could be used for fabrication, assembly, and/or deployment. The table also lists the ports that are cited in Section 3.5.1 (Commercial Fisheries and For-Hire Recreational Fishing) as deriving a substantial amount of commercial fishing revenue from the Lease Area or along the offshore SFEC (see Table 3.5.1-12 and Table 3.5.1-16). Note that Sheet Harbor in Nova Scotia may be used as a backup port if needed for the marshalling of WTGs and possibly foundation components. However, the use of Sheet Harbor would be minimal as it relates to the overall Project construction (Ørsted 2021). Therefore, Sheet Harbor is not included in the analysis area.

Table 3.5.3-1. Ports, Communities, Counties, and States in the Analysis Area

Port/Facility Name/ Place Name	City/Town	County, State	Fabrication, Assembly, Deployment	Crew Transfer, Logistics, Storage	SFEC Site	Commercial Fishing	For-Hire Recreational Fishing
Port of New London	New London	New London, CT	X	X		X	
Stonington	Stonington	New London, CT				X	X
Fairhaven	Fairhaven	Bristol, MA				X	X
New Bedford Marine Commerce Terminal	New Bedford	Bristol, MA	X	X		X	X
Westport	Westport	Bristol, MA				X	X
Sparrow's Point	Edgemere	Baltimore, MD	X				
Paulsboro Marine Terminal	Paulsboro	Gloucester, NJ	X				
East Hampton	East Hampton	Suffolk, NY			X		
Port of Montauk	Montauk	Suffolk, NY		X	X	X	X
Shinnecock Fishing Dock	Hampton Bays	Suffolk, NY		X		X	X
Greenport Harbor	Greenport	Suffolk, NY		X			X
Port of Providence	Providence	Providence, RI	X				
Port of Galilee/Point Judith	Narragansett	Washington, RI		X		X	X
Old and New Harbor	New Shoreham	Washington, RI		X		X	X
Port of Davisville and Quonset Point	North Kingstown	Washington, RI	X	X			X
Newport	Newport	Newport, RI				X	X
Tiverton	Tiverton	Newport, RI				X	X
Little Compton	Little Compton	Newport, RI				X	X
Port of Norfolk/Norfolk International Terminal	Norfolk	Norfolk City, VA	X				

Note: CT = Connecticut, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

3.5.3.1.1 DEMOGRAPHIC CHARACTERISTICS WITHIN THE ANALYSIS AREA

This section describes demographic characteristics and trends in the analysis area. Table 3.5.3-2 describes each potentially affected county and city/town in terms of its area in square miles, population change between 2010 and 2020, population density, and median household income. While a change in population is not itself considered an impact, population change has the potential to drive beneficial or adverse impacts to other socioeconomic variables, such as availability of housing and demand for public infrastructure and services.

Among the potentially affected counties, Suffolk County, New York, had the largest population with nearly 1.5 million residents as well as the highest population density. Population declined for four of the eight counties shown—New London County, Rhode Island, experienced the biggest loss at -3.3%, while Bristol County, Massachusetts, had the largest gain at 3.4%. Populations of listed communities in New York's Suffolk County all increased, while populations in all of the listed communities in Rhode Island declined, with the exception of Providence.

Table 3.5.3-2. Population and Median Income by City/Town and County

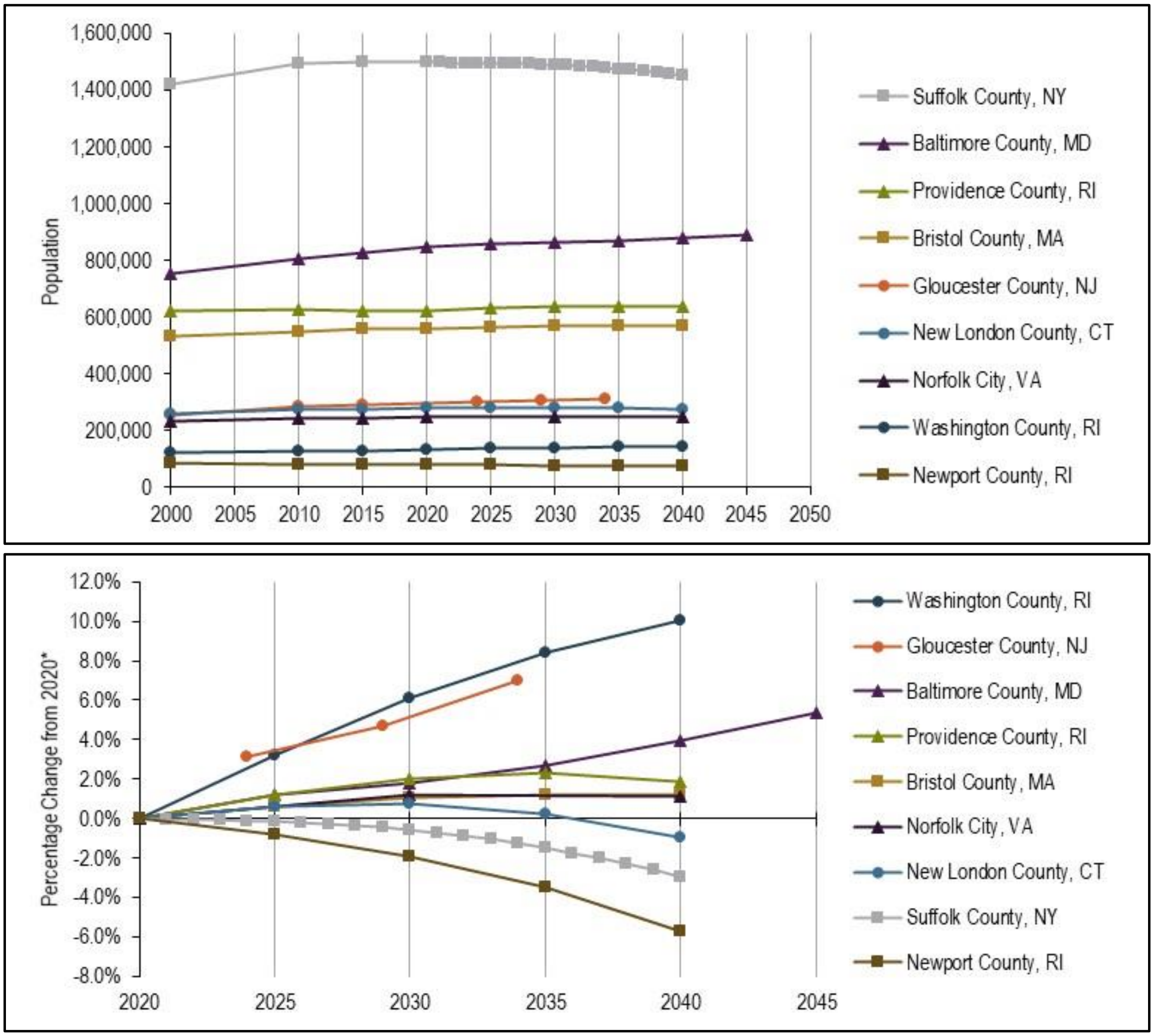
State/County/City or Town		Land Area (square miles)*	Population (2010)**	Population (2020)†	2010-2020 (percent change)	Population Density (population/ square mile)	Median Household Income (2019)††
Connecticut	New London County	665	274,055	264,999	-3.3%	398	$73,490
	New London	6	27,620	26,870	-2.7%	4,478	$46,298
	Stonington	39	18,545	18,566	0.1%	476	$81,667
Massachusetts	Bristol County	553	548,285	566,765	3.4%	1,025	$69,095
	New Bedford	20	95,072	95,517	0.5%	4,776	$46,321
	Westport	50	15,532	16,097	3.6%	322	$79,895
Maryland	Baltimore County	598	805,029	826,017	2.6%	1,381	$76,866
	Edgemere	11	8,669	8,633§	-0.4%	785	$80,307§
New Jersey	Gloucester County	322	288,288	293,245	1.7%	911	$87,283
	Paulsboro Borough	2	6,097	5,866	-3.8%	2,933	$45,450
New York	Suffolk County	912	1,493,350	1,474,273	-1.3%	1,617	$101,031
	East Hampton	74	21,457	22,097	3.0%	299	$96,687
	Montauk (village in East Hampton)	17	3,326	3,655§	9.9%	215	$97,278§
	Hampton Bays (hamlet in Southampton)	13	13,603	14,280§	5.0%	1,098	$81,250§
	Greenport (village in Southhold)	1	2,197	2,261	2.9%	2,261	$50,298§

State/County/City or Town		Land Area (square miles)*	Population (2010)**	Population (2020)†	2010-2020 (percent change)	Population Density (population/ square mile)	Median Household Income (2019)††
Rhode Island	Providence County	410	626,667	636,547	1.6%	1,553	$58,974
	Providence	18	178,042	179,270	0.7%	9,959	$45,610
	Washington County	329	126,979	125,746	-1.0%	382	$85,531
	Narragansett	14	15,868	15,309	-3.5%	1,094	$86,920
	New Shoreham	9	1,051	1,029§§	-2.1%	114	$59,423§§
	North Kingstown	43	26,486	26,278	-0.8%	611	$91,796
	Newport County	102	82,888	81,836	-1.3%	802	$79,454
	Newport	8	24,672	24,412	-1.1%	3,052	$67,102
	Tiverton	29	15,780	15,569	-1.3%	537	$75,295
	Little Compton	21	3,492	3,462§§	-0.9%	165	$89,353§§
Virginia	Norfolk City	54	242,803	242,803	0.0%	4,496	$51,590

Source: U.S. Census Bureau (2010a,* 2010b,** 2021†), U.S. Bureau of Economic Analysis (2020††), Data USA (2021§), Cubit (2021§§)

Note: Population estimates for communities shown with the § or §§ symbol are estimates for 2019. These symbols also indicate the data source.

Figure 3.5.3-1 is a two-panel figure that shows past and forecast trends in population of the counties in the analysis area. The top panel contains population counts and the lower panel shows the forecast percentage change from the 2020 population estimate. While the available population forecasts do not use the same base year or the same set of assumptions with respect to future changes, they generally represent the best publicly available information. For three of the nine counties (Washington County, Rhode Island; Gloucester County, New Jersey; and Baltimore County, Maryland), forecasts show population increasing throughout the forecast period. Population forecasts for three counties increase initially but then flatten while still remaining greater than 2020 (Providence County, Rhode Island; Bristol County, Massachusetts; and Norfolk County, Virginia). Lastly, three counties are forecast to see population decline in the long run (New London County, Connecticut; Suffolk County, New York; and Newport County, Rhode Island).



Sources: Connecticut State Data Center (2018); Demographics Research Group (2019); UMASS Donahue Institute (2018); New Jersey Dept. of Labor and Workforce Development (2014); Cornell Program on Applied Demographics (2018); Rhode Island Statewide Planning Program (2013); Maryland State Data Center (2017).

Figure 3.5.3-1. Population trends and forecasts of counties in the analysis area, 2000–2050.

3.5.3.1.2 ECONOMIC CHARACTERISTICS WITHIN THE ANALYSIS AREA

This section summarizes primary economic characteristics in the analysis area, including the gross domestic product (GDP) of each potentially affected county and state and state and county employment statistics. The GDP values presented in this analysis represent the market value of goods and services produced by the labor and property located within a geographical area, but they do not include the value of intermediate or used goods in the area. A focus of this analysis is the GDP for the "ocean economy," which includes economic activity dependent upon the ocean, such as commercial fishing and seafood processing, marine construction, commercial shipping and cargo handling facilities, ship and boat building, marine minerals, harbor and port authorities, passenger transportation, boat dealers, and ocean-related tourism and recreation (National Ocean Economics Program 2020).

Most analysis area counties display diverse economic activity, and many have well-developed ocean-based economic sectors. In particular, the ocean-related recreation and tourism sector plays a major role in many county economies affected by the Project (see Section 3.5.8 [Recreation and Tourism]). In addition, commercial fishing fleets are important to coastal communities by generating employment and income for vessel owners and crews as well as by creating demand for shoreside products and services to maintain vessels and process seafood products (see Section 3.5.1 [Commercial Fisheries and For-Hire Recreational Fishing]). The marine transportation sector is expanding in some coastal counties, with the major regional ports seeing increased vessel visits and undertaking upgrades to accommodate the increased utilization.

Table 3.5.3-3 summarizes trends in the annualized total GDP and ocean economy GDP of potentially affected states and counties. Among states, New York had both the largest total GDP and ocean economy GDP, and experienced the largest increase in total GDP over the 2005–2019 period and highest increase in ocean economy GDP over the 2005–2018 period. Among counties, the ocean economy GDP of both Washington County, Rhode Island, and Baltimore County, Maryland, more than doubled in size over the 2005–2018 period. The ocean economy GDP of Norfolk City (an independent city and the equivalent to a county in Virginia) was the only county in analysis area to experience a decline in it ocean economy.

Table 3.5.3-3. Annualized Total and Ocean Economy Gross Domestic Product of Potentially Affected States and Counties

State/County	Total GDP (millions of 2019 dollars)		2005–2019 Percent Change	Percentage of Analysis Area Total GDP in 2019	Ocean Economy GDP (millions of 2019 dollars)		2005–2018 Percent Change	Percentage of Analysis Area Ocean Economy GDP in 2018
	2005	2019			2005	2018		
Connecticut	**$266,338**	**$287,822**	**8.1%**	**6.6%**	**$3,774**	**$4,763**	**26.2%**	**5.9%**
New London County	$19,980	$19,957	-0.1%	–	$1,770	$2,449	38.3%	–
Maryland	**$339,610**	**$426,747**	**25.7%**	**9.8%**	**$5,598**	**$9,015**	**61.0%**	**11.2%**
Baltimore County	$49,170	$59,077	20.1%	–	$314	$691	119.8%	–
Massachusetts	**$441,748**	**$596,593**	**35.1%**	**13.8%**	**$5,461**	**$8,004**	**46.6%**	**9.9%**
Bristol County	$22,413	$29,132	30.0%	–	$545	$671	23.2%	–
New Jersey	**$562,253**	**$634,784**	**12.9%**	**14.6%**	**$8,838**	**$11,348**	**28.4%**	**14.1%**
Gloucester County	$12,356	$15,134	22.5%	–	$208	$280	34.1%	–
New York	**$1,291,963**	**$1,772,261**	**37.2%**	**40.9%**	**$20,147**	**$34,117**	**69.3%**	**42.4%**
Suffolk County	$75,510	$97,132	28.6%	–	$1,494	$2,654	77.6%	–
Rhode Island	**$57,609**	**$61,884**	**7.4%**	**1.4%**	**$2,348**	**$3,298**	**40.5%**	**4.1%**
Providence County	$34,732	$37,080	6.8%	–	$683	$809	18.6%	–
Washington County	$6,068	$7,222	19.0%	–	$545	$1,208	121.5%	–
Newport County	$5,837	$6,069	4.0%	–	$684	$794	16.1%	–
Virginia	**$460,585**	**$556,905**	**20.9%**	**12.8%**	**$8,615**	**$9,954**	**15.5%**	**12.4%**
Norfolk City	$24,608	$24,009	-2.4%	–	$1,414	$1,318	-6.8%	–
Analysis area	**$3,420,105**	**$4,336,996**	**26.8%**	**100.0%**	**$54,781**	**$80,500**	**46.9%**	**100.0%**

Sources: U.S. Bureau of Economic Analysis 2021); National Ocean Economics Program (2020).

Note: A detailed list of economic sectors and industries that the National Ocean Economics Program defines as the ocean economy is available at https://www.oceaneconomics.org/Market/sectors.asp.

Table 3.5.3-4 summarizes the employment characteristics of the analysis area, including the size of the labor force, the number of persons employed, and the unemployment rate in 2019. The size of the labor force in each county mirrors the county's population size, with the largest labor force present in urban areas. Among the potentially affected counties, Suffolk County, New York, had the largest labor force in 2019, with 0.78 million workers. Newport County, Rhode Island, had the smallest labor force, with 44,280 workers. The unemployment rate was low throughout the analysis area in 2019, ranging from 2.7% in Virginia to 3.9 in New York. The unemployment rate calculated as the number of unemployed persons in in the labor force over the entire analysis area was 3.4%. However, unemployment rates throughout the United States have risen substantially in recent months due to the restrictions on economic activity that have been imposed as a result of the COVID-19 pandemic.

Table 3.5.3-4. Employment Characteristics of Potentially Affected States and Counties, 2019

State/County	Estimated Size of Labor Force	Estimated number of Person Employed	Percentage of Labor Force That is Unemployed
Connecticut	**1,912,889**	**1,853,997**	**3.8%**
New London County	137,386	132,457	3.1%
Massachusetts	**3,816,470**	**3,727,633**	**2.8%**
Bristol County	304,217	298,047	3.2%
Maryland	**3,260,104**	**3,160,365**	**3.4%**
Baltimore County	457,555	452,655	3.0%
New Jersey	4,489,884	4,367,342	3.7%
Gloucester County	149,747	145,732	3.8%
New York	**9,512,296**	**9,156,258**	**3.9%**
Suffolk County	778,193	747,013	3.8%
Rhode Island	**555,418**	**537,582**	**3.5%**
Providence County	325,490	317,818	3.4%
Washington County	69,050	67,473	2.8%
Newport County	44,280	43,981	2.8%
Virginia	**4,410,200**	**4,324,694**	**2.7%**
Norfolk City	112,364	109,594	3.1%
Analysis area	**27,957,261**	**27,127,871**	**3.4%**

Source: U.S. Bureau of Labor Statistics (2020).

3.5.3.2 Environmental Consequences

3.5.3.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.5.3-5 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts to demographics, employment, and economics for the final EIS. Appendix F provides additional details of the analysis, data sources, and assumptions.

Table 3.5.3-5. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Demographics, Employment, and Economics

<table>
<tr><th>Issue</th><th>Impact Indicator</th><th>Significance Criteria</th></tr>
<tr><td>Development and construction expenditures and employment</td><td>Changes in GDP
Changes in full-time equivalent (FTE) jobs and income
Changes in the demand for housing
Changes in the local supply chain for offshore wind farm components</td><td rowspan="3">Negligible: No measurable impacts would occur.
Minor: Adverse impacts to the affected activity or geographic place could be avoided with EPMs and impacts would not disrupt the normal or routine functions of the affected activity or geographic place. Once the impacting agent is eliminated, the affected activity or geographic place would return to a condition with no measurable effects.
Moderate: Impacts to the affected activity or geographic place are unavoidable, but EPMs would reduce impacts substantially during the life of the Project. The affected activity or geographic place would have to adjust somewhat to account for disruptions due to impacts of the Project, or, once the impacting agent is eliminated, the affected activity or geographic place would return to a condition with no measurable effects if proper remedial action is taken.
Major: The affected activity or geographic place would experience unavoidable disruptions to a degree beyond what is normally acceptable, and, once the impacting agent is eliminated, the affected activity or geographic place could retain measurable effects indefinitely, even if remedial action is taken.</td></tr>
<tr><td>Operational expenditures and employment</td><td>Changes in FTE jobs and income</td></tr>
<tr><td>Conceptual decommissioning expenditures and employment</td><td>Changes in FTE jobs and income</td></tr>
</table>

3.5.3.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing demographics, employment, and economic trends from past and present activities. Attachment 3 in Appendix E provides additional information regarding past and present activities and associated demographics, employment, and economic impacts. Future non-Project actions include residential, commercial, and industrial development and onshore utility projects that include solar power, transmission, gas pipeline, communications tower, and land-based wind energy projects. Offshore projects other than offshore wind would support the existing marine industries and workforce. Ocean-based industries, including tourism and recreation, commercial fishing, and marine transportation, would continue to be important to the economies of many of the counties within the geographic analysis area. Attachment 3 in Appendix E also discloses future non-offshore wind activities and associated demographics, employment, and economic impacts. Impacts associated with future offshore wind activities are described below.

Future Activities (without the Proposed Action)

Employment: The assessment of impacts of future offshore wind activities on demographics, employment, and economics in the analysis area under the No Action alternative primarily focuses on the potential employment opportunities generated by these activities. As shown in in Appendix E, approximately 17 separate offshore wind development projects phases are in planning phases through 2030. Together, these wind farms could add approximately 21,000 MW of renewable energy by 2030 into the energy grid from Massachusetts to North Carolina, using the same geographic ranges of ports specified in the COP for the SFWF Project.

Table 3.5.3-6 shows projected employment from existing and future offshore wind developments within the analysis area for the years 2020–2030 under the No Action alternative. The estimates have been developed using the JEDI Offshore Wind Model[23] using the construction phases described in Tables E-4 in Appendix E.[24] Most of the direct construction-related jobs would be attributed to either the community

[23] The Jobs and Economic Development Impacts Offshore Wind Model—an interactive spreadsheet model developed and maintained by the National Renewable Energy Laboratory (2017)—was used to generate estimates of local employment and income as well as capital and operating expenditures. The model is described more completely in Appendix F.
[24] The timeline shown in the table does not extend into the future far enough to include conceptual decommissioning jobs.

hosting the regional headquarters of the project developer or the fabrication and storage ports that would be used. In general, the specific locations of the regional fabrication and storage ports for specific projects have not been announced, although it is clear that New Bedford has been selected for the Vineyard Wind project.

Table 3.5.3-6. Projected Construction and Operations Jobs in the Geographic Analysis Area under the No Action Alternative, 2020–2030

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Wind Farm Construction Jobs (includes pre-construction jobs)*											
Direct jobs	0	248	4,074	10,227	9,004	5,976	4,613	3,489	0	0	0
Indirect jobs	0	348	6,302	17,097	15,305	10,372	7,645	5,962	0	0	0
Induced jobs	0	251	4,486	11,069	9,836	6,990	5,430	4,211	0	0	0
Total jobs	**0**	**847**	**14,862**	**38,394**	**34,145**	**23,338**	**17,688**	**13,662**	0	0	0
Wind Farm Operations and Maintenance Jobs											
Direct jobs	2	2	2	3	3	117	269	324	362	484	484
Indirect jobs	11	11	11	15	15	714	1,577	1,877	2,100	2,803	2,803
Induced jobs	4	4	4	6	6	282	602	721	810	1,087	1,087
Total jobs	**17**	**17**	**23**	**23**	**1,113**	**2,448**	**2,922**	**3,272**	**4,374**	**4,374**	**4,374**

Source: Estimates were developed using the JEDI-OWM (National Renewable Energy Laboratory 2017).

Note: The O&M jobs shown for 2020 are estimates for the BIWF.

* Construction jobs are defined as full-time equivalents (FTEs), or 2,080-hour units of labor (one construction period job equates to one full-time job for 1 year).

BVG Associates, Ltd. (2017) analyzed the specific occupations required for offshore wind energy development in the United States. The main finding was a significant requirement for technician-level workers in production roles, particularly high-value manufacturing positions; installation and commissioning positions, vessel and offshore equipment operation, and commissioning and testing turbines, cables, and substations; and O&M roles, particularly turbine technicians. The report notes that a particular value of offshore wind jobs is that many are created in industrialized coastal areas, which have suffered from economic decline in recent years. Offshore wind can play an important part in reversing that situation.

In communities with ports that would be used for staging and fabrication of offshore wind facilities, offshore wind development could temporarily compete with the local commercial fishing industry for marine workers. This competition could exacerbate current fishing industry labor shortages. Recent studies (e.g., Johnson and Mazur 2018) show that some commercial fisheries in the New England and Mid-Atlantic regions face workforce challenges, with a lack of young people entering the industry. In addition, the increased economic activity during the construction phase of offshore wind facilities may temporarily increase competition for some onshore facilities and services, thereby resulting in higher prices for these facilities and services. With an increase in prices, some businesses in the commercial fishing industry and other marine sectors may seek facilities and services in ports not supporting offshore wind development.

<u>Port utilization and traffic</u>: Offshore wind development could also generate economic activity at ports used to support the construction and operation of offshore wind projects through port upgrades and development as well as marine transportation. These types of upgrades are described in Appendix E. Where existing ports are improved and channels are dredged for use in support of offshore wind, additional shore-based and marine workers would be hired, resulting in a trained workforce for the offshore wind industry and contributing to beneficial local and regional economic activity. Moreover, these port improvements would be beneficial to other port activity. Overall, the port investment and usage generated by offshore wind under the No Action alternative would have long-term beneficial impacts on

employment and economic activity by providing employment opportunities and supporting marine service industries such as marine construction, ship construction and servicing, and related manufacturing. See Whitney et al. (2016) for a summary of the current status of U.S. ports as well as some of the planned and implemented port expansions to further support offshore wind.

However, congestion and delays could increase fuel costs (i.e., for vessels forced to wait for port traffic to pass) and could decrease productivity for commercial shipping, fishing, and recreational vessel businesses, the income of which depends on the ability to spend time out of port. Collisions could lead to vessel damage and spills, which could have direct costs (i.e., vessel repairs and spill cleanup) as well as indirect costs from damage caused by spills. This would represent a temporary and minor adverse impact.

Land disturbance, presence of structures, new cable emplacement/maintenance, light, noise: Actions associated with onshore and offshore construction and O&M would result in temporary to long-term increases in noise, traffic, lighting, and human activity. These actions would qualify as negligible to minor because it is expected that these impacts would not disrupt normal or routine demographic characteristics, employment, or economic activity in the analysis area—or that, in the case of temporary economic activity specifically associated with construction, any such changes would generally revert to pre-construction conditions following construction completion. Detailed analysis of structure and cable impacts to commercial and for-hire recreation fishing and navigation are provided in Sections 3.5.1.2.2 (No Action Alternative) and 3.5.6.2.2 (No Action Alternative), respectively. Analysis of noise impacts to fish populations, which could indirectly affect fishing-related economic activity, is described in Section 3.4.2.2.2 (No Action Alternative). Lighting, noise, and structure impacts to recreation and tourism are described in Section 3.5.8.2.2 (No Action Alternative).

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on demographics, employment, and economic activity, primarily through new job formation associated with offshore wind development.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities would be **negligible** to **minor**, and **minor beneficial**. Based on the IPFs described in Appendix E Attachment 3, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be **minor** to **minor beneficial**. These impacts would be driven primarily by the continued operation of existing marine industries, especially commercial fishing, recreation/tourism, and shipping; increased pressure for environmental protection of coastal resources; the need for port maintenance and upgrades; and the risks of storm damage and sea level rise.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor beneficial** impacts, as effects would represent a small improvement to the geographic analysis area's diverse economy.

3.5.3.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

The impact of the Project capital expenditures (CapEx) on GDP would be minor and beneficial for the analysis area.[25] As indicated in Table F-10 in Appendix F, local CapEx for development and construction of the SFWF are expected to inject between $182.4 and $246.8 million into the regional economy, including taxes, over a 3-year period beginning in 2021, or $60.8 to $82.3 million on an annual basis. The range of estimates depends primarily on installed capacity of the wind farm, which could be as low as 90 MW or as high as 180 MW. When compared to the analysis area, this level of spending represents less than 0.006% of the area's total GDP. Even if 100% of the larger of the two local CapEx amounts was spent in a single year entirely within Rhode Island (the smallest of the analysis area's state economies), it would account for less than 0.4% of that state's annual GDP. If that growth in GDP had been injected into Rhode Island's economy in 2018, the annual GDP growth rate would have increased from 0.77% to 1.18%. Therefore, the impact of the Project on the GDP of states within the analysis area would be beneficial but minor and temporary.

The impact of the Project CapEx on local full-time equivalent (FTE) jobs and income would be beneficial. Table F-12 in Appendix F indicates that depending on the total Project capacity, local full-time equivalent (FTE) jobs in the analysis area from direct spending by SFW over the 3-year development and construction period would range from 331 to 432, and indirect FTE jobs in the supply chain would range from 538 to 704. In addition, between 357 and 475 induced FTE jobs are expected. In total, an estimated 1,226 to 1,611 FTE jobs would be created during Project construction. These estimates of the number of jobs created are presented in job-years, which does not account for the timing or the duration of the work. In other words, these job-years would likely be spread over multiple years, which means that fewer people would likely be working at a given time than the numbers presented. As described in Table G-1 in Appendix G, where possible, local workers would be hired to meet labor needs for Project construction.

Economic benefits are also expected to accrue to ports that undertake improvements to support Project development. Additional shore-based and marine workers would be hired, resulting in a trained workforce for the offshore wind industry and contributing to beneficial local and regional economic activity. Moreover, port improvements would support and enhance other port activities. These beneficial impacts to local employment and economic activity would range from minor to moderate.

The adverse or beneficial economic impacts of Project construction activities on other sectors in the ocean economy aside from marine construction and transportation would be temporary and negligible to moderate. With respect to the ocean-related recreation and tourism sector, all construction activities would be conducted such that public recreation would not be precluded from use (see Section 3.5.8 [Recreation and Tourism]). SFW would establish a construction schedule to minimize economic impacts to local communities during the summer tourist season. Construction and installation of the Project would have temporary minor to moderate adverse economic impacts on commercial fisheries and for-hire recreational fishing because of increased congestion in ports, reduced fishing access, damage to or loss of fishing gear, and decreased catch of target species (see Section 3.5.1 [Commercial Fisheries and For-Hire Recreational Fishing]). As described in Section 3.5.1.2.3, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the Mid-Atlantic regions would be in the ports of New Shoreham (3.6%), Little Compton (3.4%), and Tiverton (2.2%). The communities in which these

[25] The Jobs and Economic Development Impacts Offshore Wind Model (JEDI-OWM) —an interactive spreadsheet model developed and maintained by the National Renewable Energy Laboratory (2017)—was used to generate estimates of capital and operating expenditures, together with estimates of local employment and income noting that the JEDI-OWM defines local as occurring within the state in which the development and construction project is based. The JEDI-OWM is described in greater detail in Appendix F.

ports are located have a low to medium dependence on commercial fishing. The annual exposed revenue across all affected ports represents approximately 0.17% of the total commercial fishing revenue of these ports. Section 3.5.1.2.3 notes that revenue exposure estimates should not be interpreted as measures of actual economic impact. The actual economic impact would depend on many factors, including the potential for fishing vessel operators to find suitable alternative fishing locations and continue to earn revenue. Considering the estimated low revenue of risk across ports, together with the small number of vessels that depend heavily on the Lease Area, the impacts to other fishing industry sectors, including seafood processors and distributors and shoreside support services, are expected to be temporary and moderate.

In communities with ports that would be used for staging and fabrication of the Project, Project-related construction activities could temporarily compete with the local commercial fishing industry for marine workers. As described in Section 3.5.3.2.1, some commercial fisheries in the New England and Mid-Atlantic regions face workforce challenges, with a lack of young people entering the industry. The competition for marine workers during Project construction may also result in higher prices for certain local shoreside support services. With an increase in service prices, some businesses in the commercial fishing industry and other marine sectors may seek services in ports not supporting Project construction.

Project construction would have a negligible impact on population-related variables such as availability of housing and demand for public infrastructure and services. Workers involved in offshore installation of WTGs, the OSS, the inter-array cable, and the offshore SFEC would all be housed on-board vessels and would be expected to work for several weeks at sea before returning to shore. These conditions imply that offshore crews would have little incentive to relocate to a port city. In ports selected for fabrication and assembly, non-local workers could need temporary housing depending on the ports selected. Local hiring practices by SFW contractors for these jobs could mitigate temporary, local increases in demand for housing and public infrastructure and services.

The Project would have a temporary and minor beneficial impact on the local supply chain for offshore wind farm components. Because of the specialized nature of many offshore wind components, a single project is unexpected to spur major investment in manufacturing facilities.

Operations and Maintenance

O&M occupations would consist of wind technicians, plant managers, water transportation workers, and engineers. As described in Table G-1 in Appendix G, where possible, local workers would be hired to meet labor needs for Project O&M. Section 3.2.1.5 of the COP states the O&M activities would be based in either Quonset Point in North Kingstown, Rhode Island, or in Montauk/East Hampton, New York. As summarized in Table F-12 in Appendix F, results from the Jobs and Economic Development Impacts Offshore Wind Model indicate that local operating expenditures (OpEx) and employment resulting from the Project would create an estimated 47 to 96 FTE jobs annually along with $4 million to $8 million in local annual income. If it is assumed that as many as 50 of the OpEx-related jobs are located in Suffolk County, New York, they would represent less than 0.01% of total employment in the county. Similarly, if 50 of the OpEx-related jobs were located in Quonset Point, they would represent less than 0.08% of the total employment in Washington County, Rhode Island. Thus, the impacts of OpEx employment and income would be beneficial and long term but minor.

In addition to local employment and income, BOEM estimates that the SFWF would provide the U.S. Treasury an annual operating fee of approximately $432,000 (Stillings 2019). The actual value of the fee would depend on various factors, such as annual average wholesale electric power price and the wind farm's capacity factor.

The adverse or beneficial economic impacts of Project O&M activities on sectors in the ocean economy are expected to be long term but negligible to moderate. Economic benefits to ports would be minor, as port use would be limited to vessel traffic associated with routine Project O&M. Operation of onshore Project components would have negligible adverse economic impacts to the ocean-related recreation and tourism sector because onshore maintenance requirements are infrequent (see Section 3.5.8 [Recreation and Tourism]). It is anticipated that ocean beaches could experience a temporary increase in curiosity visits as well as a decrease in visits from users who do not appreciate seeing the WTGs while recreating. All adverse economic impacts to commercial fisheries and for-hire recreational fishing during Project O&M would be minor to moderate (see Section 3.5.1 [Commercial Fisheries and For-Hire Recreational Fishing]). As described in Section 3.5.1.2.3, the largest impacts in terms of exposed revenue as a percentage of total commercial fishing revenue in the Mid-Atlantic regions would be in the ports of Little Compton (1.3%) and Westport (0.8%). The communities in which these ports are located have a low to medium dependence on commercial fishing. The annual exposed revenue across all affected ports represents about 0.02% of the total commercial fishing revenue of these ports. Section 3.5.1.2.3 notes that revenue exposure estimates should not be interpreted as measures of actual economic impact. The actual economic impact would depend on many factors, including the potential for continued fishing to occur in the SFWF and for fishing vessel operators to find suitable alternative fishing locations. The “reef effect” of WTG foundations and associated scour protection would have minor to moderate beneficial economic impacts to for-hire recreational fishing, depending on the extent to which the foundations attract targeted species.

Conceptual Decommissioning

As with the Project CapEx, expenditures and employment for conceptual decommissioning of the offshore infrastructure—estimated to take an additional 2 years to complete after the 25-year Project duration—are not expected to substantially change the existing trends of employment and economic activity in the region. As described in Appendix F, conceptual decommissioning costs are expected to range from $110.8 to $136.3 million (see Appendix F for assumptions and data source). Because these costs are primarily labor and contracting costs, a relatively high percentage of these expenditures would accrue to local economies. Thus, conceptual decommissioning would have a temporary, minor beneficial impact on employment and income in the analysis area.

Conceptual decommissioning of the SFWF and offshore SFEC would have similar impacts on commercial fisheries and for-hire recreational fishing as construction. Removal of structures that act as artificial reefs would result in loss of any beneficial fishing impacts that could have occurred during O&M.

Cumulative Impacts

<u>Employment</u>: BOEM anticipates that the Proposed Action would result in minor beneficial incremental impacts employment due to new hiring and economic activity. Offshore wind development would provide a regional market and ongoing demand for workers skilled in the professions and trades needed for construction, installation, maintenance, and repair of offshore wind facilities. Construction activities related to future offshore wind projects are expected to create an average of approximately 13,000 FTE job-years from 2020 through 2030, including direct, indirect, and induced jobs. It is estimated that the Project would account for approximately 4% of those job-years. By 2030, O&M activities related to future offshore wind projects are expected to create on average approximately 4,374 annual FTE jobs if direct, indirect, and induced jobs are included, with the Project accounting for about up to 2% of those jobs depending on the installed capacity of the project. Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Project would have long-term, minor beneficial impacts for demographics, employment, and economics.

Port utilization and traffic: Port upgrades and vessel activity associated with the Proposed Action could result in minor beneficial and minor adverse incremental impacts through an increase in economic and employment opportunities, as well as reduced port access, increased delays and congestion, or increased collision risk. Where existing ports are improved and channels are dredged for use in support of offshore wind, additional shore-based and marine workers would be hired, resulting in a trained workforce for the offshore wind industry and contributing to beneficial local and regional economic activity. Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Project would have temporary minor adverse impacts and long-term, minor beneficial impacts for demographics, employment, and economics.

Land disturbance, presence of structures, new cable emplacement/maintenance, light, noise: The Proposed Action would contribute negligible to minor incremental onshore and offshore impacts, including new structures, lighting, and noise sources, to the No Action alternative. The effects of these actions are addressed in other final EIS sections. Analysis of structure impacts to commercial and for-hire recreation fishing and navigation are provided in Sections 3.5.1.2.3 (Proposed Action Alternative) and 3.5.6.2.3 (Proposed Action Alternative). Analysis of noise impacts to fish populations, which could indirectly affect fishing-related economic activity, is described in 3.4.2.2.3 (Proposed Action Alternative). Lighting, noise, and structure impacts to recreation and tourism are described in Section 3.5.8.2.3 (Proposed Action Alternative). Overall, effects from these IPFs would be limited in duration and magnitude. Therefore, the Proposed Action when combined with other past, present, and reasonably foreseeable activities would also result in negligible to minor adverse impacts to demographics, employment, and economics.

Conclusions

Project construction and installation and conceptual decommissioning would generate new revenue and jobs to the regional economy. Economic benefits from Project O&M would be much lower than those produced during construction and conceptual decommissioning, but could also result in limited employment and income. BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible to minor** adverse and **minor beneficial** to **moderate beneficial**. Therefore, BOEM expects the overall impact from the Proposed Action alone to be **minor beneficial** because the effect that would occur to routine demographic characteristics, employment, or economic activity in the geographic analysis area would be small. In the case of temporary economic activity specifically associated with construction, any such changes would generally revert to pre-construction conditions following construction completion.

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor adverse** and **minor beneficial** impacts to demographics, employment, and economics. BOEM made this conclusion as the effect to routine demographic characteristics, employment, or economic activity in the geographic analysis area would be small.

3.5.3.2.4 VESSEL TRANSIT LANE ALTERNATIVE

Under the Transit alternative, the Project would have slightly smaller beneficial economic impacts during the Project construction phase because elimination of turbines would result in lower construction expenditures and employment.

During Project O&M, the Transit alternative would also have less of an adverse economic impact on commercial fisheries relative to the Proposed Action due to the lower navigation complexity of the Transit alternative. All other construction and installation, O&M, and conceptual decommissioning impacts on demographics, employment, and economics would be similar to the Proposed Action: negligible to minor adverse and minor beneficial to moderate beneficial.

Cumulative Impacts

The Transit alternative would contribute less to beneficial economic impacts due to fewer construction-related jobs. This alternative would also contribute fewer adverse impacts for commercial fisheries, due to a reduced number of WTGs. However, as noted above, the Transit alternative would otherwise result in incremental impacts to demographics, employment, and economics at quantities and durations similar to, or slightly reduced from, the Proposed Action. Therefore, the cumulative impacts to demographics, employment, and economics would be similar to the Proposed Action: negligible to minor and minor beneficial.

Conclusions

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible to minor** adverse and **minor beneficial** to **moderate beneficial** because the effect to routine demographic characteristics, employment, or economic activity in the geographic analysis area would be small.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible to minor and minor beneficial**). The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level (with the same rationale) as under the Proposed Action: **minor** adverse and **minor beneficial**.

3.5.3.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

Under the Habitat alternative for either option layout, several of the proposed WTGs and associated inter-array cables would be eliminated. Consequently, this alternative would have slightly smaller beneficial economic impacts during the Project construction phase as compared to the Proposed Action because elimination of turbines would result in lower construction expenditures and employment. All other impacts on demographics, employment, and economics in the analysis area would be similar to the Proposed Action. Therefore, impacts would not be measurably different than under the Proposed Action: negligible to minor adverse and minor beneficial to moderate beneficial.

Cumulative Impacts

It is presumed that the Habitat alternative under either layout option would reduce the total number of WTGs, which would result in a marginal reduction in construction-related offshore wind farm employment. These reductions would most often be seen in the duration of employment rather than in the number of employed persons. Therefore, cumulative demographic effects would be only marginally less than the impact under the Proposed Action (i.e., negligible to minor and minor beneficial).

Conclusions

Although the Habitat alternative under either layout option would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible to minor** adverse and **minor beneficial** to **moderate beneficial** because the effect to routine demographic characteristics, employment, or economic activity in the geographic analysis area would be small.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor** and **minor beneficial**). The overall impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level (with the same rationale) as under the Proposed Action: **minor** adverse and **minor beneficial**.

3.5.3.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, BOEM expects that impacts would range from **negligible to minor** adverse and **minor beneficial** to **moderate beneficial** for all action alternatives because the effect to routine demographic characteristics, employment, or economic activity in the geographic analysis area would be small.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from **negligible** to **minor** and **minor beneficial**. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **minor** adverse and **minor beneficial**. These impacts would not disrupt normal or routine demographic characteristics, employment, or economic activity in the geographic analysis area—or that, in the case of temporary economic activity specifically associated with construction, any such changes would generally revert to pre-construction conditions following construction completion.

3.5.3.4 Mitigation

No potential additional mitigation measures for demographics, employment, and economics are identified in Appendix G.

3.5.4 Environmental Justice

3.5.4.1 Affected Environment

Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) requires that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, Native American tribes, and indigenous peoples" (EPA 2019).[26] Table 3.5.4-1 describes selected environmental justice characteristics of the cities/towns, counties, and states where potentially affected ports or landing sites are located. The environmental justice characteristics of possible cities/towns supporting Project activities that Section 3.5.1 (Commercial Fisheries and For-Hire Recreational Fishing) identified as major fishing ports (see Section 3.5.1) are shown in their own section of the table.

[26] The term *indigenous peoples* includes state-recognized tribes; indigenous and tribal community-based organizations; individual members of federally recognized tribes, including those living on a different reservation or living outside Native American country; individual members of state-recognized tribes; Native Hawaiians; Native Pacific Islanders; and individual Native Americans (EPA 2020a).

Table 3.5.4-1. Environmental Justice Characteristics of Cities/Towns, Counties, and States in the Analysis Area

Port or Landing Site	City/Town	County, State	City/Town Population Composition Rating¶	City/Town Poverty Rating‡‡	City/Town Personal Disruption Rating§§	Total Population in County	Minority % in County	Low-Income % in County	Total Population in State (millions)	Minority % in State	Low-Income % in State
Potential Ports Supporting Project Activities											
Shinnecock Fishing Dock	Southampton	Suffolk, NY	Low	Low	Low	1,497,595	32%	18%	19.80	44%	31%
Greenport Harbor	Southold	Suffolk, NY	Low	Medium	Low	1,497,595	32%	18%	19.80	44%	31%
Providence	Providence	Providence, RI	High	High	High	633,704	38%	35%	1.06	27%	29%
Port of Davisville/ Quonset Point	North Kingstown	Washington, RI	Low	Low	Low	126,190	9%	21%	1.06	27%	29%
Old Harbor/ New Harbor	New Shoreham	Washington, RI	Low	Low	Low	126,190	9%	21%	1.06	27%	29%
Paulsboro Marine Terminal	Paulsboro	Gloucester, NJ	Medium	High	Medium–High	291,372	21%	18%	8.96	44%	24%
Sparrows Point	Edgemere	Baltimore, MD	Low	Low	Low	828,637	41%	23%	6.00	48%	23%
Norfolk International Terminals	Norfolk City	Norfolk City, VA	Medium	Medium-High	Medium–High	245,752	56%	41%	8.37	37%	26%
Potential Ports Supporting Project Activities That Are Major Fishing Ports											
Montauk*	East Hampton	Suffolk, NY	Low	Medium	Low	1,497,595	32%	18%	19.80	44%	31%
New London	New London	New London, CT	Medium–High	High	High	270,772	24%	24%	3.59	32%	23%
Narragansett/ Point Judith	Narragansett	Washington, RI	Low	Low	Low	126,190	9%	21%	1.06	27%	29%
New Bedford	New Bedford	Bristol, MA	Medium–High	High	Medium–High	557,016	17%	27%	6.79	27%	24%
Onshore Areas Potentially Affected as Landing Sites, Onshore Substation, and Cable Routes											
Hither Hills*	East Hampton	Suffolk, NY	Low	Medium	Low	1,497,595	32%	18%	19.80	44%	31%
Beach Lane†	East Hampton	Suffolk, NY	Low	Medium	Low	1,497,595	32%	18%	19.80	44%	31%

Source: EPA (2020b); National Oceanic and Atmospheric Administration Fisheries Office of Science and Technology (2019).

Note: CT = Connecticut, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia

* Three of the five census block groups included in the zone around Montauk are also included in the zone around Hither Hills, whereas 15 of the 22 census block groups in the zone around Hither Hills are also included in the zone around Beach Lane.

† Fifteen of the 20 census block groups in the zone around Beach Lane are also included in the zone around Hither Hills.

¶ Population composition corresponds to the demographic makeup of a community, including race, marital status, age, and ability to speak English. A high rating indicates a more vulnerable population.

‡‡ Poverty is expressed as those receiving assistance, families below the poverty line, and individuals older than 65 and younger than 18 in poverty. A high rating indicates a high rate of poverty and a more vulnerable population.

§§ Personal disruption captures unemployment status, educational attainment, poverty, and marital status. A high rating indicates less personal capacity to adapt to changes and thus a more vulnerable population.

Five-km zones were drawn around potentially affected ports or landing sites. These zones encompass most onshore Project activities during construction and installation, O&M, and conceptual decommissioning that could impact local residents. Zones were identified as areas of potential environmental justice concern if 1) the minority population exceeds 50%, or 2) the minority or low-income population is meaningfully greater than the minority or low-income population percentage in a reference population. For the purpose of this analysis, the reference population is the population of the county or state in which a 5-km zone is located. Appendix F describes the methodology used to calculate whether a minority or low-income population is meaningfully greater than the reference population. Minority and low-income populations were identified using the EPA's EJSCREEN tool (EPA 2020b). Within that tool, minority status determination is based on identifying individuals who are non-white or who are white but have Hispanic ethnicity; low-income status determination is based on identifying individuals for whom the ratio of household income to the poverty level in the previous 12 months was less than two.

Table 3.5.4-2 and Table 3.5.4-3 show the census block groups in the 5-km zones of the analysis area that are areas of potential environmental justice concern according to the above definition. Of the estimated 533 census block groups in the analysis area, approximately 41% were determined to be areas of potential environmental justice concern because of the concentrations of minority populations, whereas approximately 40% had concentrations of low-income populations. Three of the ports (New Bedford, Providence, and New London) accounted for 90% of the minority census blocks and 85% of the low-income census blocks. Figures F-1 through F-6 in Appendix F show the locations of these census block groups.

Data are not available to identify the at-sea and shoreside participants in the potentially affected commercial and for-hire recreational fisheries who are members of minority or low-income populations. However, studies (e.g., National Guestworker Alliance 2016; New American Economy 2017) suggest that certain workers in the United States commercial fishing industry, such as factory floor seafood processor workers and fishing vessel deckhands, are often members of minority and/or low-income groups. Some of these industry participants who are members of minority and/or low-income groups likely reside in communities other than those listed in Table 3.5.1-4. Due to increasing real estate values and tax burdens in many northeastern coastal communities (e.g., see Jimenez 2021), a large number of workers in the fishing industry, especially those with low incomes, may reside in distant communities and have little direct connection to the ports where fishing vessels are based and where fish are landed and processed. Consequently, the fishing industries in communities in Table 3.5.1-4 with a low population composition and poverty rating can still have a high proportion of minority and low-income individuals and have little direct connection to the ports where fishing vessels are based or where fish are landed and processed.

Guidance provided by the Council on Environmental Quality (CEQ) indicates that potential impacts on the social or cultural practices of Native American tribes as a result of impacts to the natural or physical environment should be assessed as potential environmental justice impacts (CEQ 1997). The connection of Native American tribes to marine fisheries within the current project areas has been established in academic literature (Chaves 2014; Trigger 1978). During government-to-government consultations with BOEM, representatives from federally recognized tribes expressed concerns about a variety of potential impacts to culturally significant environmental and physical resources (see Appendix A).

Representatives from federally recognized tribes shared with BOEM the deep cultural and spiritual connection their tribal members have to the natural environment and wildlife within and around the Proposed Action, including the now submerged and buried landforms on the OCS previously occupied by their ancestors, which contain the remains of their settlements as well as burials. The representatives expressed concerns about potential negative impacts to culturally significant species such as NARW, fish and shellfish communities that have sustained their people for millennia, and potential water quality impacts that could affect future generations. Representatives from the federally recognized tribes also expressed concerns about potential visual impacts to sacred landscape features and sacred spaces from the presence of renewable energy infrastructure.

Potential impacts to the following environmental and physical resources that are considered culturally significant to the consulted tribes are assessed in the final EIS: water quality (Section 3.3.2), shellfish (Section 3.4.2), finfish (Section 3.4.2), marine mammals (Section 3.4.5), benthic communities (Section 3.4.2), tourism (Section 3.5.8), and historic properties (Section 3.5.2).

Table 3.5.4-2. Census Block Groups in the Analysis Area That Are Areas of Potential Environmental Justice Concern Due to Minority Populations*

Port or Landing Site	County, State	Population in 5-Km Zone	Number of Block Groups in 5-Km Zone	Number of Block Groups of Potential EJ Concern	Percentage of Block Groups of Potential EJ Concern	Total Population in Block Groups of Potential EJ Concern
Potential Ports Supporting Project Activities						
Shinnecock Fishing Dock	Suffolk, NY	9,321	12	0	0%	0
Greenport Harbor	Suffolk, NY	11,189	12	1	8%	1,212
Port of Providence	Providence, RI	246,748	214	125	58%	150,602
Port of Davisville/Quonset Point	Washington, RI	19,666	17	2	12%	2,651
Old Harbor/New Harbor	Washington, RI	830	2	0	0%	0
Paulsboro Marine Terminal	Gloucester, NJ	26,457	22	3	14%	1,740
Sparrows Point	Baltimore, MD	40,505	33	3	9%	2,949
Norfolk International Terminal	Norfolk City, VA	41,025	19	8	42%	10,246
Potential Ports Supporting Project Activities That Are Also Major Fishing Ports						
Montauk	Suffolk, NY	3,662	6	0	0%	0
New London	New London, CT	74,074	51	20	39%	29,347
Narragansett/Point Judith	Washington, RI	10,310	10	1	10%	1,507
New Bedford	Bristol, MA	123,333	111	52	47%	54,928
Onshore Areas Potentially Affected as Landing Sites, Onshore Substation, and Cable Routes						
Hither Hills to Substation	East Hampton, NY	18,796	22	2	9.1%	2,732
Beach Lane to Substation	East Hampton, NY	15,910	20	3	15.0%	3,170

Source: EPA (2020b).

Note: CT = Connecticut, EJ = environmental justice, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* Census block groups with minority populations that exceed 50% or that have meaningfully greater percentages of minority populations.

Table 3.5.4-3. Census Block Groups in the Analysis Area That Are Areas of Potential Environmental Justice Concern Due to Low-Income Populations*

Port or Landing Site	County, State	Population in 5-Km Zone	Number of Block Groups in 5-Km Zone	Number of Block Groups of Potential EJ Concern	Percentage of Block Groups of Potential EJ Concern	Total Population in Block Groups of Potential EJ Concern
Potential Ports Supporting Project Activities						
Shinnecock Fishing Dock	Suffolk, NY	9,321	12	1	8%	1,311
Greenport Harbor	Suffolk, NY	11,189	12	3	25%	3,248
Port of Providence	Providence, RI	246,748	214	105	49%	131,249
Port of Davisville/Quonset Point	Washington, RI	19,666	17	2	12%	2,651
Old Harbor/New Harbor	Washington, RI	830	2	0	0%	0
Paulsboro Marine Terminal	Gloucester, NJ	26,457	22	5	23%	4,669
Sparrows Point	Baltimore, MD	40,505	33	10	30%	14,324
Norfolk International Terminal	Norfolk City, VA	41,025	19	8	42%	28,306
Potential Ports Supporting Project Activities That Are Also Major Fishing Ports						
Montauk	Suffolk, NY	3,662	6	0	0%	0
New London	New London, CT	74,074	51	18	35%	26,848
Narragansett/Point Judith	Washington, RI	10,310	10	3	30%	2,691
New Bedford	Bristol, MA	123,333	111	58	52%	59,936
Onshore Areas Potentially Affected as Landing Sites, Onshore Substation, and Cable Routes						
Hither Hills to Substation	East Hampton, NY	18,796	22	1	4.5%	498
Beach Lane to Substation	East Hampton, NY	15,910	20	1	5.0%	498

Source: EPA (2020b).

Note: CT = Connecticut, EJ = environmental justice, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

* Census block groups that have meaningfully greater percentages of low-income populations.

3.5.4.2 Environmental Consequences

3.5.4.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.5.4-4 lists the issues identified for environmental justice and the indicators and significance criteria used to assess impacts for the final EIS.

Table 3.5.4-4. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Environmental Justice

Issue	Impact Indicator	Significance Criteria
Potential public health and safety impacts	Qualitative assessment of impacts to minority and low-income populations from Project impacts that could affect public health and safety, including air quality, water quality, noise, and land use impacts	Negligible: No measurable impacts would occur. Minor to moderate: Adverse impacts to the affected environmental justice population could be avoided with EPMs or would be unavoidable but not disproportionately high and adverse. Major: The affected environmental justice population would experience disproportionately high and adverse effects due to 1) impacts on the natural or physical environment; 2) impacts that appreciably exceed or are expected to appreciably exceed those on the general population or other appropriate comparison group; or 3) impacts that occur or would occur in a minority or low-income population, or Native American tribe affected by cumulative or multiple adverse exposures from environmental hazards
Potential job and income losses due to disruption of commercial fisheries or for-hire recreational fishing*	Qualitative assessment of economic impacts to minority and low-income populations due to Project impacts to commercial fisheries and for-hire recreational fishing	
Potential underrepresentation of minority or low-income populations in the public participation process	Qualitative assessment of impacts on the natural or physical environment	

* This analysis does not assess economic impacts to minority or low-income populations that could occur as a result of employment and income changes in sectors of the ocean economy other than the commercial fishing and for-hire recreational fishing industries. As discussed in Section 3.5.3.2.3 (Demographics, Employment, and Economics), Project construction and installation would support new employment and economic activity in the marine construction and transportation sectors. As described in Table G-1 in Appendix G, where possible, local workers would be hired to meet labor needs for Project construction. These employment and income benefits are expected to be no greater for minority or low-income populations than those experienced by non-minority or non-low-income members of the general population who also reside in the analysis area. Section 3.5.3.2.3 also notes that the adverse or beneficial economic impacts of Project construction activities on other sectors in the ocean economy aside from marine construction and transportation and would be temporary and negligible to moderate. The adverse or beneficial economic impacts of Project O&M activities on sectors in the ocean economy are also expected to be negligible to moderate but long term.

3.5.4.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing environmental justice populations occurring in the geographic analysis area. Attachment 3 in Appendix E provides additional information regarding past and present activities that could affect environmental justice populations. Attachment 3 in Appendix E also discloses future non-offshore wind activities that could affect environmental justice populations. Impacts to environmental justice populations associated with future offshore wind activities are described below.

Future Activities (without the Proposed Action)

Air emissions and noise: During construction of future wind development activities, there could be temporary, minor to moderate impacts to air quality, and neighboring or adjacent land to reasonably foreseeable projects could temporarily be disturbed by project–related noise and dust. See Section 3.5.5 (Land Use and Coastal Infrastructure) and Section 3.3.1 (Air Quality) for additional details. State and local agencies would be responsible for managing actions to help minimize and avoid noise, air quality, and other impacts on nearby neighborhoods during construction. Therefore, offshore wind energy construction is expected to have temporary, minor to moderate air quality and noise impacts on environmental justice populations.

Despite the potential for increased air emissions during construction of new offshore wind energy projects, replacing the need for fossil fuel power generation, would have a net beneficial impact on air quality. The reduction in air emissions could produce measurable benefits in terms of lower health costs and loss of life. See Section 3.3.1 (Air Quality) for additional details. Members of minority and low-income populations tend to be more burdened with adverse health conditions that can increase susceptibility to the harmful health effects of exposure to environmental pollution, including the fine particulate matter air pollution from fossil fuel–fired power plants (EPA 2016; Thind et al. 2019). Therefore, the air quality improvements from offshore wind energy development would have a long-term beneficial impact on environmental justice populations. Similarly, future offshore wind project GHG emissions during construction would be negligible (14,161 tons of CO_2) as compared to aggregate global emissions, and these projects may beneficially contribute to a broader combination of actions to reduce future impacts from climate change over the long term.

By reducing fossil fuel power plant GHG emissions future offshore wind projects may also beneficially contribute to a broader combination of actions to reduce future impacts from climate change over the long term. See Section 3.3.1 (Air Quality) for additional details. People who live in poverty may be particularly vulnerable to the adverse economic impacts of climate change because they have fewer financial resources to cope with these effects (EPA 2017). Therefore, the reduction in GHG emissions resulting from offshore wind energy development would have a long-term beneficial impact on environmental justice populations.

Accidental releases and discharges: Future offshore wind activities would affect water quality via increased potential turbidity and sedimentation and accidental spills. See Section 3.3.2 (Water Quality) for additional details. However, offshore wind energy development would comply with all regulatory requirements for water quality protection. Therefore, environmental justice populations in the analysis area are expected to experience long-term but minor adverse water quality impacts as a result of future offshore wind activities.

Vessel traffic, presence of structures, new cable emplacement/maintenance, light: An analysis of vessel traffic, structure, cable, and other impacts to commercial fisheries and for-hire recreational fishing that could result from future offshore wind energy development is provided in Section 3.5.1 (Commercial Fisheries and For-Hire Recreational Fishing). Onshore and offshore lighting and structure impacts to recreation and tourism, as described in Section 3.5.8 (Recreation and Tourism), could also affect for-hire recreational fisheries. Many lower level workers employed in the commercial fishing and for-hire recreational fishing industries, such as factory floor seafood processor workers and fishing vessel deckhands, are members of minority and/or low-income groups. To the extent that the impacts of future offshore wind activities result in declines in the economic performance of commercial and for-hire recreational fisheries, members of environmental justice populations could be disproportionately affected, especially if employment in the seafood processing industry declines. However, WTG spacing and orientation measures, offshore cable burial, financial compensation programs for fishing interests, and other mitigation measures implemented by offshore wind developers, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction and O&M activities related to offshore wind energy development, would help ensure that fishing businesses could continue to operate with minimal disruption. Therefore, adverse impacts to minority and low-income populations engaged in commercial fisheries and for-hire recreational fishing would be minor to moderate.

In addition, the temporary to long-term adverse impacts of future offshore wind activities on recreational fisheries could impact low-income residents who disproportionately rely on these fisheries as a food source. Similarly, future offshore wind activities could have adverse impacts on the subsistence fisheries of tribal and indigenous peoples in the analysis area. However, most recreational fishing in the analysis area occurs close to shore (see Section 3.5.8 [Recreation and Tourism]). In addition, historically, much of the fishing by the region's tribal and indigenous peoples was concentrated in the nearshore marine and estuarine environment (Bennett 1955). Recent BOEM consultation with Native American tribes in adjacent lease areas to the Project indicate that tribal subsistence fisheries continue to occur predominately in inshore areas (BOEM 2020). Consequently, future development occurring further offshore, such as offshore wind projects, are expected to have a negligible to minor impact on the recreational and subsistence fishing activities of environmental justice populations.

Land disturbance: As noted in Section 3.5.2 (Cultural Resources), cable emplacement resulting from future offshore wind energy development could damage submerged ancient landforms that may have cultural significance to tribal and indigenous peoples in the analysis area as part of ancient and ongoing tribal practices. Disturbance and destruction of even a portion of an identified submerged landform could degrade or even eliminate the value of these resources as potential repositories of archaeological knowledge and cultural significance to tribes. If these landforms are disturbed during offshore cable emplacement, the impact on the cultural resource would be permanent, resulting in a disproportionately large and adverse impact on the affected tribes. However, the results of submerged cultural resources surveys could be used to design future offshore wind activities so as to avoid impacting known submerged cultural resources or minimize impacts to varying degrees. Moreover, BOEM would work with tribes and consulting parties to develop project-specific treatment plans.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on environmental justice populations associated with the Project would not occur. However, ongoing and future activities would have temporary to long-term impacts on environmental justice populations, primarily through public health and safety impacts associated with air emissions, noise, and water quality changes; potential job and income losses due to disruption of commercial fisheries or for-hire recreational fishing; and damage to submerged ancient landforms that may have cultural significance to tribal and indigenous peoples.

BOEM anticipates that the adverse impacts to environmental justice populations from reasonably foreseeable offshore wind activities would be long term and **minor** to **moderate**. These ratings reflect impacts on minority and low-income communities from cable emplacement, construction-phase noise and vessel traffic, and the long-term presence of offshore structures, which could affect marine-dependent businesses. Construction-related port activities could have impacts on environmental justice communities near ports through air emissions, traffic, or noise. This rating also reflects potential impacts on Tribes resulting from long-term impacts on culturally important ocean views and permanent impacts on submerged ancient landforms or other resources of importance to the values and practices of certain Native American Tribes. The air quality improvements from offshore wind energy development would have a long-term beneficial impact on environmental justice populations. As described in Appendix E Attachment 3, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be **minor** to **moderate**.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** to **moderate** adverse impacts to environmental justice populations because most adverse impacts could be avoided with EPMs or would be unavoidable but not disproportionately high and adverse. In addition, beneficial effects to environmental justice populations may result from reductions in air emissions if offshore wind displaces energy generation using fossil fuels.

3.5.4.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Environmental justice impacts in the final EIS are based on adverse impacts that would occur to air quality, water quality, land use and coastal infrastructure, commercial fisheries and for-hire recreational fishing, and cultural resources that are disproportionately borne by environmental justice populations. Adverse impacts to air quality during Project construction were characterized as minor to moderate, regional in extent, and short term (see Section 3.3.1 [Air Quality]). Similarly, no major adverse impacts to water quality identified during Project construction, with the potential exception of a fuel or oil spill (see Section 3.3.2 [Water Quality]). These potential spills could occur in or near concentrations of minority or low-income populations in East Hampton, New York (Figures F-1 and F-3); however, Table G-1 in Appendix G includes EPMs to avoid or minimize air emissions and potential spill impacts on water quality. SFW would develop an SPCC plan and HDD inadvertent release plan to protect nearby surface waters. Therefore, impacts to minority and low-income populations associated with changes in air or water quality during Project construction would be temporary and minor to moderate, as <u>potentially</u> disproportionately high and adverse impacts would be avoided with EPMs. As described in Section 3.5.5 (Land Use and Coastal Infrastructure), land use and coastal infrastructure affected by construction of offshore Project components would include chosen port facilities. As identified in Table 3.5.4-4, concentrations of minority or low-income populations have been identified near several ports that could support Project construction. These populations could experience short-term adverse effects as a result of noise, vibration, and vehicular traffic associated with construction-related port activities. Table 3.5.4-4 also shows concentrations of minority or low-income populations near the proposed landing sites and onshore SFEC routes. These populations could also experience short-term adverse effects through construction noise, vibration, and dust, together with intermittent delays in travel along affected roads. SFW would employ EPMs (see Table G-1 in Appendix G) to minimize noise and traffic impacts related to Project construction. Therefore, impacts to minority and low-income populations associated with noise, vibration, and vehicular traffic during Project construction would be temporary and minor to moderate, as potentially disproportionately high and adverse impacts would be avoided with EPMs.

As noted in Section 3.5.1 (Commercial Fisheries and For-Hire Recreational Fishing), some individual operators of commercial fishing or for-hire recreational fishing businesses could experience adverse economic impacts during Project construction as a result of increased port congestion, reduced fishing access, damage to or loss of fishing gear, and decreases in target species' abundance or availability. These impacts would be temporary and minor, but it is conceivable that certain workers engaged in commercial fisheries and for-hire recreational fishing, such as fishing vessel deckhands and factory floor seafood processor workers, would be more vulnerable to job or income losses should Project construction disrupt fishing activities. As described in Section 3.5.4.1, many of these workers are members of minority and/or low-income groups. However, SFW's communication plans with the fishing industry and its financial compensation program for damage to or loss of fishing gear, together with the ability of many fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction activities, would help ensure that fishing businesses could continue to operate with minimal disruption. Therefore, adverse impacts to minority and low-income individuals engaged in commercial fisheries and for-hire recreational fishing would be temporary and minor to moderate during Project construction, as <u>potentially</u> disproportionately high and adverse impacts would be avoided with EPMs.

Members of environmental justice populations for whom recreational and subsistence fisheries are an important food source are not expected to lose access to fishing areas on the shoreline or close to shore during construction of the offshore SFEC and the Project's onshore components. As described in Section 3.5.8 (Recreation and Tourism), construction staging areas would be located such that public parking, beach access, and access to campsites would be maintained. Additionally, SFW would inform all mariners, including commercial and recreational fishermen, and recreational boaters of construction activities and vessel movements (see Table G-1 in Appendix G). If the O&M facility is located in the Port of Montauk, initial construction dredging would occur, but only within a previously dredged footprint. The impact of this dredging on invertebrate and fish populations would be negligible (see Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish]). Therefore, potential adverse impacts to environmental justice populations from reduced recreational and subsistence fishing opportunities caused by dredging are considered negligible.

As described in Section 3.5.2 (Cultural Resources), cable emplacement during Project construction could damage submerged ancient landforms that may have cultural significance to tribal and indigenous peoples in the analysis area as part of ancient and ongoing tribal practices. Disturbance and destruction of even a portion of an identified submerged landform could degrade or even eliminate the value of these resources as potential repositories of archaeological knowledge and cultural significance to tribes. If these landforms are disturbed during offshore cable emplacement, the impact on the cultural resource would be permanent, resulting in a disproportionately large and adverse impact on the affected tribes. BOEM remains in consultation with Native American tribes and other consulting parties under NHPA Section 106 on identified cultural resources, adverse effects, and the resolution of adverse effects (per 36 CFR part 800).

Operations and Maintenance and Conceptual Decommissioning

As described in the respective resource analysis sections, O&M would include the same permit requirements and controls as described for construction activities and would lead to the same types of minor adverse impacts to air quality (Section 3.3.1 [Air Quality]), water quality (Section 3.3.2 [Water Quality]), and land use and coastal infrastructure (Section 3.5.5 [Land Use and Coastal Infrastructure]). SFW would employ EPMs (see Table G-1 in Appendix G) to minimize air, water, and land use impacts related to Project construction Therefore, adverse impacts to minority and low-income populations would be long term and minor to moderate during Project O&M, as potentially disproportionately high and adverse impacts would be avoided with EPMs.

During operations, the Project would have a long-term, minor beneficial health impact on populations in the analysis area, including environmental justice populations, due to reduced fossil fuel power plant air emissions. See Section 3.3.1 [Air Quality] in Appendix H for additional details. Given that environmental justice populations tend to be more burdened with adverse health conditions that can increase susceptibility to the harmful effects of air pollution, the beneficial health impacts of reducing emissions may be greater than those experienced by non-minority or non-low-income members of the general population who also reside in the affected area.

As noted in Section 3.5.1 (Commercial Fisheries and For-Hire Recreational Fishing), some individual operators of commercial fishing or for-hire recreational fishing businesses could experience long-term, minor to moderate adverse economic impacts during Project O&M as a result of reduced fishing access, damage to or loss of fishing gear, and decreases in target species abundance or availability. It is conceivable that certain workers engaged in commercial fisheries and for-hire recreational fishing, such as fishing vessel deckhands and factory floor seafood processor workers, would be more vulnerable to job or income losses should Project O&M disrupt fishing activities. As described in Section 3.5.4.1, many of these workers are members of minority and/or low-income populations. However, SFW's communication plans with the fishing industry and its financial compensation program for damage to or loss of fishing gear, together with the ability of many fishing vessel operators to adjust transit and fishing locations to avoid conflicts with operation activities, would help ensure that fishing businesses could continue to operate with minimal disruption. Therefore, adverse impacts to minority and low-income populations engaged in commercial fisheries and for-hire recreational fishing would be long term and minor to moderate during Project O&M. as potentially disproportionately high and adverse impacts would be avoided with EPMs.

As previously noted, members of environmental justice populations for whom recreational and subsistence fisheries are an important food source generally fish close to shore and are not likely to travel and fish within the SFWF. Therefore, adverse impacts to these individuals during Project O&M would be long term but negligible to minor. If the O&M facility is located in the Port of Montauk, maintenance dredging would occur, but only within a previously dredged footprint. The impact of this dredging on invertebrate and fish populations would be negligible (see Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish]). Therefore, potential adverse impacts to environmental justice populations from reduced recreational and subsistence fishing opportunities caused by dredging are considered negligible.

As described in Section 3.5.2 (Cultural Resources), O&M of the SFWF and offshore SFEC could impact unknown submerged marine cultural resources. For example, vessels conducting O&M activities could inadvertently damage avoidance-buffered or unknown resources. However, SFW could conduct O&M activities on equipment in areas that previously experienced disturbance during construction, thereby reducing impacts to submerged marine cultural resources to long term but negligible. Therefore, impacts to tribal and indigenous peoples due to potential disturbance of these cultural resources is expected to be negligible.

Conceptual decommissioning of the SFWF and offshore SFEC would have similar impacts on minority and low-income populations as impacts from construction.

Cumulative Impacts

Air emissions and noise: The Proposed Action would increase exposure to noise and air pollution by environmental justice populations beyond conditions under the No Action alternative. This would be a negligible incremental impact and would cease when construction is complete. As noted in Section 3.5.4.2.2, to the extent that increases in air or noise pollution occur as a result of ongoing and future non-offshore activities, environmental justice communities or individuals could experience adverse environmental and health effects. State and local agencies would be responsible for minimizing and avoiding noise and air quality impacts on nearby neighborhoods, including those neighborhoods in which environmental justice populations reside.

Despite the potential for increased air emissions during construction of new offshore wind energy projects, replacing the need for fossil fuel power generation would have a net beneficial impact on air quality. Environmental justice populations tend to be more burdened with adverse health conditions that can increase susceptibility to the harmful effects of air pollution, and they may be particularly vulnerable to the adverse economic impacts of climate change because they have fewer financial resources to cope with these effects. Therefore, the beneficial impacts of reducing air emissions, including GHG emissions, may be greater than those experienced by non-minority or non-low-income members of the general population who also reside in the region.

Accidental releases and discharges: The Proposed Action could increase water impacts to environmental justice populations. However, it is expected that onshore and offshore development, including the Proposed Action, would comply with all regulatory requirements for water quality protection. Therefore, when combined with past, present, and other reasonably foreseeable projects, the Project would have minor to moderate adverse water quality impacts on environmental justice populations.

Vessel traffic, presence of structures, new cable emplacement/maintenance, light: The Proposed Action would contribute negligible to moderate incremental onshore and offshore impacts, including new structures and cables, lighting, and vessel traffic, to conditions under the No Action alternative. The effects of these actions are addressed in other final EIS sections. An analysis of structure, cable, and vessel traffic impacts to commercial and for-hire recreation fishing is provided in Section 3.5.1 (Commercial Fisheries and For-Hire Recreational Fishing). Lighting, noise, and structure impacts to recreational and tourism activities, including recreational fishing, are described in Section 3.5.8 (Recreation and Tourism).

To the extent that Project impacts, together with the impacts of ongoing and other future onshore and offshore activities, result in declines in the economic performance of commercial and for-hire recreational fisheries, members of environmental justice populations could be disproportionately affected, especially if employment in the seafood processing industry declines. However, financial compensation policies implemented by offshore wind developers, together with the ability of some fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction and O&M activities related to offshore wind energy development, would help ensure that fishing businesses could continue to operate with minimal disruption. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in minor to moderate adverse impacts to members of environmental justice populations employed in commercial fisheries and for-hire recreational fishing.

In addition, to the extent that the Project, together with ongoing and other future onshore and offshore activities, result in adverse impacts on recreational and subsistence fisheries, environmental justice populations could be disproportionately affected. However, most recreational and subsistence fishing in the analysis area occurs close to shore. Consequently, the Proposed Action would result in a minor to moderate incremental adverse impact to members of environmental justice populations engaged in recreational and subsistence fishing.

<u>Land disturbance</u>: The combined cable emplacement impacts on submerged marine cultural resources from ongoing and future onshore and offshore activities, including the Project, could have major disproportionate impacts on Native American tribes that trace their ancestry to these resources. However, the results of submerged cultural resources surveys could be used to design future offshore wind activities so as to avoid impacting known submerged cultural resources or minimize impacts to varying degrees. Moreover, BOEM would work with tribes and consulting parties to develop project-specific treatment plans.

Conclusions

Project construction and installation, O&M, and conceptual decommissioning would have temporary to long-term, **negligible to moderate** impacts on environmental justice populations, primarily through public health and safety impacts associated with air emissions, noise, and water quality changes; potential job and income losses due to disruption of commercial fisheries or for-hire recreational fishing; and damage to submerged ancient landforms that may have cultural significance to tribal and indigenous peoples. BOEM expects the overall impact on environmental justice populations from the Proposed Action alone due to these factors to be **minor** to **moderate,** as adverse impacts could be avoided with EPMs or would be unavoidable but not disproportionately high and adverse.

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** to **moderate** adverse impacts to environmental justice populations because adverse impacts could be avoided with EPMs or would be unavoidable but not disproportionately high and adverse. In addition, **minor** beneficial effects to environmental justice populations may result from reductions in air emissions if offshore wind displaces energy generation using fossil fuels.

3.5.4.2.4 VESSEL TRANSIT LANE ALTERNATIVE

The Transit alternative could result in decreased impacts to air and water quality and reduced noise levels in the analysis area during Project construction if less trenching, vessel traffic, or time is needed to install a reduced number of WTGs and their associated inter-array cables. Overall, however, the work areas and construction timing windows for the SFWF and offshore SFEC would be similar to those of the Proposed

Action. Moreover, the reduction in the number of WTGs under this alternative is not expected to affect the selection of port facilities that would support construction. Therefore, the construction phase of this alternative would result in short-term, minor to moderate adverse impacts on air and water quality and noise levels. The same environmental justice populations identified under the Proposed Action would be affected, and the level of adverse impacts on air and water quality and noise levels experienced by these populations during the O&M phase of this alternative would also not be measurably different than under the Proposed Action.

As discussed in Section 3.5.1 (Commercial Fisheries and For-Hire Recreational Fishing), the establishment of a vessel transit lane could simplify navigation through the SFWF and potentially reduce conflicts between the Project and businesses involved in commercial fisheries and for-hire recreational fishing. As a result, the Transit alternative would be less disruptive to fishing activities in the SFWF in comparison to the Proposed Action. Therefore, the Transit alternative would have a lower adverse impact on members of minority and/or low-income populations who are employed in commercial fisheries and for-hire recreational fishing, albeit still expected to be minor to moderate.

As with the Proposed Action, the Transit alternative may not be able to avoid impacts on all submerged marine landforms of cultural significance to Native Americans, but BOEM would consult with Native American tribes and other consulting parties under NHPA Section 106 on identified cultural resources, adverse effects, and the resolution of adverse effects (per 36 CFR part 800).

Cumulative Impacts

The Transit alternative would incrementally add sources of air, water quality, and noise pollution at quantities and durations similar to, or slightly reduced from, the Proposed Action. Offshore, the Transit alternative would have a lower adverse impact on members of minority and/or low-income populations who are employed in commercial fisheries and for-hire recreational fishing. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Transit alternative when combined with past, present, and reasonably foreseeable activities would result in minor to moderate adverse impacts to environmental justice populations because adverse impacts could be avoided with EPMs or would be unavoidable but not disproportionately high and adverse. In addition, minor beneficial effects to environmental justice populations may result from reductions in air emissions if offshore wind displaces energy generation using fossil fuels.

Conclusions

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects the overall impacts to environmental justice populations resulting from the alternative alone would be similar to the Proposed Action: **minor** to **moderate**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative's incremental impacts to environmental justice populations would be similar to the Proposed Action. The overall adverse impact to environmental justice populations of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor** to **moderate** adverse and **minor** beneficial.

3.5.4.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

The Habitat alternative under either layout option could result in decreased impacts to air and water quality and reduced noise levels in the analysis area during Project construction if less trenching, vessel traffic, or time is needed to install a reduced number of WTGs and their associated inter-array cables. However, the reduction in the number of WTGs under this alternative is not expected to affect the selection of port facilities that would support construction. Therefore, the construction and installation phase of this alternative would be similar to the Proposed Action and result in the short-term, minor adverse impacts on air and water quality and noise levels.

As discussed in Section 3.5.1 (Commercial Fisheries and For-Hire Recreational Fishing), the exclusion of WTG sites to reduce impacts to complex fisheries habitats could simplify navigation through the SFWF and potentially reduce conflicts between the Project and businesses involved in commercial fisheries and for-hire recreational fishing. Therefore, the Habitat alternative under either layout option would have a lower adverse impact on members of minority and/or low-income populations who are employed in commercial fisheries and for- hire recreational fishing, albeit still expected to be minor to moderate.

As with the Proposed Action, the Habitat alternative under either layout option may not be able to avoid impacts on all submerged marine landforms of cultural significance to Native Americans, but BOEM would consult with Native American tribes and other consulting parties under NHPA Section 106 on identified cultural resources, adverse effects, and the resolution of adverse effects (per 36 CFR part 800).

Cumulative Impacts

The Habitat alternative under either layout option would incrementally add sources of air, water quality, and noise pollution at quantities and durations similar to, or slightly reduced from, the Proposed Action. Offshore, the Habitat alternative under either layout option would have a lower adverse impact on members of minority and/or low-income populations who are employed in commercial fisheries and for-hire recreational fishing. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would result in minor to moderate adverse impacts to environmental justice populations because adverse impacts could be avoided with EPMs or would be unavoidable but not disproportionately high and adverse. In addition, minor beneficial effects to environmental justice populations may result from reductions in air emissions if offshore wind displaces energy generation using fossil fuels.

Conclusions

Although the Habitat alternative under either layout option would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the overall impacts to environmental justice populations resulting from the alternative alone would be similar to the Proposed Action: **minor** to **moderate**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative's incremental impacts would be similar to the Proposed Action. The overall adverse impacts to environmental justice populations of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor** to **moderate** adverse and **minor** beneficial.

3.5.4.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, BOEM expects the overall environmental justice impacts would be **minor** to **moderate** for all action alternatives. These ratings reflect impacts on minority and low-income communities from cable emplacement, construction-phase noise and vessel traffic, and the long-term presence of offshore structures, which could affect marine-dependent businesses. Construction-related port activities could have impacts on environmental justice communities near ports through air emissions, traffic, or noise. This rating also reflects potential impacts on Tribes resulting from long-term impacts on culturally important ocean views and permanent impacts on submerged ancient landforms or other resources of importance to the values and practices of certain Native American Tribes.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar. Therefore, the overall impact to environmental justice populations of any action alternative when combined with past, present, and reasonably foreseeable activities would be the same: **minor** to **moderate adverse**, because most adverse impacts could be avoided with EPMs or would be unavoidable but not disproportionately high and adverse. In addition, **minor** beneficial effects to environmental justice populations may result from reductions in air emissions if offshore wind displaces energy generation using fossil fuels.

3.5.4.4 Mitigation

No potential additional mitigation measures for environmental justice are identified in Appendix G. However, mitigation measures have been proposed for impacts to resource areas that would potentially affect environmental justice populations. In Table G-1 of Appendix G, see the environmental protection measures proposed by SFW for air quality, water quality, commercial fisheries and for-hire recreational fishing, and cultural resources.

3.5.5 Land Use and Coastal Infrastructure

3.5.5.1 Affected Environment

The Town of East Hampton, one of the 10 towns in Suffolk County, on the south shore of Long Island, is bordered on the south by the Atlantic Ocean, on the north by Gardiner's Bay and Block Island Sound, and on the west by the Town of Southampton. With the exception of Shelter Island, East Hampton is the least populous of the Suffolk County towns (Suffolk County Department of Planning 2011).

East Hampton is characterized by unique hamlets, villages, and countryside; includes world-renowned beaches; and supports one of the highest concentrations of rare and endangered species in New York State (Liquori and Nagle 2005). The incorporated Village of East Hampton and a portion of the incorporated Village of Sag Harbor, as well the hamlets of Amagansett, Montauk, Springs, and Wainscott, lie within the borders of East Hampton (RKG Associates, Inc. 2017). Town land use, as a whole, largely comprises small areas of low-density residential enclaves separated by large blocks of open space; limited areas of commercial, industrial, and institutional land uses occur adjacent to area roadways (Dodson and Flinker et al. 2017). Approximately 45% of East Hampton's land area is in residential land use, with more than half of the residential acreage designated as low density. Protected open space makes up the second highest percentage of land use (31%), and vacant land the third (15%) (Liquori and Nagle 2005). A number of harbors and inlets are along the north shore: Northwest Creek, Three Mile Harbor, Accabonac Harbor, Napeague Harbor, Northwest Harbor, Hog Creek, and Lake Montauk (Dodson and Flinker 2017).

The Project considers two landing sites (see Figure 3.2-3 in the COP). The proposed Beach Lane landing site is located on a Town of East Hampton public road that provides public access to the wide, straight Atlantic beach that fronts the town from the hamlet of Wainscott on the west to the easterly end of the hamlet of Montauk on the east. The public access includes parking along Beach Lane at the terminus of the roadway; the beach access is undeveloped and does not provide restroom or picnic amenities. The landing site is proposed to occur landward of the Beach Lane public parking area and is flanked by residentially developed land to the west and open farmland to the east. Wainscott School is located approximately 1 mile northeast of the Beach Lane public access parking lot and would therefore not be affected by the onshore SFEC route.

The Hither Hills landing site is located in the hamlet of Montauk in the Town of East Hampton, immediately south of the Montauk Highway in a parking lot that is part of Hither Hills State Park. The parking lot includes three Americans with Disabilities Act parking spaces and parking for 54 additional vehicles. The lot provides trail access to the park's North Trail as well as trail access to the beach, restrooms, the Hither Hills General Store, and nearby beach campgrounds (New York State Office of Parks, Recreation and Historic Preservation 2019).

From the landing sites, installation of the onshore SFEC would occur entirely underground, with access points at strategic locations via manholes for safety and ease of maintenance (Jacobs 2021). Figures 4.6-7 and 4.6-8 in the COP show land uses adjacent to the Beach Lane and Hither Hills SFEC routes.

The interconnection facility for the Project would be located adjacent to the existing East Hampton 69-kV LIPA substation on 2.4 acres of the same parcel that houses the existing substation. The existing substation parcel is zoned for commercial industrial use and the portion of the parcel proposed for the interconnection facility is currently wooded. The interconnection facility site would include all equipment necessary to safely connect the SFEC with the NYISO transmission system (see Figure 3.2-4 in the COP).

In addition to the landing sites and interconnection facility, the Project would use various ports for construction and installation as well as for O&M. SFW has proposed an O&M facility to be located onshore in an existing port either in Montauk, East Hampton, or in Quonset Point, North Kingstown, Rhode Island.

Montauk Harbor supports the largest commercial fishing port in New York State, both in terms of the landed value of fish and the number of fishing vessels. The harbor is also an estuary supporting populations of fish and wildlife (Liquori and Nagle 2005). The Montauk dock area is a major commercial and industrial center with restaurants and shops alongside a working waterfront with zoning that supports these uses. Land uses are consistent with zoning, including a marina, boatyards, fish processing, a ferry terminal, restaurants, and some retail (Dodson and Flinker 2017). The ferry terminal provides summer service to Block Island, Martha's Vineyard, and New London, Connecticut. The USCG operates a station on Star Island in Montauk Harbor, which serves as a search and rescue and law enforcement unit. Montauk Airport is on the east side of the harbor.

Quonset Point, a port located in the town of North Kingstown, Rhode Island, is a former naval air station that is now a thriving, modern industrial park (Interface Studio 2016). The industrial park, known as Quonset Point/Davisville Business Park, is on a peninsula in Narragansett Bay. The port is a multimodal transportation area with deepwater piers used for both shipping and ship repairs, an airport with the longest runway in the state, freight and passenger rail facilities, and interstate highway connections. The availability of a variety of industrially zoned land with full-service networks provide opportunities for new industries (Maguire Group, Inc. 2008).

Port facilities in New York, Rhode Island, Massachusetts, Connecticut, New Jersey, Maryland, Virginia, and/or Nova Scotia would support offshore installation activities for the SFWF and the offshore SFEC (see Table 3.1-5 in the COP). These ports are generally industrial in character and are typically adjacent to other industrial or commercial land uses and major transportation corridors. Before construction begins, SFW would finalize mobilization plans and arrangements at port facilities to support Project activities, including logistic support for fabrication, as needed (Jacobs 2021). See Section 3.5.1 (Commercial Fisheries and For-Hire Recreational Fishing), Section 3.5.3 (Demographics, Employment, and Economics), and Section 3.5.8 (Recreation and Tourism) for discussions of recreational vessel and commercial fishing activity in these ports.

3.5.5.2 Environmental Consequences

3.5.5.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.5.5-1 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for the final EIS.

Table 3.5.5-1. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Land Use and Coastal Infrastructure

Issue	Impact Indicator	Significance Criteria
Public health and safety	Construction- or operation-related volume increases, traffic delays, traffic re-routes, and noise Onshore EMF	Negligible: No measurable/detectable change to area land use would occur. Minor: Impacts would be detectable but would be short term and localized. Moderate: Impacts would be detectable and broad-based, affecting a variety of land uses, but would be short term and would not result in long-term change. Major: Impacts would be detectable, long term, extensive, and result in permanent land use change.
Port improvements and operations	Changes to vehicle, vessel traffic volumes, and infrastructure demands	
Land use code and zoning	Qualitative assessment of compliance with local land use regulations	

3.5.5.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing land use and coastal infrastructure trends from past and present activities. Attachment 3 in Appendix E provides additional information regarding past and present activities and associated land use and coastal infrastructure impacts. Future non-Project actions include inlet management; beach, dune, and berm construction; breach response plans; raising and retrofitting homes; road raising; and coastal process features, disaster cleanup and remediation, and port upgrades, including onshore development or underwater improvements such as dredging in New York, Connecticut, Rhode Island, and Massachusetts, to support the offshore wind industry. Attachment 3 in Appendix E discloses future non-offshore wind activities and associated land use and coastal infrastructure impacts. These impacts are also described below.

Future Activities (without the Proposed Action)

Onshore, neighboring or adjacent land to reasonably foreseeable projects could temporarily be disturbed by future Project–related noise, vibration, and dust as well as travel delays along impacted roads. The simultaneous construction of two or more onshore development projects and/or landing sites and onshore cable routes would generate cumulative short-term impacts to land use. State and local agencies would be responsible for managing actions to help minimize and avoid noise, air quality, and other impacts on nearby neighborhoods during construction. For the reasons described in the following sections, under the No Action alternative, land disturbance would have negligible to minor, short-term adverse cumulative impacts to land use and coastal infrastructure.

<u>Accidental releases and discharges</u>: Future offshore activities could result in accidental releases of trash or water quality contaminants (see Section 3.3.2.2.2 for quantities and details). Trash and contaminant spills would be minimized by vessel compliance with USCG regulations. In the event of a spill, adjacent properties and coastal infrastructure could be temporarily restricted. The exact extent of restrictions and other impacts would depend on the locations of landfall, substations, and cable routes as well as the ports used to support future offshore wind energy projects. These impacts, however, would generally be localized and short term.

Light: Permanent aviation warning lighting on offshore wind WTGs would be visible from south-facing beaches and coastlines. Visibility would depend upon distance from shore, topography, and atmospheric conditions but would be long term. If this lighting alters visitor behavior, land use in the form of tourism, recreation, and property values may subsequently be impacted. Lighting from substations could also affect the adjacent property use and residential development. However, new substations would be constructed near existing energy infrastructure or where land development regulations, such as zoning and land use plan designations, allow such uses. Therefore, land use would not be expected to be measurably changed.

Port utilization: Various ports would be improved to support future offshore wind projects (see Appendix E). These improvements would occur within the boundaries of existing port facilities or repurposed industrial facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for the development of waterfront infrastructure. Therefore, ports would experience long-term beneficial impacts such as greater economic activity and increased employment due to demand for vessel maintenance services and related supplies, vessel berthing, loading and unloading, warehousing and fabrication facilities for offshore wind components, and other business activity related to offshore wind. State and local agencies would be responsible for minimizing the potential adverse impacts of these future port expansions by managing port resources and traffic control to ensure continued access to ports and adjacent land uses.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on land use and coastal infrastructure associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on land use and coastal infrastructure, primarily through onshore construction and port activities.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities would be **negligible** to **minor**. As described in Appendix E Attachment 3, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be **minor adverse and minor beneficial**. Accidental releases and land disturbance could have temporary adverse impacts on local land uses, but as a whole, ongoing use and development would support the region’s diverse mix of land uses and provides support for continued maintenance and improvement of coastal infrastructure.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse **and minor beneficial** impacts because the overall effect would be small, localized, and short term.

3.5.5.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Land uses impacted by the construction of offshore components would include chosen port facilities used for shipping, storing, and fabricating Project components and for crew transfer, cargo logistics, and storage. SFW would use one or more ports to offload shipments of components, prepare them for installation, and load components onto vessels for delivery and installation. Selected ports could require improvements or upgrades to meet Project needs (see Table 3.1-5 in the COP). Jacobs (2021) notes that required port upgrades could include erection of buildings (up to 350,000 square feet); reinforcement of terrestrial bearing capacity (up to 1,300,000 square feet) and changes to surface materials, reinforcement, and/or rehabilitation of quayside(s) (up to 500 feet); and installation of supporting infrastructure such as lighting, electricity, water, fencing, and/or a security booth. Such upgrades, if necessary, would be conducted by individual ports or lessees operating within the confines of ports and would not be conducted by SFW.

BOEM (2016) analyzed potential impacts to ports that could require upgrades to accommodate offshore wind projects or that are in the process of completing upgrades in anticipation of increased port use associated with offshore wind projects. BOEM noted that land use and transportation impacts primarily include land-based space conflicts with current or planned uses of adjacent areas and land-side traffic delays or conflicts associated with construction. BOEM (2016) also identified potential water-based space conflicts with other uses of port waterways such as dredging, pile driving, and fill placement. The ports under consideration for construction staging are industrial in character, designated by local zoning and land use plans for heavy industrial activity, and typically adjacent to other industrial or commercial land uses and major transportation corridors.

Activities associated with offshore construction of the Project would generate noise, vibration, and vehicular traffic, and would temporarily alter views at one or more ports listed in Table 3.1-5 in the COP. Port improvements would result in combustion emissions from construction vehicles and equipment and could result in fugitive particulate emissions from soil movement. These impacts would be typical for construction in and operation of industrial ports. Noise, vibration, vehicular traffic increases, and vehicular emission generation would be short term. Space use conflicts would also be short term and would be minimized through siting for minimal displacement and coordination with both waterway users and the USCG (BOEM 2016). Potential land-side transportation impacts would be minimized through construction hour restrictions, improvements such as road widening and signalization, and appropriate route selection (BOEM 2016). Activity and development from the Project would not occur at levels above those typically experienced or expected at these facilities and would not hinder other nearby land use or use of coastal infrastructure. Overall, construction and installation of offshore components would have minor, beneficial impacts to land use and coastal infrastructure by supporting designated uses at ports and supporting port improvements and/or redevelopment. Improvements such as road widening and signalization would provide transportation flow benefits over the long term. Section 3.5.3 Demographics, Employment, and Economics provides additional detail regarding potential economic impacts of the Project’s use of the listed ports.

Construction of the chosen landing site and onshore SFEC route would temporarily disturb neighboring land uses through temporary increases in construction noise, vibration and dust, and intermittent delays in travel along impacted roads. Sheet pile installation for sea to shore transition HDD operations would occur over approximately 2 days, would occur during the daytime hours (7:00 a.m. to 8:30 p.m.), and would be largely generated by an excavator, crane, and sheet pile driver. Noise generated by these activities would comply with the Town of East Hampton noise code but would exceed the NYSDEC noise guidelines, requiring implementation of noise BMPs such as notifying nearby residences of the days and times that sheet piling would occur; installing the perimeter sound wall prior to sheet pile driving, if construction logistics allow; and using quieter methods (i.e., push-in piling) to install sheet piling as geological conditions allow.

Construction and installation of the Project’s onshore components would require construction staging in parking lots adjacent to or near the landing sites, reducing public parking available at Beach Lane or Hither Hills State Park during construction. These disturbances would be short term, with timing projected to occur between September and May (see COP Table 1.5-1). Construction along public roadways would be completed in a matter of days or weeks. At the landing site, the Project would make the physical connection between the offshore SFEC and the onshore SFEC in one underground concrete transition vault. The only long-term visible components of the cable system would be the manhole covers (Jacobs 2021).

Onshore construction and installation would include trench excavation and placement of the onshore SFEC within existing paved roads and the railroad ROW. SFW would abide by local construction ordinances. Construction would occur primarily during normal daylight hours except for certain activities associated with cable installation at the chosen landing site (Jacobs 2021) that could require nighttime activity to meet rapid construction timelines. SFW would work with the Town of East Hampton to develop a detailed plan that includes traffic and other control measures prior to beginning major construction. The traffic plan with East Hampton would identify appropriate alternative routes that would accommodate projected traffic loading during construction activities. BOEM assumes that the Project would avoid permanent disruption to existing underground utilities, such as water, sewer, and electrical lines. However, depending on the exact placement of the onshore SFEC cable, the physical size and location of the cable could hamper future installation of public utilities such as water, sewer, and storm water lines, which are typically placed beneath roadway travel lanes. Construction noise would approach or exceed the NYSDEC noise guideline limit for construction activities at receptors immediately adjacent to the road or railroad ROWs. BMPs (see Table G-1 in Appendix G) would be implemented to minimize construction noise such as replacing back-up alarms with strobes, assuring that equipment is functioning properly and is equipped with mufflers, locating especially noisy equipment as far from sensitive locations as possible, using quieter construction equipment, using path noise controls such as portable enclosures, limiting the period of time when construction occurs, and maintaining strong communication with the public. Vehicular and construction equipment emissions would be similar to those described for offshore development. The potential impacts from construction and diesel-generating equipment would be reduced through mitigation measures related to fuel-efficient engines, as outlined in Section 3.2.1, Air Quality. As a result, and considering the described traffic, construction and installation of the Project would have a moderate adverse impact to land use and coastal infrastructure.

The interconnection facility would be constructed adjacent to the existing East Hampton substation, in an area zoned for commercial industrial use. Installation of the interconnection facility could increase visibility of the existing substation to nearby residents along Horseshoe Drive (Jacobs 2021). The visual impacts of the interconnection facility would be minimized through the installation of vegetation to provide year-round screening from nearby Horseshoe Drive, appropriate substation siting, low-profile design, and minimal lighting, all of which would be directed downward (EDR 2018). As designed, the interconnection facility would generate sound below existing, ambient sound levels (VHB 2020). According to federal, state, and local noise standards, there would be no impact and no need for mitigation as a result of the operation of the interconnection facility. The interconnection facility, therefore, would have a negligible adverse impact to land use and no impacts to coastal infrastructure.

The Project would include an O&M facility to be located onshore at either Lake Montauk, East Hampton or in Quonset Point, North Kingstown, Rhode Island. The O&M facility could use existing buildings or require renovation or new construction of buildings and installation of a stationary land-based crane and floating dock. If the Lake Montauk location is selected, modification would be required for the in-water portions of the site, including maintenance repairs to the existing bulkhead and both initial and maintenance dredging to support the crew transfer vessels (BOEM 2021). To allow for suitable depths for navigation and berthing, a dredge footprint of up to 1,500 square feet would be required, with annual maintenance dredging of up to 40,500 cubic feet over a 10-year period. Dredged materials would be loaded into scows that, once full, would be transported to the adjacent beach west of the Montauk Harbor entrance, where sediment would be pumped to shore and used as nourishment material. Other potential in-water work would include maintenance repairs to the existing bulkhead. A floating dock would also be installed through pile installation to support berthing a single crew transfer vessel. One additional pile would be installed to provide safe berthing conditions (i.e., mooring dolphin). These actions could result moderate, short-term adverse land use and coastal infrastructure impacts due to disruption of access, noise, and dust typically associated with construction.

Operations and Maintenance and Conceptual Decommissioning

O&M would require daily activity at the O&M facility and periodic activity at the port chosen for O&M installation. Activity would also occur at other ports, if needed. The O&M facility would include offices, a warehouse, training facilities, repair facilities, and a floating dock, which are consistent with the range of land uses associated with the ports listed in Table 3.1-5 in the COP. The increased activity within any of the listed port areas zoned for business and industrial uses would reinforce the designated land use and provide a source of investment in the coastal infrastructure. O&M activities would be limited to temporary, periodic use of vehicles and equipment; associated impacts would be minor and would not affect land uses over those that typically occur at port facilities. Activities at ports, as described under construction and installation, would be consistent with the existing and designated uses at other ports. O&M of offshore components would therefore have minor, beneficial impacts to land use and coastal infrastructure by supporting designated uses at ports and supporting port improvements and/or redevelopment that would benefit port uses beyond those necessary for the Project.

Once installed, the onshore SFEC would be underground and would not change adjacent land uses or affect coastal infrastructure. Modeling results for onshore EMF indicate that maximum emissions would not exceed 4.7 mG at 3.28 feet aboveground and 50 feet from the duct bank line, which is below the New York Public Service Commission EMF limits of 200 mG. The maximum calculated magnetic field level at the sea-to-shore transition is 0.3 mG at an HDD depth of 62 feet, 1.8 mG at an HDD depth of 22 feet, and 11 mG at an HDD depth of 7 feet (Exponent 2018). Because these modeled values are well below the reported human health reference levels of 2,000 mG and 9,040 mG for the general population (Institute of Electrical and Electronics Engineers 2006; International Commission on Non-ionizing Radiation Protection 2010), onshore EMF adverse impacts would be long term but negligible. The SFEC would be installed at least 30 feet (9.1 m) below the current profile of the beach (Jacobs 2021). SFW has also designed the Project to account for site-specific oceanographic and meteorological conditions within the analysis area; therefore, potential for beach erosion to expose the SFEC at the sea to shore transition zone would be long term but negligible.

O&M activities would include periodic inspections and repairs at the interconnection facility and cable access manholes, which would require minimal use of worker vehicles and construction equipment. Periodic maintenance and repairs would have temporary impacts on access to adjacent land uses. The onshore SFEC would therefore have negligible impacts on land use and coastal infrastructure.

Impacts during conceptual decommissioning would be similar to the impacts during construction and installation. The activity generated at listed ports would continue to be consistent with existing and designated port uses. For onshore decommissioning, any removal of the underground, onshore cables (if not decommissioned in place) could result in temporary construction disturbances and delays along the affected roads and near the landing sites. The length and extent of these delays would be similar to those experienced during installation. If conceptual decommissioning occurs outside of the June to August peak tourist season, conceptual decommissioning of the onshore components of the Project would result in negligible impacts to land use, whereas conceptual decommissioning of the offshore components would result in beneficial impacts to port land use through supported port activities and expanded port infrastructure that would be available to other users into the future.

Cumulative Impacts

Onshore construction associated with the Proposed Action would add noise and land disturbance through the removal of 2.4 acres of land for the interconnection facility and a small area (0.1 acre) of land at the selected O&M facility to conditions under the No Action alternative. The Proposed Action would also introduce lighting at the interconnection facility, although lighting would be minimal. These actions would result in localized, short-term, minor incremental impacts on land use and coastal infrastructure. If SFW chooses the Hither Hills SFEC route, construction activities could coincide with the projected East Hampton Railroad Station improvements and could increase traffic delays; result in additional traffic rerouting; and increase short-term, construction-related vehicular and equipment emissions that would impact area residents. The FIMP Project to control beach erosion and provide hurricane protection would also extend to Montauk Point, approximately 10 miles east of Hither Hills State Park. Activities associated with the FIMP Project could overlap with the proposed cable landing and onshore SFEC route initiation at Hither Hills State Park. Longer delays at roadways and extended construction windows could result from the overlapping projects. No other onshore development projects would be adjacent to (and none would use roads impacted by) the Project landing sites and onshore SFEC. BOEM assumes that other projects would occur near existing energy infrastructure or where land development regulations, such as zoning and land use plan designations, allow such uses. State and local agencies would also be responsible for minimizing and avoiding noise, air quality, and other impacts on nearby neighborhoods during construction. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be temporary, localized, and minor.

Offshore impacts would predominately be associated with changes in lighting, port use, and spills.

<u>Accidental releases and discharges</u>: The Proposed Action could result in accidental release of contaminants, trash/debris, or invasive species that could add to releases from other reasonably foreseeable projects. However, the potential volumes of oils, lubricants, and diesel spilled would be minimal and would result in localized, short-term, negligible incremental impacts on land use and coastal infrastructure. The Project and other reasonably foreseeable projects would be expected to comply with any applicable permit requirements to implement erosion, storm water, and spill controls to minimize, reduce, or avoid impacts on water and air quality. As a result, the Proposed Action when combined with past, present, and other reasonably foreseeable projects would result in adverse, short-term, and negligible cumulative impacts on land use and coastal infrastructure.

<u>Light</u>: The Proposed Action would add permanent lighting for up to 15 WTGs and one OSS. Although this lighting would be visible, in part, from south-facing beaches and coastlines, this represents a negligible (less than a 1%) incremental increase over total estimated WTG and OSS foundations providing long-term lighting under the No Action alternative if all projected offshore wind projects are constructed. BOEM estimates a maximum cumulative total of 2,301 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be similar to those impacts described under the No Action alternative and would be negligible.

<u>Port utilization</u>: Port upgrades and vessel activity associated with the Proposed Action could result in minor beneficial and minor adverse incremental impacts through an increase in economic and employment opportunities, as well as reduced port access, increased delays and congestion, or increased collision risk. Project port activity and upgrades (via dredging and in-water work) could also coincide with other forecasted projects. Quonset Point is scheduled to undergo remediation at the former NIKE Battery PR-58 and Disaster Village Training Area in 2021. No specific non-Project improvements are proposed for Montauk Harbor, but the New York State Energy Research Development Authority issued an offshore wind master plan that notes Montauk Harbor as having the potential to be used or developed into facilities capable of supporting offshore wind projects (New York State Energy Research Development Authority 2017).

Port activities could be delayed or area transportation routes could experience longer delays as result of the overlap in construction activities. All activities would, however, be in accordance with land use goals and plans. Construction and operation improvements associated with the Project and other offshore wind energy would occur within the boundaries of existing port facilities or repurposed industrial facilities, would be similar to existing activities at the existing ports, and would support state strategic plans and local land use goals for development of waterfront infrastructure as well as economic opportunities (see Section 3.5.3.2.3 [Proposed Action Alternative]). State and local agencies would also be responsible for minimizing the impacts of these future development plans by ensuring continued access to ports and adjacent land uses and minimization or avoidance of noise, air quality, and other impacts on nearby neighborhoods. Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Project would have temporary negligible adverse impacts and long-term, minor beneficial impacts.

Conclusions

Project construction and installation and conceptual decommissioning would temporarily generate noise, vibration, and vehicular traffic. Impacts during O&M would be expected to be similar, but in lower duration and extent. BOEM anticipates the adverse impacts resulting from the Proposed Action alone would range from **negligible** to **moderate**, due to land disturbance activities. Project O&M would also generate long-term, **minor beneficial** impacts by supporting designated uses at ports and supporting port improvements and/or redevelopment. Therefore, BOEM expects the overall impact on land use and coastal infrastructure from the Proposed Action alone to be **minor** adverse and **minor beneficial**, as the overall adverse effect due to land disturbance would be small, localized, and short term. Beneficial impacts could also result from port utilization.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor** and **minor beneficial**, for similar reasons as above. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** impacts and **minor beneficial** impacts to land use and coastal infrastructure. BOEM made this call because the overall adverse effect would be small and the resource would be expected to recover completely. Beneficial impacts could also result from port utilization.

3.5.5.2.4 VESSEL TRANSIT LANE ALTERNATIVE

This alternative would not impact land use and coastal infrastructure. Therefore, the impacts of this alternative would be the same as those of the Proposed Action. Adverse impacts would be negligible to moderate and both short term and long term; minor beneficial impacts would be long term.

Cumulative Impacts

If the Transit alternative is implemented, economic activity at port facilities and underused industrial sites could increase. These cumulative impacts resulting from the Transit alternative would be consistent with established state and local land use goals and when combined with past, present, and reasonably foreseeable future development could generate beneficial impacts not measurably different from the Proposed Action: negligible to minor and minor beneficial.

Conclusions

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, these changes would not measurably affect land use and coastal infrastructure. Therefore, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **moderate**. Project O&M would also generate long-term, **minor beneficial** impacts by supporting designated uses at ports and supporting port improvements and/or redevelopment.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible to minor and minor beneficial**). The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level (with similar rationale) as under the Proposed Action: **minor** adverse and **minor beneficial**.

3.5.5.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

The Habitat alternative under either layout option would not impact land use and coastal infrastructure. Therefore, the impacts of this alternative would be the same as those of the Proposed Action. Adverse impacts would be negligible to moderate and both short term and long term; minor beneficial impacts would be long term.

Cumulative Impacts

The Habitat alternative under either layout option would not affect Project onshore activities; therefore, cumulative effects to land use and coastal infrastructure would be the same as those described under the Proposed Action: negligible to minor and minor beneficial.

Conclusions

Although the Habitat alternative under either layout option would reduce the number of WTGs and their associated inter-array cables, these changes would not measurably affect land use and coastal infrastructure. Therefore, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **moderate**. Project O&M would also generate long-term, **minor beneficial** impacts by supporting designated uses at ports and supporting port improvements and/or redevelopment.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor** and **minor beneficial**). The overall impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor** adverse and **minor beneficial**.

3.5.5.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, BOEM expects that land use and coastal infrastructure impacts would range from **negligible** to **moderate and minor beneficial** for all action alternatives. The main drivers for this impact rating are the beneficial impacts of port utilization and minor impacts of land disturbance.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from **negligible to minor and minor beneficial**. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **minor** adverse and **minor beneficial**, as the overall adverse effect due to land disturbance would be small, localized, and short term. Beneficial impacts could also result from port utilization.

3.5.5.4 Mitigation

No potential additional mitigation measures for land use and coastal infrastructure are identified in Appendix G.

3.5.6 Navigation and Vessel Traffic

The reader is referred to Table 2.3.1-1 and Appendix H for a discussion of current conditions and potential impacts to navigation and vessel traffic from implementation of the Proposed Action and other considered alternatives.

3.5.7 Other Uses (marine, military use, aviation, offshore energy)

3.5.7.1 Affected Environment

<u>Marine mineral resources and dredged material disposal</u>: BOEM's Marine Mineral Program manages non-energy minerals (primarily sand and gravel) in federal waters of the OCS and leases access to these resources to target shoreline erosion, beach renourishment, and restoration projects. At this time, there are no active or requested BOEM leases near the Project. The closest active BOEM lease is offshore of New Jersey, approximately 162 miles from the Project (BOEM 2018a). One USACE borrow area (7A) is located offshore the town of Wainscott, in the vicinity of the SFEC.

The EPA designates and manages dredged material disposal sites, and USACE permits the disposal of material in the sites. One active disposal site is located in the analysis area approximately 3 miles east of Block Island, Rhode Island, and 10 miles northwest of the SFWF. No inactive or closed disposal sites are located in the geographic analysis area.

Increased shoreline erosion and coastal damage from storms has led to increased demand for sand resources in recent years. Although this increased demand is expected to continue, BOEM does not anticipate overlap between marine mineral leases and the Proposed Action.

<u>Military and national security uses</u>: The U.S. Navy, the USCG, and other military entities have numerous facilities in the region. Major onshore regional facilities include Naval Station Newport, the Naval Submarine Base New London, the Northeast Range Complex/Narragansett Bay Operation Area, Joint Base Cape Cod, and numerous USCG stations (Epsilon Associates, Inc. 2018). Onshore and offshore military use areas could have designated surface and subsurface boundaries and special use airspace. The Project is entirely within the Navy's Narragansett Operating Area in which national defense training exercises and system qualification tests are routinely conducted (MARCO 2019). This operating area extends approximately 100 miles south and 200 miles east of the Project. The Project is approximately 10 miles north of a Military Special Use Airspace (FK Facility Narragansett Bay) and 20 miles northeast of the closest submarine transit lanes. A U.S. Department of Defense assessment of compatibility of offshore wind development with military assets and activities determined that potential conflicts exist in the area surrounding the Project and could require site-specific mitigation measures (OCM 2019).

Military and national security interests are expected to continue to use the onshore and offshore areas in the analysis area at similar levels in the foreseeable future.

<u>Aviation and air traffic</u>: Numerous public and private airports serve portions of New York, Rhode Island, and Massachusetts in the region surrounding the Project. Major airports serving the region include Boston Logan International Airport, located approximately 100 miles northeast of the Project; T.F. Green Airport in Providence, Rhode Island, located approximately 50 miles north of the Project; and Montauk Airport in Montauk, New York, approximately 30 miles west of the SFWF and 9 miles north of the offshore SFEC.

The closest public airports to the Project are Nantucket Memorial Airport, approximately 55 miles east on Nantucket; Martha's Vineyard Airport, approximately 32 miles northeast on Martha's Vineyard; and Block Island State Airport, approximately 20 miles west on Block Island.

Air traffic is expected to continue at current levels in and around the Project.

Offshore energy uses: The OCS near the Project is currently experiencing active leasing and exploration in support of offshore wind energy development. Appendix E provides a list of known and anticipated offshore wind project and wind energy leases exist in the area that could lead to additional wind farm development. BOEM anticipates that developers may continue to propose offshore wind energy projects near the Project. The trend in increased wind farm development is anticipated to continue on the OCS. Several tidal energy projects have been implemented in the region and several are in the planning stages. Tidal energy projects are typically located in the nearshore environment where landforms constrict tidal water passage, thereby increasing the velocity of tidal currents. No such landforms exist in the analysis area, so tidal projects are not discussed further in this section.

Undersea cables: At least seven undersea cables are buried in the seabed west of the Lease Area that the offshore SFEC would cross. These cables deliver telecommunications signals between North America and Europe. Other than cables for other offshore wind projects, BOEM has not identified any publicly noticed plans for additional submarine cables or pipelines; therefore, no new cable installation is expected.

Radar systems: Several radar systems supporting commercial air traffic control, national defense, weather forecasting, and ocean condition observation operate near the Project (Epsilon Associates, Inc. 2018). In all, nine radar systems are within operational "line of site" of the SFWF, eight of which are high-frequency radars used to measure ocean currents and one airport surveillance radar (ASR) at Warwick RI (Colburn et al. 2020).

The high-frequency SeaSonde radars are operated by the Integrated Ocean Observing System. SeaSonde radar stations are located on the southern shore of Martha's Vineyard (three stations); on the southern shore of Nantucket (two stations); on the southeastern shore of Block Island (one station); on Montauk Point, Long Island (one station); and on the mainland shore at Misquamicut, Rhode Island (one station) (Integrated Ocean Observing System 2018).

The closest air traffic control radar system operates at Boston Logan International Airport and provides flight control for 165,000 square miles of airspace that includes airports in Connecticut, Vermont, Massachusetts, Rhode Island, Maine, New Hampshire, New York State, and Pennsylvania (FAA 2018). The Precision Acquisition Vehicle Entry/Phased Array Warning System installation at Joint Base Cape Cod supports national defense in the regions surrounding the Project. The nearest Next-Generation Radar weather system is located approximately 60 miles north of the Project. Additionally, the FAA operates a Terminal Doppler Weather Radar installation at Boston Logan International Airport.

These radar systems would continue to provide weather, navigational, and national security support to the region. The number of radars and their coverage area is anticipated to remain at current levels for the foreseeable future.

Scientific research and surveys: Regular fisheries management and ecosystem monitoring surveys conducted by or in coordination with the NEFSC would overlap offshore wind lease areas in the New England region and south into the Mid-Atlantic region. Surveys include 1) the NEFSC Bottom Trawl Survey, a more than 50-year multispecies stock assessment tool using a bottom trawl; 2) the NEFSC Sea Scallop/Integrated Habitat Survey, a sea scallop stock assessment and habitat characterization tool, using a bottom dredge and camera tow; 3) the NEFSC Surfclam/Ocean Quahog Survey, a stock assessment tool for both species using a bottom dredge; 4) the NEFSC Ecosystem Monitoring Program, a more than 40-

year shelf ecosystem monitoring program using plankton tows and conductivity, temperature, and depth units; 5) NOAA's Atlantic Marine Assessment Program for Protected Species aerial and shipboard survey; and 6) North Atlantic Right Whale Sighting Advisory System aerial survey (BOEM 2021). As future wind development continues, alternative platforms, sampling designs, and sampling methodologies could be needed to maintain surveys conducted in or near the Project.

3.5.7.2 Environmental Consequences

3.5.7.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.5.7-1 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for the final EIS.

Table 3.5.7-1. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Other Marine Uses

Issue	Impact Indicator	Significance Criteria
Reduction in the military's ability to access and use the site due to construction vessel traffic and WTG installation	Level of interruption to military exercises	Negligible: No measurable impacts would occur. Minor: Adverse impacts to the affected activity could be avoided with EPMs, and impacts would not disrupt the normal or routine functions of the affected activity. Once the Project is decommissioned, the affected activity would return to a condition with no measurable effects. Moderate: Impacts to the affected activity are unavoidable, but EPMs would reduce impacts substantially during the life of the Project. The affected activity would have to adjust somewhat to account for disruptions due to impacts of the Project, or, once the Project is decommissioned, the affected activity would return to a condition with no measurable effects if proper remedial action is taken. Major: The affected activity would experience unavoidable disruptions to a degree beyond what is normally acceptable, and, once the Project is decommissioned, the affected activity could retain measurable effects indefinitely, even if remedial action is taken.
Reduced availability of offshore energy (oil/gas) production at the site	Acreage of oil and gas activities excluded due to WTGs or offshore SFEC	
Reduced access to sand and minerals on the OCS	Acreage of mineral extraction area excluded due to WTGs or offshore SFEC	
Risk to aviation traffic	Qualitative assessment of risk to approach flight vectors to regional airports	
Impact to land-based radar (air traffic control, NOAA weather, high-frequency ocean observation radar)	Qualitative assessment of potential for radar shadow	
Impacts to other renewable energy projects, particularly if there is overlap in ports to be used; transit lane orientation	Qualitative assessment of potential for exclusion of other renewable energy projects	
Impact to any proposed/approved pipelines; electricity/telecom transmission lines	Qualitative assessment of potential for exclusion of or damage to other undersea cables	
Impacts to scientific research and surveys	Qualitative assessment of potential for reduced or eliminated survey opportunities	
Impact to dredged material ocean disposal sites	Project overlap with ocean disposal sites	

3.5.7.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing other use trends from past and present activities. Attachment 3 in Appendix E provides additional information regarding past and present activities and associated impacts to other uses. Future non-Project actions include cable trenching, port expansion, and increased vessel traffic. Attachment 3 in Appendix E discloses future non-offshore wind activities and associated other uses impacts. Impacts associated with future offshore wind activities are described below.

Future Projects

Marine Mineral Resources and Dredged Material Disposal

Presence of structures and new cable emplacement/maintenance: The demand for sand resources is anticipated to grow with increasing trends in coastal erosion, storm events, and sea level rise. The geographic analysis area contains a large area of available sand and mineral resources (over 4 million cubic yards of sand available for authorized use [USACE 2020]). Future offshore wind project infrastructures, including WTGs and transmission cables, could prevent future marine mineral extraction activities where project footprints overlap with extraction areas. However, mineral extraction typically occurs within 8 miles of the shoreline, limiting adverse impacts to cable routes. Additionally, future projects would avoid identified borrow areas by consulting with the BOEM Marine Minerals Program and USACE before approving offshore wind cable routes. Therefore, the combined adverse impacts on sand and mineral extraction are anticipated to be negligible under the No Action alternative.

Military and National Security

Presence of structures: Installation of up to 1,294 structures in the RI/MA WEA, which currently supports only five offshore wind turbines associated with the BIWF, as well as several meteorological buoys (see Appendix E), would impact military and national security vessels primarily through risk of allision and collision with stationary structures and other vessels. Vessels could directly allide with WTG foundations. Vessel traffic would increase during Project construction, and once the WTGs are operational, the artificial reef effect created by offshore structures could attract commercial and recreational fishing vessels. This would increase the risk of vessel collisions and increase navigation complexity, leading to potential use conflicts. In general, risks to military and national security vessels would increase over time as additional wind energy facilities are built.

Military and national security vessels could allide with WTG structures. However, deep-draft military vessels are not anticipated to transit outside of navigation channels unless necessary for SAR (of people or marine mammals) or nontypical operations. Allision risks for smaller vessels moving within or near offshore wind structures would be higher. However, these risks would be minimized by projects adhering to structural lighting requirements according to the USCG and BOEM, which would provide lighting at sea level. Additionally, allision would be further mitigated by following a fixed 1 × 1–nm WTG layout proposed by offshore wind leaseholders to facilitate safe navigation through the offshore wind energy lease areas (Brostrom et al. 2019).

Additionally, risk of collision with recreational fishing vessels could indirectly increase as a result of the artificial reef effect around the offshore wind facility structures. New artificial reef effects could attract recreational fishing vessels farther offshore than currently occurs, adding to existing vessel traffic and subsequently increasing the risk of collision with military and national security vessels. Furthermore, an increase in recreational vessels in and around offshore wind projects could increase the demand for USCG SAR operations (of people or marine mammals).

In addition to allision or collision risks, military and national security vessels may be impacted by offshore wind energy structures by the need to change routes and navigate around both project footprints and project associated vessels, particularly during the construction periods between 2021 and 2030. Furthermore, military and national security vessels may experience congestion and delays in port due to the increase in offshore wind facility vessels.

Military and national security aircraft would be impacted by the presence of tall equipment necessary for offshore wind facility construction, such as stationary lift vessels and cranes, which would increase navigational complexity in the area. Warning area W-105A measures approximately 23,000 square miles, with approximately 4% (approximately 1,000 square miles) overlaying the geographic analysis area (BOEM 2021). Military and national security operations conducted within W-105A would be impacted during construction and operation periods. However, it is assumed all offshore wind energy project operators would coordinate with relevant agencies during the COP development process to identify and minimize conflicts with military and national security operations.

Measures mitigating risks would include operational protocol to stop WTG rotation during SAR aircraft operations and implementation of FAA and BOEM recommended navigational lighting and marking to reduce the risk of aircraft collisions. Wind energy structures would be visible on military and national security vessel and aircraft radar. Nonetheless, the presence and layout of large numbers of WTGs could make it more difficult for SAR aircraft to perform operations (of people or marine mammals), leading to less effective search patterns or earlier abandonment of searches. This could result in otherwise avoidable loss of life due to maritime incidents.

Navigational hazards would gradually be eliminated when structures are removed during conceptual decommissioning. Based on coordinating efforts and the anticipated mitigating measures discussed above, the overall impacts to military and national security uses are anticipated to be minor to moderate under the No Action alternative.

Traffic: Increased vessel traffic due to construction and conceptual decommissioning of future offshore wind facilities could lead to course changes of military and national security vessels, congestion and delays at ports, and increased traffic along vessel transit routes. Vessel activity could peak in 2024 with as many as 379 vessels involved in construction of reasonably foreseeable projects. While construction periods of various wind energy facilities may be staggered, some overlap would result in a cumulative impact to traffic loads.

Aviation and Air Traffic

Presence of structures: Future offshore wind development could add up to 1,294 structures to the offshore environment in the RI/MA WEA. WTGs could have maximum blade tip height of 853 feet above mean sea level. As these structures are built, aircraft navigation patters and complexity would incrementally increase. These changes could compress lower altitude aviation activity into more limited airspace above the offshore wind energy lease areas leading to airspace conflicts or congestion, and increasing collision risks for low-flying aircraft.

All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidance to minimize collision risks.

Open airspace around the lease areas would still exist, however, after all foreseeable future offshore wind energy projects are built. BOEM assumes that offshore wind project operators would coordinate with aviation interests throughout the planning, construction, operations, and conceptual decommissioning process to avoid or minimize impacts on aviation activities and air traffic. For this reason, cumulative adverse impacts to aviation and airports are anticipated to be minor.

Offshore Energy Uses

Construction and operation of offshore energy projects are expected between 2021 and 2030. This use is not carried forward for standalone cumulative analysis because the impact of offshore wind is already evaluated as part of all other IPFs.

Undersea Cables

Presence of structures: Up to 1,294 structures along with 4,247 miles of cables are expected to be installed between 2021 and 2030 in the RI/MA WEA as part of future offshore wind energy project infrastructure. The presence of future offshore wind energy structures could preclude future submarine cable placement within any given development footprint, requiring future cables to route around these areas. However, the placement and presence of these cables would not prohibit the placement of additional cables and pipelines. Following standard industry procedures, cables and pipelines can be crossed without adverse impact. The risk of allision to cable maintenance vessels could increase as more offshore wind energy projects are constructed. However, given the infrequency of required maintenance at any given location along a cable route, this risk is expected to be low. Impacts on submarine cables would be eliminated during conceptual decommissioning of offshore wind farms if export cables associated with those projects are removed. Under the No Action alternative, minor cumulative adverse impacts to cables in the area would be anticipated.

Radar

Presence of structures: WTGs that are near or in direct line-of-site to land-based radar system can interfere with the radar signal causing shadows or clutter in the received signal. Construction of 1,294 structures in the RI/MA WEA could lead to long-term, minor cumulative impacts to radar systems. However, these structures would be sited at such a distance from existing and proposed land-based radar systems to minimize interference to most radar systems.

BOEM assumes that all offshore wind developments in the geographic analysis area would use the developer agreed up 1 × 1–nm spacing in fixed east–west rows and north–south columns (Baird 2020), and will evaluate each of those individual projects in their respective NEPA analyses. This arrangement would reduce, but not eliminate, navigational complexity and space use conflicts during the operation phases of the projects. Navigational complexity in the area would increase during construction as offshore wind foundations are installed, would remain constant during simultaneous operations, and would decrease as projects are decommissioned and structures are removed. The Final Massachusetts and Rhode Island Port Access Route Study (USCG 2020) concludes that general mitigation measures, such as properly trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS all enable safe navigation with minimal loss of radar detection. Following the layout recommendations in the Final Massachusetts and Rhode Island Port Access Route Study would improve safety, but it would not remove the risk of allisions or collisions with WTGs during SAR operations (of people or marine mammals) particularly in challenging weather or visibility conditions (USCG 2020).

Scientific Research and Surveys

Presence of structures: If construction of all projected future offshore wind facilities occurs along the Atlantic coast, these developments would add up to 2,547 structures between 2021 and 2030 that could have a maximum blade tip height of up to 853 feet above mean sea level. Collectively, these developments would prevent NMFS from continuing ongoing scientific research surveys or protected species surveys under current vessel capacities and could reduce future opportunities for NMFS' scientific research in the area. This EIS incorporates, by reference, the detailed analysis of potential impacts to scientific research and surveys provided in the Vineyard Wind final EIS in Section 3.12.2.5, Scientific Research and Surveys (BOEM 2021). In summary, offshore wind facilities actuate impacts on scientific surveys and advice by preclusion of NOAA survey vessels and aircraft from sampling in survey strata and impacts on the random-stratified statistical design that is the basis for assessments, advice, and analyses. NOAA has determined survey activities within offshore wind facilities are outside of safety and operational limits. Survey vessels would be required to navigate around offshore wind projects to access survey locations, leading to a decrease in operational efficiency. The height of turbines would affect aerial survey design and protocols, requiring flight altitudes and transects to change. Scientific survey and protected species survey operations would therefore be reduced or eliminated as offshore wind facilities are constructed (BOEM 2021). Offshore wind facilities will disrupt survey sampling statistical designs, such as random stratified sampling. Impacts to the statistical design of region-wide surveys violate the assumptions of probabilistic sampling methods. Development of new survey technologies, changes in survey methodologies, and required calibrations could help to mitigate losses in accuracy and precision of current practices due to the impacts of wind development on survey strata.

Other offshore wind projects could also require implementation of mitigation and monitoring measures identified in records of decision. Identification and analysis of specific measures are speculative at this time; however, these measures could further impact NMFS's ongoing scientific research surveys or protected species surveys because of the increased vessel activity and/or in-water structures from these other projects.

BOEM is committed to working with NOAA toward a long-term regional solution to account for changes in survey methodologies as a result of offshore wind farms.

Overall, the No Action alternative would have major effects on NMFS' scientific research and protected species surveys, potentially leading to impacts on fishery participants and communities; as well as potential major impacts on monitoring and assessment activities associated with recovery and conservation programs for protected species.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on other uses associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on other uses due to the presence of structures that introduce navigational complexities and vessel traffic.

BOEM anticipates that the impact to other marine uses from the combination of most ongoing activities and reasonably foreseeable activities other than offshore wind would be **negligible** because BOEM anticipates that any issues with aviation routes or radar systems would be resolved through coordination with the DOD or FAA, as well as through implementation of navigational marking of structures according to FAA, USCG, and BOEM requirements and guidelines. Impacts on scientific research and surveys are anticipated to be **moderate** for scientific research and surveys due to the impacts of ongoing offshore wind activities (BIWF) and fishing (static gear) (Weinberg 2020) as well as potential impacts from climate change and fishing. BOEM anticipates that the impacts to reasonably foreseeable offshore wind activities would be **major**, primarily because of the potential impacts to NMFS survey efforts.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **negligible** to **minor** adverse impacts for most uses, as the overall effect would be small. However, the overall effect would be notable and **moderate** adverse for radar systems due to WTG interference, and **major** adverse for scientific research and surveys and USCG SAR activities (of people or marine mammals). The presence of stationary structures could prevent or hamper continued NMFS scientific research surveys using current vessel capacities and monitoring protocols or reduce opportunities for other NMFS scientific research studies in the area. Coordinators of large vessel survey operations or operations deploying mobile survey gear have determined that activities within offshore wind facilities would not be within current safety and operational limits. In addition, changes in required flight altitudes due to the proposed WTG height would affect aerial survey design and protocols. BOEM acknowledges that NOAA's Office of Marine and Aviation Operations endorses the restriction of large vessel operations to greater than 1 nm from wind installations due to safety and operational challenges.

The No Action alternative would forgo the fisheries monitoring that SFW has committed to voluntarily perform. Therefore, the results of this monitoring would not be available to provide an understanding of the effects of offshore wind development; benefit future management of finfish, invertebrates, and EFH; or inform planning of other offshore developments. However, other ongoing and future surveys could still provide similar data to support similar goals.

3.5.7.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Marine mineral resources and dredged material disposal: There are no BOEM OCS sand and mineral lease areas and no identified sand resource blocks within the SFWF and offshore SFEC; therefore, the Project would have no impacts on these marine mineral resources. Similarly, because Project activities would not overlap any active dredged material disposal sites, the Project would have no impact on dredged material disposal. However, SFW has requested a buffer area between USACE borrow area 7A and the offshore SFEC. This buffer zone could result in long-term, minor adverse impacts to the USACE's ability to extract sand from the borrow area.

Military and national security uses: Access by military vessels to the SFWF and SFEC would be limited during installation; however, USCG search and rescue activities would still occur. The Proposed Action layout would ensure two lines of orientation for USCG helicopters to conduct search and rescue operations. The U.S. Department of Defense concluded that the Proposed Action would have minor but acceptable adverse impacts on their operations (OCM 2019). Therefore, the Project would have minor adverse impacts on military operations and national security.

Aviation and air traffic: The Proposed Action would add 15 WTGs with maximum blade tip heights of up to 853 feet above mean sea level to the geographic analysis area. The addition of these structures would increase navigational complexity and could change aircraft navigation patterns for aircraft flying at low altitudes and for airports in the vicinity, increasing collision risks for some aircraft during the Proposed Action's operational timeframe. However, more than 90% of existing air traffic in the analysis area would occur at altitudes that would not be impacted by the presence of WTGs (BOEM 2021).

WTGs would be marked with appropriate lighting to meet FAA warning guidelines and would be visible on the radar systems of low-flying aircrafts, similar to other large-scale sea surface activity. Therefore, impacts to air traffic would be negligible, long term, and adverse. Similarly, WTG components located at staging ports could result in issuance of notices to airmen, causing some aircraft to reroute. WTG components would be in staging ports for brief periods leading to short-term adverse impacts. This is anticipated to lead to negligible adverse impacts to air traffic.

Offshore energy uses: Because renewable energy projects occur within individual lease areas, there would be no opportunity for the SFWF to directly overlap or substantially interfere with other renewable energy projects. However, overlapping construction time frames could lead to increased navigation risk or impacts to construction ports. Such impacts are not anticipated to affect construction timelines or alter the layouts of other renewable energy projects. For this reason, adverse impacts to other renewable energy projects are deemed negligible.

Undersea cables: The installation of the SFEC would cross at least seven undersea telecom cables, three active and four inactive (see COP Figure 4.6-10). Because SFW would use standard techniques during installation to prevent damage to cables, adverse impacts would be minor. Cables installed in the future would be able to cross the SFEC using standard protection techniques; therefore, adverse impacts on future cables would be negligible.

Land-based radar systems: No radar screening analysis has been conducted for the Project; however, because the Project would be installed more than 15 miles from shore, in an area of the OCS very similar to where the Vineyard Wind Energy Project is planned, the radar screening analysis conducted by Vineyard Wind provides an acceptable surrogate. Based on that analysis, BOEM concluded the Project would have only negligible adverse impacts to radar (Epsilon Associates, Inc. 2018).

The Project would, however, adversely impact North American Aerospace Defense Command's air defense mission by causing interference with the Falmouth ASR-8, as identified by the DOD Clearinghouse. To address these concerns, BOEM plans to include approval conditions in the COP requiring 30- to 60-day advanced notification to the North American Aerospace Defense Command ahead of Project completion and when the Project is complete and operational for RAM scheduling, funding of RAM execution, and curtailment for national security or defense purposes, as described in the leasing agreement. Any other impacts on radar systems are anticipated to be mitigated by overlapping coverage and radar optimization. The FAA would evaluate potential impacts on radar systems, as well as mitigation measures, when SFW refiles Form 7460-1 for individual WTGs located within U.S. territorial waters. SFW's marine coordinator would remain on duty for the life of the Proposed Action to liaise with military, national security, civilian, and private interests to reduce potential radar conflicts.

Scientific research and surveys: Scientific research and protected species surveys could be affected from the construction of the SFWF and SFEC. Some vessels or low-flying aircraft could be required to alter course to avoid WTGs and NOAA policy advises survey vessels to remain at least 1 mile from fixed structures if possible (Gabriel 2019). Specifically, the coordinators of large vessel survey operations and operations deploying mobile survey gear regard survey activities within offshore wind facilities to exceed current safety and operational limits. In consequence, NOAA has concluded that survey operations would be curtailed within offshore wind facility areas, if not eliminated, under current vessel capacities and monitoring protocols. However, the substrate in the SFWF is substantially rock and cobble, making it suboptimal for survey and commercial trawling because equipment may become entangled. In fact, commercial fishing effort is substantially less in the SFWF than in surrounding habitat (Northeast Ocean Data Portal 2018). Also, although vessels or aircraft could be required to make minor course adjustments to avoid collisions, they would not be completely blocked from access to areas between the WTGs. Nevertheless, NMFS scientific research and protected species surveys could be curtailed within the Lease Area, and NMFS believes that construction of the SFWF and the survey adjustments needed will constitute a major, long-term impact on those surveys.

Operations and Maintenance and Conceptual Decommissioning

Impacts during O&M and conceptual decommissioning of the Project are anticipated to be less than or similar to those described for construction.

Cumulative Impacts

Marine Mineral Resources and Dredged Material Disposal

Presence of structures and new cable emplacement/maintenance: Because the Project would have no impacts on marine mineral resources or on dredged material disposal, other than long-term, minor adverse impacts to the USACE's ability to extract sand from borrow area 7A, the Project would only add negligible adverse incremental impacts to the conditions under the No Action alternative. Under the No Action alternative, it is expected that the demand for sand resources will grow based on current trends. However, there is a large area of available sand and mineral resources on the OCS (e.g., over 4 million cubic yards of sand available for authorized use [BOEM 2018b]) and future projects would avoid identified borrow areas by consulting with the BOEM Marine Minerals Program and USACE before approving offshore wind cable routes. Therefore, the cumulative impact for the Proposed Action when combined with past, present, and reasonably foreseeable projects would be long term and negligible.

Military and National Security Uses

Presence of structures: The Proposed Action would result in short-term and long-term, minor to moderate incremental impacts to military and national security through the installation of 16 structures (15 WTGs and one OSS), along with stationary lift vessels and cranes during construction, to conditions under the No Action alternative, for a total of 1,310 structures within the RI/MA WEA. Project structures could support artificial reef effects, which may also increase traffic and activity near the WTGs for recreational fishing or sightseeing vessels. These structures would increase the short-term and long-term risks of allision for military and national security vessels, as well as search and rescue vessels. However, deep-draft military vessels are not anticipated to transit outside of navigation channels unless needed for search and rescue. Potential allision risks if these vessels lost power would be minimized through the Proposed Action's 1 ×1–nm WTG spacing. BOEM also anticipates that coordination with military and national security interests would be ongoing during construction and installation, O&M, and conceptual decommissioning.

Changing navigation patterns could also concentrate vessels within and around the outsides of the RI and MA Lease Areas, potentially causing space use conflicts in these areas or reducing the effectiveness of SAR operations (of people or marine mammals). While the addition of Project structures and associated construction vessels would also increase navigational complexity or alter navigation patterns for military and national security aircraft operating in the region, Project structures would be marked as a navigational hazard per FAA, BOEM, and USCG guidelines and WTGs would be visible on military and national security vessel and aircraft radar. The Proposed Action would implement a 1 × 1–nm spacing, consistent with all other projects in the RI/MA WEA.

Proposed Action structures represents no more than a 2% increase over total estimated WTG and OSS foundations across the geographic analysis area under the No Action alternative. BOEM estimates a cumulative total of 1,310 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominately of impacts described under the No Action alternative, which would represent a long-term, minor to moderate impact on military and national security uses.

Traffic: As described in Section 3.5.6.2.3 (Proposed Action Alternative), the Proposed Action would require 13 construction vessels per construction day over the 2-year construction period. This vessel activity would increase the risk of collisions, allisions, and spills. However, the Proposed Action represents a small proportion (4%) of the total vessels potentially present. Therefore, the Proposed Action would result in negligible incremental impacts to military and national security uses.

BOEM estimates a peak of 379 vessels due to offshore wind project construction over a 10-year time frame. Although the number of construction vessels (reaching a maximum in 2024) would represent a large portion of the traffic in the region, most vessels would remain in the MWA, with fewer vessels transporting materials back and forth from ports. With multiple offshore wind projects under construction, traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Additionally, BOEM also anticipates that coordination with military and national security interests would be ongoing during construction and installation, O&M, and conceptual decommissioning activity. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be long term and minor.

Aviation and Air Traffic

Presence of structures: Because WTGs are the tallest features expected to be constructed on the OCS, development of additional offshore wind farms is the only expected activity to cumulatively affect air traffic. The Proposed Action would result in long-term, negligible incremental impacts to aviation and air traffic through the installation of 16 structures (15 WTGs and one OSS) to conditions under the No Action alternative. These structures would also increase navigational complexity and navigation patterns for low-flying aircraft. BOEM estimates that these impacts would occur for no more than 10% of air traffic, but affected pilots could be required to alter routes to avoid constructed WTGs. Siting of the Project more than 15 miles offshore would place the Project outside typical approach routes to nearby airports. All existing stationary structures would have navigation marking and lighting in accordance with FAA, USCG, and BOEM guidelines to minimize collision risks. WTGs would also be visible on aircraft radar.

Proposed Action structures represents no more than a 2% increase over total estimated WTG and OSS foundations across the geographic analysis area under the No Action alternative. BOEM estimates a cumulative total of 1,310 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominately of impacts described under the No Action alternative, which would represent a long-term, minor impact on aviation and air traffic uses.

Undersea Cables

Presence of structures: The Proposed Action would result in long-term, negligible incremental impacts to existing undersea cables through the installation of 16 structures (15 WTGs and one OSS) and 82.5–86.9 miles of cable to conditions under the No Action alternative. BOEM estimates a cumulative total of 1,310 offshore WTGs and OSS foundations and up to 4,334 miles of cable for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA. Placement of these project components would not preclude the placement of additional cables and pipelines. Following standard industry procedures, cables and pipelines can be crossed without adverse impact. Cable maintenance vessels transiting through or working within the geographic analysis area would be at risk of allisions with Project structures, but required navigational hazard marking and implementation of a 1 × 1–nm spacing would minimize this risk, as would the relatively infrequent need for maintenance activities. For the same reasons, the cumulative effects associated with the Proposed Action and past, present, and reasonably foreseeable activities would result in long-term but negligible impacts on undersea cables.

Radar

Presence of structures: The Proposed Action would result in long-term, negligible incremental impacts to land-based radar through the installation of 16 structures (15 WTGs and one OSS) to conditions under the No Action alternative. These structures would increase the long-term risk of radar interference or clutter, but existing radars are sited at such a distance to minimize interference. BOEM's (2020) study of radar interference concludes that SeaSonde radars appear to be the most heavily-impacted radar by offshore wind projects because of their prevalence. However, as noted in Section 3.5.7.2.2 (No Action Alternative), the Final Massachusetts and Rhode Island Port Access Route Study (USCG 2020) concludes that general mitigation measures, such as properly trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS, all enable safe navigation with minimal loss of radar detection. BOEM would include approval conditions in the COP regarding notification to North American Aerospace Defense Command of RAM scheduling, funding of RAM execution, and curtailment for national security or defense purposes, as needed.

Therefore, the Proposed Action and past, present, and reasonably foreseeable activities would result in long-term and moderate cumulative impacts on radar systems.

Scientific Research and Surveys

Presence of structures: The Proposed Action would result in long-term major incremental impacts to NMFS' scientific research and surveys through the installation of 16 structures (15 WTGs and one OSS) to conditions under the No Action alternative. These structures would result in adverse impacts to NMFS' scientific research and protected species surveys due to 1) WTG blade tip height that would exceed the survey altitude for current surveying methodologies, and 2) Lease Area geographic overlap with ongoing NMFS's Northeast Fisheries Science Center fishery resource monitoring surveys. Research and monitoring proposed by the lessees and/or conducted by other scientific institutions would continue in offshore wind facilities. This final EIS incorporates, by reference, the detailed analysis of potential impacts to scientific research and surveys provided in the Vineyard Wind final EIS (BOEM 2021).

Proposed Action structures represents no more than a 1% increase over total estimated 2,547 WTG and OSS foundations under the No Action alternative that could be present along the Atlantic coast if all projected future offshore wind facilities are constructed. BOEM estimates a cumulative total of 2,563 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominately of impacts described under the No Action alternative, which would represent a long-term, major impact on NMFS's scientific research and protected species surveys and the resulting stock assessments.

Conclusions

Project construction and installation, O&M, and conceptual decommissioning would affect ongoing military, aviation, and scientific research studies occurring in the analysis area. Similar impacts from Project O&M would occur, although at lesser extent and duration for some uses. BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible** to **major**, as described below by topic.

- Marine mineral resources and dredging: Potential impacts would be **minor** due to limited mineral extraction and consultation with the BOEM Marine Minerals Program and the USACE before approving offshore wind cable routes.
- Military and national security uses: Potential **minor** impacts on military and national security uses would primarily be caused by installation of WTGs in the geographic analysis area, resulting in increased navigational complexity and associated risks.
- Aviation and air traffic: Potential **negligible** impacts on aviation and air traffic would primarily be caused by installation of WTGs in the geographic analysis area due to potential changed in navigational patterns.
- Undersea cables: Potential impacts on cables would be **negligible** due to the limited number of existing submarine cables and use of standard techniques to avoid impacts.
- Radar: Potential impacts on radar systems would be localized, long-term, and **negligible**. Although presence of WTGs has the potential to cause interference with radar systems, ground-based radar systems are located a sufficient distance that radar interference is not anticipated, and mitigation would not be required.
- Scientific research and surveys: Potential impacts on scientific research and surveys would generally be **major**, particularly pertaining to NOAA and NMFS surveys supporting commercial fisheries and protected species research programs. Presence of structures would exclude certain areas within the WDA occupied by project components (e.g., WTG foundations, cable routes) from potential vessel and aerial sampling, and by impacting survey gear performance, efficiency, and availability.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **major**. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would range from **negligible** to **minor** adverse impacts for most uses (since the impact would be small), to **moderate** adverse for some military uses and radar systems (since potential conflicts could be addressed through established processes), and **major** adverse for NMFS's scientific research and surveys and SAR operations (of people or marine mammals). The main drivers for the major impact ratings are installation of structures, primarily WTGs, that would hinder survey efforts. NOAA and NMFS scientific research and surveys would qualify as major because entities conducting surveys and scientific research would have to make significant investments to change methodologies to account for unsampleable areas, with potential long-term and irreversible impacts on fisheries and protected species research as a whole as well as the commercial fisheries community. There could be impacts on other types of surveys, and increased opportunities to study impacts of offshore wind development on a variety of resources.

3.5.7.2.4 VESSEL TRANSIT LANE ALTERNATIVE

The Transit alternative would lead to the same types of impacts on other uses from construction and installation, O&M, and conceptual decommissioning activities as described for the Proposed Action. However, construction of this alternative would install fewer WTGs and associated inter-array cables, which would slightly reduce the construction impact footprint and installation period. Therefore, this alternative would result in negligible to moderate impacts to ongoing military, aviation, and scientific research studies occurring in the analysis area.

Cumulative Impacts

The Transit alternative would add resource impacts at quantities and durations similar to, or slightly reduced from, the Proposed Action, driven by the continued presence of offshore structures—primarily WTGs—in the Lease Area.

The transit lanes could reduce cumulative impacts related to allision and collision risk throughout the lease areas (USCG 2020). Conversely, allisions and collisions could increase if commercial and recreational fishing and boating occurs within, or congregates alongside, the transit lanes. Implementing transit lanes could allow easier access for scientific research and survey activity within the transit lanes; however, these activities would still be impacted by the presence of offshore structures. Therefore, the overall cumulative impacts of this alternative when combined with past, present, and reasonably foreseeable activities would range from negligible to minor adverse impacts for most uses (since the impact would be small), to moderate adverse for some military uses and radar systems (since potential conflicts could be addressed through established processes), and major adverse for NMFS's scientific research and surveys and SAR operations (of people or marine mammals).

Conclusions

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **major**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **major**. The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **negligible** to **minor** adverse impacts for most uses (since the impact would be small), to **moderate** adverse for some military uses and radar systems (since potential conflicts could be addressed through established processes), and **major** adverse for NMFS's scientific research and surveys and SAR operations (of people or marine mammals).

3.5.7.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

The Habitat alternative under either layout option would result in a reduction in the number of turbines and associated inter-array cable. Impacts to marine mineral resources and dredged material disposal, military and national security uses, aviation and air traffic, offshore energy uses, undersea cables, land-based radar, and scientific research and surveys from construction and installation, O&M, and conceptual decommissioning of the SFWF, SFEC, and Montauk O&M facility would be reduced, but not measurably, to the Proposed Action. Therefore, the Habitat alternative under either layout option is anticipated to result in negligible to moderate adverse impacts.

Cumulative Impacts

The Habitat alternative under either layout option is similar to the Proposed Action except that it has a reduced number of turbines and associated inter-array cables. Therefore, the Habitat alternative under either layout option would add resource impacts at quantities and durations similar to, or slightly reduced from, the Proposed Action, driven by the continued presence of offshore structures—primarily WTGs—in the Lease Area. As such, the overall cumulative impacts of this alternative when combined with past, present, and reasonably foreseeable activities would range from negligible to minor adverse impacts for most uses (since the impact would be small), to moderate adverse for some military uses and radar systems (since potential conflicts could be addressed through established processes), and major adverse for NMFS's scientific research and surveys and SAR operations (of people or marine mammals).

Fisheries Habitat Impact Minimization Alternative Conclusions

Although the Habitat alternative under either layout option would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **major**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **major**). The overall impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **negligible** to **minor** adverse impacts for most uses (since the impact would be small), to **moderate** adverse for some military uses and radar systems (since potential conflicts could be addressed through established processes), and **major** adverse for NMFS's scientific research and surveys and SAR operations (of people or marine mammals).

3.5.7.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, BOEM expects that impacts to other uses would range from **negligible** to **major** for all action alternatives.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from **negligible** to **major**. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **negligible** to **minor** adverse impacts for most uses (since the impact would be small), to **moderate** adverse for some military uses and radar systems (since potential conflicts could be addressed through established processes), and **major** adverse for NMFS's scientific research and surveys and SAR operations (of people or marine mammals). The main drivers for the major impact rating are installation of structures, primarily WTGs, that would hinder survey efforts.

3.5.7.4 Mitigation

Implementation of the regional Federal Survey Mitigation Program to address adverse impacts from Atlantic offshore wind energy development on recurring scientific research and protected species surveys may not significantly reduce the expected major impacts on NOAA scientific surveys from the Project in the short term but should lessen long-term impacts.

3.5.8 Recreation and Tourism

The reader is referred to Table 2.3.1-1 and Section 3.5.8 of Appendix H for a discussion of current conditions and potential impacts to recreation and tourism, including private recreational fishing, from implementation of the Proposed Action and other considered alternatives.

3.5.9 Visual Resources

3.5.9.1 Affected Environment

This Visual Resources section addresses non-historic visual resources. Historic visual resources are addressed in the Cultural Resources section (Section 3.5.2).

Coastal Massachusetts, Rhode Island, and Connecticut have a wide range of visual characteristics, with communities and landscapes ranging from large cities to small towns, suburbs, rural areas, and wildlife preserves (EDR 2020). Daytime and nighttime skies are characterized by clear conditions, clouds, fog, and haze. The scenic quality of the coastal environment is important to the identity, attraction, and economic health of many of the coastal communities (EDR 2020). The visual qualities of historic coastal towns, which include marine activities within small-scale harbors, and the ability to view birds and marine life, are important community characteristics (EDR 2018, 2020). The characteristic onshore landscape includes high to moderate quality scenery elements, as follows: landforms, comprising a ridge (elevation 182 feet), dunes, and scenic sea coast; waterbodies, including ponds and the Atlantic Ocean; vegetation, including dune grasses, forest, coastal scrub, and residential plantings; structures, including residential buildings, fences, roads, parking; and cultural resource elements, including the East Hampton Scenic Areas of Statewide Significance (New York State Department of State, Division of Coastal Resources 2010). The onshore landscape includes Wainscott, Georgica, Hook, Lily and Town Ponds, surrounding upland landscapes, and 7 miles of Atlantic beaches.

The characteristic seascape of the SFWF and offshore SFEC (see Figure C-31 in Appendix C) comprises views of open ocean from recreational and commercial boating (offshore) and views from the mainland and islands (onshore). Because of the proximity of the Atlantic Ocean and the views associated with the shoreline, coastal New England has been extensively developed for water-based recreation and tourism (EDR 2020) and commercial and industrial uses. Recreational and commercial vessels and activities contribute to the visual character of the seascape.

3.5.9.2 Environmental Consequences

3.5.9.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.5.9-1 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for the final EIS.

Table 3.5.9-1. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Visual Resources

Issue	Impact Indicator	Significance Criteria
Change in scenic quality of the landscape and seascape	Visual contrast and dominance of Project component structures and activities onshore and offshore visible in the viewshed	Negligible: The landscape or seascape character appears to be intact. Very low levels of change that do not attract viewer attention and/or atmospheric conditions obscure visibility of Project components. Project activities are not readily evident with no or minimal overall contrast and are often indistinct or not obvious. The scale of Project components is very small to small in comparison with the existing visual environment. Minor: The landscape or seascape character appears to be noticeably altered. Low levels of change that may be seen but do not attract the viewer's attention and/or atmospheric conditions begin to obscure visibility of Project components but are discernible. Project activities may be evident but do not attract attention with weak contrast, which may be visible or evident. The scale of Project components are small in comparison with the existing visual environment. Moderate: The existing landscape or seascape character appears substantially altered. Moderate levels of change that may attract attention but do not dominate the view. Project activities are evident and begin to attract attention with moderate contrast and are clearly visible or noticeable. The scale of Project components are moderate in comparison with the existing visual environment. Motion of wind turbines begins to be the focus of attention in offshore views. Major: The existing landscape or seascape character appears severely altered. Major levels of change with strong contrast that dominates the view and are the major focus of viewer attention and cannot be overlooked. The scale of Project components are large in comparison with the existing visual environment.
Change seen and perceived as Project facilities by people/ sensitive viewers	Luminance and illuminance from Project component lighting sources onshore and offshore visible in the viewshed	

3.5.9.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing visual resource trends from past and present activities. Attachment 3 in Appendix E provides additional information regarding past and present activities and associated visual impacts. Future non-Project actions include offshore wind facility development and onshore communications tower updates and replacements, development projects, and port upgrades. Attachment 3 in Appendix E also discloses future non-offshore wind activities and associated visual impacts. Impacts associated with future offshore wind activities are described below.

Future Projects

Offshore

Presence of structures: Proposed or anticipated future wind facility projects would consist of up to 1,294 WTGs and associated OSS in the visual geographic analysis area (see Attachment 4 in Appendix E). The combined visual effects of the WTGs and associated infrastructure when visible from viewing areas would create long-term, minor to major visual impacts if future projects are fully implemented. The degree of the perceivable contrast, dominance, and scale of WTGs and an OSS along the horizontal plane of the ocean depends on the viewer's proximity and orientation to the wind energy projects and will either increase or decrease as natural lighting angles and atmospheric conditions change throughout the day. Under clear conditions and depending on lighting angles, projects built within BOEM leases that are within 12 miles of viewing areas would have major visual impacts, viewing areas within 12 to 24 miles would have moderate to major impacts, and viewing areas within 24 to 30 miles would have minor impacts. Viewing areas that exceed 30 miles from projects would have negligible visual impacts due to distance, curvature of the Earth, and the influence of atmospheric conditions, which would decrease the ability of the viewer to discern or perceive projects at that distance.

Light: Development of offshore wind lease areas would increase the amount of offshore light sources associated with construction and installation, O&M, and conceptual decommissioning during the life of future projects. Lighting associated with night construction and conceptual decommissioning for future projects would be localized and temporary. Construction and conceptual decommissioning for each future project within BOEM lease areas are also assumed to be staggered; therefore, the lease areas would not have light sources across the entirety of the geographic analysis area at one time. However, light sources, depending on quantity, intensity, and location, could be visible from unobstructed sensitive onshore and offshore viewing locations based on viewer distance.

FAA hazard lighting systems would be used for the duration of Project O&M for each reasonably foreseeable offshore wind project (1,294 structures). The amassing of these WTGs and associated synchronized flashing strobe lights affixed with a minimum of three red flashing lights at the mid-section of each tower and two at the top of each WTG nacelle within the lease areas would have long-term, minor to major impacts on sensitive onshore and offshore viewing locations based on viewer distance and angle of view, and assuming no obstructions. Similar to structures discussed above, atmospheric and environmental factors such as haze and fog would also influence visibility and perceivability of hazard lighting from sensitive viewing locations.

Field observations associated with visibility of FAA hazard lighting for the BIWF off the coast of Rhode Island were conducted in May 2019 (HDR 2019). The BIWF project consists of five WTGs with a blade tip height of approximately 600 feet. Observations of FAA nighttime lighting visibility under clear sky conditions in open water identified that FAA hazard lighting may be visible to the naked eye at a distance of 26.8 miles from the viewer (HDR 2019). The BIWF report also concludes that daytime visibility of WTGs from land and water viewing locations is strongly dependent on weather conditions and distance (HDR 2019).

The implementation of an ADLS (or a similar system) would activate the hazard lighting system in response to detection of nearby aircraft. Implementation of an ADLS may be required by BOEM as a mitigation measure and condition of COP approval. The synchronized flashing of the ADLS if implemented would result in shorter duration night sky impacts on the surrounding landscape. The shorter duration synchronized flashing of the ADLS is anticipated to have reduced visual impacts at night as compared to the standard continuous, medium-intensity red strobe FAA warning system due to the duration of activation. Based on recent studies associated with the SFWF, activation of the ADLS if implemented, would occur for 3 hours and 49 minutes per year, or on average, from 2 minutes to 46 minutes per month as compared to standard continuous FAA hazard lighting (EDR 2020a). It is anticipated that the reduced time of FAA hazard lighting resulting from an implemented ADLS would reduce duration of the potential impacts of nighttime aviation lighting to less than 1% of the normal operating time that would occur without using the ADLS.

Because of the variable distances from visually sensitive viewing locations (EDR 2020b), other reasonably foreseeable offshore wind projects would have minor to major long-term cumulative effects on non-historic visually sensitive viewing areas. As also discussed in Section 3.5.8 Recreation and Tourism, the recreational and commercial boating community would experience major adverse effects in foreground views. Onshore viewers would experience minor to major effects from nighttime lighting associated with construction and O&M. After conceptual decommissioning, the minor to major impacts associated with O&M would cease.

Onshore

Future port upgrade planning projects could require port modifications and expansions, although specific locations and design have not been determined (see Appendix E, Table E-8). However, any improvements to existing port facilities and the development of new port facilities are anticipated to occur within areas of current port development. Therefore, the addition of additional structures, infrastructure, and night lighting sources associated with port expansion would have long-term, negligible to moderate impacts to sensitive onshore and offshore daytime and nighttime visually sensitive viewing areas, depending on the final location of port upgrade locations.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on non-historic visual resources associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on non-historic visual resources, primarily through construction and O&M of WTGs and related lighting schemes.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities would be **minor** to **major**. BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be **minor** to **major**.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse impacts because the overall effect would be notable, but the resource would be expected to recover completely after conceptual decommissioning.

3.5.9.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Analysis area residents and visitors would experience observable changes to the characteristic background landscape and/or seascape during Project construction, including the presence of lighting, structural features, vessels, heavy equipment, vehicles, and personnel for the time period of construction. The onshore components of the Project include the interconnection facility, onshore SFEC routes, sea-to-shore transition vault (i.e., manhole), and O&M facility (located in Quonset Point, Rhode Island, or Montauk Harbor, New York); see Section 2.1.1.3, Construction and Installation, for further information.

Offshore, the increase and concentration in vessel activity during WTG construction, installation, and transport activities along with the addition of navigational marking and lighting would create short-term to long-term, moderate to major impacts to visually sensitive viewing areas. Similarly, during the installation of offshore cable systems, vessels and equipment would be concentrated and visible within the Lease Area. As cable system construction activities transition onshore, temporary vegetation clearing and surface disturbance would occur. Construction of the interconnection facility would involve temporary staging areas and vehicle traffic. The Project-related offshore and onshore construction activity would create short-term minor to moderate impacts to visually sensitive viewing areas.

Operations and Maintenance and Conceptual Decommissioning

Visual impacts from the onshore and offshore Project components would persist for the life of the Project. Because of the similarity of the existing adjacent East Hampton substation's visual features and screening by mature vegetation throughout the area, the operation of the onshore interconnection facility would cause negligible to minor long-term adverse visual impacts. Nighttime impacts caused by the onshore interconnection facility lighting would be minor because of their low-profile design, which would be directed downward.

The Quonset Point O&M facility would include two approximately 30-foot-tall structures to house office space (approximately 1,000 square feet) and storage space (approximately 11,000 square feet) with one 60-foot-tall crane that would be in use at the quayside and would be set among existing modern Air National Guard Base structures and activities. These new structures for Quonset Point would be similar to existing industrial infrastructure that have large repetitive vertical and horizontal geometric, rectangular elements and are anticipated to result in negligible to minor adverse visual impacts. The Montauk O&M facility would include similar structures for office space (1,000 square feet) and storage space (6,600 square feet) with one 60-foot-tall crane set among other similar active harbor structures and operations (EDR 2019). The structures for Montauk Point would include either reuse of the existing structures or replacement in kind of the existing structures, which have large repetitive vertical and horizontal geometric, rectangular elements and are anticipated to result in negligible long-term adverse visual impacts.

Visual impacts of offshore vessel and onshore vehicle traffic during the O&M phase would be temporary and negligible because of the low volumes of traffic. Visual impacts from vessel traffic during conceptual decommissioning would be similar to construction impacts.

The offshore components of the Project include the WTGs and the OSS, which would be visible from the visually sensitive areas in New York, Connecticut, Rhode Island, and Massachusetts. Based on visual simulations, the WTGs would be visible on the horizon from shore (unobstructed view) within the analysis area. The WTGs (and OSS) would be painted RAL 9010 Pure White or RAL 7035 Light Grey to blend into the horizon. The effects of sun lighting, shade, and shadows would cause backlit contrasts and higher impacts for onshore and offshore views from the northeast, north, and northwest. The color contrast varies due to sun angles and atmospheric clarity shifting from white WTGs against a blue or gray backdrop to a dark gray WTG against a light gray backdrop. Distance between the viewer and the WTGs, as noted in Table 3.5.9-1, along with the curvature of the Earth affects how much of the WTG is visible from sensitive viewing locations and influences its visible scale and dominance.

The 15 WTGs and one OSS would appear generally low on the horizon because of distance and the curvature of the Earth and would be located behind and partially screened or buffered by other lease area WTGs, as viewed from the northern and eastern onshore communities and sensitive viewing locations. The SFWF WTGs would be more visually apparent as viewed from the western communities and sensitive viewing locations (e.g., Block Island, Rhode Island) due to less screening from other lease areas under the foreseeable development scenario. The scale of the 15 WTGs would become less perceivable as the distance from sensitive viewing locations is increased. Atmospheric and environmental factors such as haze, sun angle, time of day, cloud cover, fog, sea spray, and wave action would also influence visibility and perceivability from sensitive viewing locations. The combined visual effect of the reasonably foreseeable WTGs in the geographic analysis area when visible from sensitive viewing areas would create long-term, minor to major visual impacts once future projects are fully implemented (see Table 3.5.9-2).

As a result, O&M would cause long-term, negligible to major visual impacts to visually sensitive viewing areas (see Table 3.5.9-2) for the life of the Project. Visual impacts from conceptual decommissioning of the WTGs and OSS would be similar to construction impacts. Long-term, moderate to major visual impacts would occur at night when aviation and navigation lighting are visible from shore that focus viewers' attention to linear, repetitive, and concentrated areas of dark skies.

Table 3.5.9-2. Summary of Impacts by Viewing Area

Viewpoint Location	Viewpoint Name	Viewer Type	Aesthetic Resource	Distance (miles)	Landscape Similarity Zone	Overall Impact
Viewpoints within 12 miles						
30	Atlantic Ocean	Tourists, fishing community	Atlantic Ocean	8.6	Open Water	Major
Viewpoints between 12 and 18 miles						
29	Nomans Land	No access	Nomans Land Island National Wildlife Refuge	15.9	Shoreline Bluffs	Minor
29	Nomans Land Sunset	No access	Nomans Land Island National Wildlife Refuge	15.9	Shoreline Bluffs	Moderate
Viewpoints between18 and 24 miles						
4	Fred Benson Beach	Resident, tourist	Crescent Beach, State Scenic Area, Rhode Island Historic District, Town Beach	20.7	Shoreline Beach	Minor
4B	New Shoreham Beach	Resident, tourist	Lakeside Drive Shore Fishing Access	20.6	Shoreline Beach	Minor
4C	Block Island Ferry	Resident, tourist, through traveler, fishing community	Block Island Sound	19.8	Open Water	Minor
5B	Southeast Lighthouse	Resident, tourist	National Register Historic Site, Mohegan Bluffs Scenic Area	19.4	Maintained Recreational Area	Minor
5B	Southeast Lighthouse Construction View	Resident, tourist	National Register Historic Site, Mohegan Bluffs Scenic Area	19.4	Maintained Recreational Area	Minor
5N	Southeast Lighthouse Night	Resident, tourist	National Register Historic Site, Mohegan Bluffs Scenic Area	19.4	Maintained Recreational Area	Major
6	Point Judith Lighthouse	Resident, tourist, fishing community	National Register Historic Site, Point Judith State Scenic Area	23.6	Maintained Recreational Area	Negligible
6N	Point Judith Lighthouse Night	Resident, tourist, fishing community	National Register Historic Site, Point Judith State Scenic Area	23.6	Maintained Recreational Area	Moderate
18	Cuttyhunk Island	Resident, tourist	The Elizabeth Islands, Buzzards Bay	22.7	Coastal Scrub/Scrub Forest	Moderate
19	Aquinnah Overlook	Resident, tourist	Gay Head - Aquinnah Shops Area State Historic Area, Gay Head West Tisbury Unit State Scenic Area	20.4	Shoreline Bluffs	Minor
19	Aquinnah Overlook Sunset	Resident, tourist	Gay Head - Aquinnah Shops Area State Historic Area, Gay Head West Tisbury Unit State Scenic Area	20.4	Shoreline Bluffs	Moderate
19N	Aquinnah Overlook Nighttime	Resident, tourist	Gay Head - Aquinnah Shops Area State Historic Area, Gay Head West Tisbury Unit State Scenic Area	20.4	Shoreline Bluffs	Major
20A	Moshup Beach	Resident, tourist	Gay Head West Tisbury State Scenic Area, Moshup Beach	20.1	Coastal Dunes	Moderate

Viewpoint Location	Viewpoint Name	Viewer Type	Aesthetic Resource	Distance (miles)	Landscape Similarity Zone	Overall Impact
20A	Moshup Beach Sunset	Resident, tourist	Gay Head West Tisbury State Scenic Area, Moshup Beach	20.1	Coastal Dunes	Moderate
21	Gay Head Lighthouse	Resident, tourist	Gay Head Lighthouse, Gay Head West Tisbury Unit State Scenic Area	20.4	Maintained Recreation Area	Negligible
22	Philbin Beach	Resident, tourist	Gay Head West Tisbury Unit State Scenic Area, Philbin Beach	20.2	Shoreline Beach	Minor
22	Philbin Beach Sunset	Resident, tourist	Gay Head West Tisbury Unit State Scenic Area, Philbin Beach	20.2	Shoreline Beach	Minor
25	Lucy Vincent Beach	Resident, tourist	Gay Head West Tisbury Unit State Scenic Area, Lucy Vincent Beach	23.8	Coastal Dunes	Negligible
25	Lucy Vincent Beach Sunset	Resident, tourist	Gay Head West Tisbury Unit State Scenic Area, Lucy Vincent Beach	23.8	Coastal Dunes	Moderate
Viewpoints between 24 and 30 miles						
2A	Trustom Pond National Wildlife Refuge	Resident, tourist	Trustom Pond/Matunuk State Scenic Area, Trustom Pond National Wildlife Refuge	27.9	Salt Pond/ Tidal Marsh	Negligible
7	Scarborough Beach	Resident, tourist	Scarborough State Beach	24.8	Shoreline Beach	Negligible
9	Narragansett Beach	Resident, tourist	Narragansett Town Beach	26.9	Shoreline Beach	Negligible
10	Beavertail Lighthouse	Resident, tourist	National Register Historic Site, Beavertail Point Scenic Area, Rhode Island Historic District, Beavertail State Park	26.3	Maintained Recreation Areas, Coastal Bluff	Negligible
11	Brenton Point State Park	Resident, tourist	Newport/Ocean Drive State Scenic Area, Brenton Point State Park, Rhode Island Historic District	25.5	Maintained Recreation Areas	Negligible
11N	Brenton Point State Park Nighttime	Resident, tourist	Newport/Ocean Drive State Scenic Area, Brenton Point State Park, Rhode Island Historic District	25.5	Maintained Recreation Areas	Moderate
12	Newport Cliff Walk	Resident, tourist	Newport/Ocean Drive State Scenic Area, Brenton Point State Park, Rhode Island Historic District	24.8	Maintained Recreation Areas, Shoreline Residential	Minor
14	Sachuest Beach (Second Beach)	Resident, tourist	Second Beach, Narragansett Bay	26.7	Shoreline Beach	Negligible
14A	Hanging Rock (Norman Bird Sanctuary)	Resident, tourist	Norman Bird Sanctuary, Paradise Avenue and Associated Roads State Scenic Byway, Second Beach	26.7	Coastal Scrub/Scrub Forest	Moderate
14B	Sachuest Point National Wildlife Refuge	Resident, tourist	Sachuest Point National Wildlife Refuge, Sachuest Point State Scenic Area	25.6	Coastal Scrub//Scrub Forest	Negligible

Viewpoint Location	Viewpoint Name	Viewer Type	Aesthetic Resource	Distance (miles)	Landscape Similarity Zone	Overall Impact
15	South Shore Beach	Resident, tourist	Narragansett Bay, Little Compton Agricultural Lands State Scenic Area, South Shore Beach	27	Shoreline Beach	Negligible
17	Gooseberry Island	Resident, tourist	Horseneck Beach State Reservation, Westport South Dartmouth Unit State Scenic Area, Buzzards Bay	26.2	Coastal Scrub/Scrub Forest	Moderate
17	Gooseberry Island Sunset	Resident, tourist	Horseneck Beach State Reservation, Westport South Dartmouth Unit State Scenic Area, Buzzards Bay	26.2	Coastal Scrub/Scrub Forest	Moderate
24	Peaked Hill Reservation	Resident, tourist	Identified by the Wampanoag of Gay Head	24.2	Forest	Minor
24	Peaked Hill Reservation Sunset	Resident, tourist	Identified by the Wampanoag of Gay Head	24.2	Forest	Moderate
Viewpoints beyond 30 miles						
1D	Montauk Point State Park	Resident, tourist, fishing community	Montauk Point State Park, National Register Historic Site, Scenic Area of Statewide Significance	35.3	Maintained Recreation Areas	Negligible
1N	Montauk Point State Park Nighttime	Resident, tourist	Montauk Point State Park, National Register Historic Site, Scenic Area of Statewide Significance	35.3	Maintained Recreation Areas	Negligible
2	Watch Hill Lighthouse	Resident, tourist	Rhode Island Historic District, State Scenic Area		Maintained Recreation Areas, Shoreline Residential	Negligible
26A	Nobska Lighthouse	Resident, tourist	National Register of Historic Places, Church Street/Nobska Point State Historic District, Nobska Beach Association Beach		Maintained Recreation Areas	Negligible
26A	Nobska Lighthouse Sunset	Resident, tourist	National Register of Historic Places, Church Street/Nobska Point State Historic District, Nobska Beach Association Beach		Maintained Recreation Areas	Negligible
27	South Beach State Park	Resident, tourist	South Beach State Park		Shoreline Beach	Negligible
27	South Beach State Park Sunset	Resident, tourist	South Beach State Park		Shoreline Beach	Minor

Cumulative Impacts

Offshore

Offshore impacts would be predominately associated with changes in above-water structures and lighting.

Presence of structures: Construction activities would incrementally add up to 15 additional WTGs and one OSS to the No Action alternative; an increase in the number of WTGs in the geographic analysis area by less than 1%. As a result, proportionately over 90% of the WTGs in the geographic analysis area would be associated with other future offshore wind development (EDR 2020b). Additionally, the Proposed Action would locate WTGs no closer than approximately 16 miles from Nomans Land, Massachusetts; 19 miles from Block Island, Rhode Island; more than 20 miles from Martha's Vineyard, Massachusetts; more than 35 miles from Montauk Point, New York; and more than 23 miles from mainland Massachusetts and Rhode Island. When combined with other past, present, and reasonably foreseeable projects, the Proposed Action would therefore result in long-term and minor to major adverse cumulative visual impacts from sensitive viewing locations.

Light: Construction related activities would incrementally add navigational safety lighting used by offshore vessels to the No Action alternative. Additionally, construction of up to 15 WTGs and one OSS would also incrementally add navigation and aviation lighting to the No Action alternative. New lighting from the Proposed Action would increase in-water structures with lighting impacts from past, present, and reasonably foreseeable future projects by no more than 1%. Nighttime vessel and construction area lighting during construction of the Proposed Action would be limited in duration and cease when construction is complete. Atmospheric and environmental conditions would influence visibility and perceivability from sensitive viewing locations. Cumulatively, when combined with other past, present, and reasonably foreseeable projects, the Proposed Action could result in long-term, minor to major adverse visual impacts on non-historic sensitive viewing locations.

Onshore

Onshore construction and installation would incrementally add an O&M facility and an interconnection facility to the No Action alternative. These new onshore structures and night lighting sources would be constructed in existing industrial areas, would use or replace existing structures, and would be expected to result in negligible to moderate visual impacts to sensitive receptors. Similarly, future port upgrades required to service the offshore wind industry would also be expected to result in similar negligible to moderate visual impacts to sensitive receptors. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long-term, negligible to moderate adverse cumulative impacts to daytime and nighttime visually sensitive viewing areas from structures and night lighting sources.

Conclusions

Project construction and installation, O&M, and conceptual decommissioning would introduce visible structures and navigation and aviation lighting to the geographic analysis area. BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible** to **major** and short term to long term. However, BOEM expects the overall impact on non-historic visual resources from the Proposed Action alone to be **moderate**, as the overall effect would be notable but the resource would be expected to return to pre-project conditions after conceptual decommissioning.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **moderate**. BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** to **moderate** impacts to non-historic visual resources. BOEM made this call because the overall effect would be notable but the resource would be expected to return to pre-project conditions after conceptual decommissioning.

3.5.9.2.4 VESSEL TRANSIT LANE ALTERNATIVE

The Transit alternative would not affect Project onshore activities; therefore, effects would be the same as the Proposed Action: negligible to major. Offshore, this alternative could result in decreased visual impacts related to nighttime aviation and navigation lighting because there would be fewer WTGs. All other visual impacts related to construction and installation, O&M, and conceptual decommissioning of onshore and nearshore components would be similar to the Proposed Action and result in similar short- and long-term, negligible to major adverse visual impacts to daytime and nighttime viewers.

Cumulative Impacts

The Transit alternative would not affect Project onshore activities. Offshore, the Transit alternative would incrementally add sources of visual impacts (structures, lighting) to the geographic analysis area at quantities and durations similar to the Proposed Action. Therefore, the overall cumulative impacts of the Transit alternative on visual resources when combined with past, present, and reasonably foreseeable activities would have long-term, negligible to major impacts.

If the Transit alternative is implemented, the WTGs associated with other reasonably foreseeable offshore wind projects may need to be relocated or eliminated within lease areas to avoid the informal or undesignated transit lanes. If these shifts result in WTG reductions that further reduce views of structures and/or nighttime lighting, these effects could decrease visual impacts relative to the Proposed Action.

Conclusions

Although the Transit alternative would reduce the number of WTGs visible in the seascape, which would have an associated reduction in visible structures with navigation and aviation lighting, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **major**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative's incremental impacts would be similar to the Proposed Action (with individual impacts ranging from **negligible** to **moderate**). The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor** to **moderate**.

3.5.9.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

This alternative under either layout option would not affect Project onshore activities; therefore, effects would be the same as the Proposed Action: negligible to major.

Offshore, this alternative could result in decreased visual impacts related to nighttime navigation lighting because there would be fewer WTGs and associated nighttime lighting. All other visual impacts related to construction and installation, O&M, and conceptual decommissioning of onshore and nearshore components would be similar to the Proposed Action and would result in similar short- and long-term, negligible to major adverse visual impacts to daytime and nighttime viewers.

Cumulative Impacts

This alternative under either layout option would not affect Project onshore activities. Offshore, this alternative would incrementally add sources of visual impacts (structures, lighting) at quantities and durations similar to the Proposed Action. Therefore, the overall cumulative impacts of the alternative on visual resources when combined with past, present, and reasonably foreseeable activities would have long-term, negligible to major impacts.

Conclusions

Although the Habitat alternative under either layout option would reduce the number of WTGs visible in the seascape, which would have an associated reduction in visible structures with navigation and aviation lighting, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **major**.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative's incremental impacts would be similar to the Proposed Action (with individual impacts ranging from **negligible** to **moderate**). The overall impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor** to **moderate**.

3.5.9.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives, although some variation in impacts is acknowledged due to fewer WTGs being constructed. Although the number of WTGs varies slightly, BOEM expects that non-historic visual impacts would range from **negligible** to **major** for all action alternatives.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ, as they do here. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from **negligible** to **moderate**. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **moderate**.

3.5.9.4 Mitigation

BOEM could require installation of an ADLS as a mitigation measure. The use of ADLS technology would reduce long-term, negligible to major adverse visual impacts to non-historic properties from nighttime lighting to negligible or minor because the short-duration synchronized flashing of the ADLS would have substantially fewer visual impacts at night than the standard continuous, medium-intensity red strobe light aircraft warning systems due to the short duration of activation, as discussed in Section 3.5.9.2.2 (No Action Alternative).

CHAPTER 4. REQUIRED DISCLOSURES

4.1 UNAVOIDABLE ADVERSE IMPACTS

Table 4.1.1-1 summarizes unavoidable adverse impacts for each analyzed resource, subject to applicable EPMs (see Table G-1 in Appendix G). Table 4.1.1-1 does not include potential additional mitigation measures that could avoid or further minimize or mitigate Project impacts. Please see the individual resource discussions in Chapter 3 for detailed analyses.

4.1.1 Potential Unavoidable Adverse Impacts of the Action Alternatives

Table 4.1.1-1. Potential Unavoidable Adverse Impacts of the Action Alternatives

Resource Area	Potential, Unavoidable Adverse Impact of the Action Alternatives
Air quality	Impacts from emissions from engines associated with vessel traffic, construction activities, and equipment operation
Water quality	Increase in erosion, turbidity and sediment resuspension, and inadvertent spills during construction and installation, O&M, and conceptual decommissioning
Bats	Displacement and avoidance behavior due to habitat loss and alteration, equipment noise, and vessel traffic Individual mortality due to collisions with operating WTGs
Benthic habitat, EFH, invertebrates, and finfish	Increase in suspended sediments and resulting effects due to seafloor disturbance Habitat quality impacts including reduction in habitat as a result of seafloor surface alterations Displacement, disturbance, and avoidance behavior due to habitat loss and alteration, equipment noise, vessel traffic, increased turbidity, sediment deposition, and electromagnetic fields Individual mortality due to construction and installation, O&M, and conceptual decommissioning Conversion of soft-bottom habitat to new hard-bottom habitat
Birds	Displacement and avoidance behavior due to habitat loss and alteration, equipment noise, and vessel traffic Individual mortality due to collisions with operating WTGs
Marine mammals	Displacement, disturbance, and avoidance behavior due to habitat loss and alteration, equipment noise, vessel traffic, increased turbidity, and sediment deposition during construction and installation and O&M Temporary loss of acoustic habitat and increased potential for vessel strikes
Terrestrial and coastal habitats and fauna	Displacement and avoidance behavior from habitat loss and alteration and from equipment noise Individual mortality from collisions with vehicles or construction equipment Short-term habitat alteration and increased invasive species risk
Sea turtles	Disturbance, displacement, and avoidance behavior due to habitat loss and alteration, equipment noise, vessel traffic, increased turbidity, sediment deposition, and electromagnetic fields
Wetlands and other WOTUS	Increase in soil erosion, sedimentation, and discharges and releases from land disturbance during construction and installation, O&M, and conceptual decommissioning
Commercial fisheries and for-hire recreation fishing	Disruption to access or temporary restriction in port access or harvesting activities due to construction of offshore Project elements Disruption to harvesting activities during operations of offshore wind facility Changes in vessel transit and fishing operation patterns Changes in risk of gear entanglement or target species
Cultural resources	Impacts to unidentified or undefined submerged marine resources from Project construction and installation and O&M Impacts to terrestrial cultural resources and to the viewshed from Project construction and installation and O&M

Resource Area	Potential, Unavoidable Adverse Impact of the Action Alternatives
Demographics, employment, and economics	No unavoidable adverse impacts
Environmental justice	Changes to air quality, water quality, land use and coastal infrastructure, and commercial fisheries and for-hire recreational fishing that are disproportionately borne by minority or low-income populations from Project construction and installation, O&M, and conceptual decommissioning
Land use and coastal infrastructure	Land use disturbance due to construction as well as effects due to noise, vibration, and travel delays
Navigation and vessel traffic	Changes in vessel transit patterns
Other marine uses	Changes in access to marine mineral resource, and cable placement Disruption of scientific surveys, radar systems, military, and aviation traffic
Recreation and tourism	Disruption of coastal recreation activities during onshore construction, such as beach access Viewshed effects from the WTGs altering enjoyment of marine and coastal recreation and tourism activities Disruption to access or temporary restriction of in-water recreational activities from construction of offshore Project elements Hindrances to some types of recreational fishing from the WTGs during operation
Visual resources	Change in scenic quality of landscape and seascape

4.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time, such as the short-term loss of timber productivity in forested areas that are kept clear for a power line or a road. Table 4.2.1-1 summarizes irreversible or irretrievable effects for each analyzed resource, subject to applicable EPMs. Table 4.2.1-1 does not include potential additional mitigation measures that could avoid or further minimize or mitigate Project impacts. Chapter 3 provides a detailed discussion of effects associated with the Project.

4.2.1 Irreversible and Irretrievable Commitment of Resources by Resource Area

Table 4.2.1-1. Irreversible and Irretrievable Commitment of Resources by Resource Area

Resource Area	Irreversible Impacts	Irretrievable Impacts	Explanation
Air quality	No	No	BOEM expects air emissions to be in compliance with permits regulating air quality standards, and emissions would be temporary during construction activities. If the Proposed Action displaces fossil-fuel energy generation, overall improvement of air quality would be expected.
Water quality	No	No	BOEM does not expect activities to cause loss of or major impacts on existing inland waterbodies or wetlands. Turbidity and other water quality impacts in the marine and coastal environment would be short term, with the rare exception of a major spill.

Resource Area	Irreversible Impacts	Irretrievable Impacts	Explanation
Bats	No	No	Based on the healthy populations of bat species more susceptible to collision with operating WTGs, and assuming implementation of time-of-year restrictions for tree clearing, displacement, avoidance behavior, and individual mortality due to collisions with operating WTGs are not expected to be irreversible or irretrievable.
Benthic habitat, EFH, invertebrates, and finfish	No	No	Although local mortality could occur, BOEM does not anticipate population-level impacts. The Project could alter habitat during construction and operations but could restore the habitat after conceptual decommissioning.
Birds	No	No	Based on the healthy populations of bird species more susceptible to collision with operating WTGs, displacement, avoidance behavior, and individual mortality due to collisions with operating WTGs are not expected to be irreversible or irretrievable. Irreversible and irretrievable impacts on bird species could occur if one or more individuals of species listed under the ESA were injured or killed. However, ongoing consultation with the USFWS would identify mitigation measures that would reduce or eliminate the potential for such impacts on listed species.
Marine mammals	No	Yes	Irreversible impacts on marine mammals could occur if one or more individuals of species listed under ESA were injured or killed; however, mitigation measures would reduce or eliminate the potential for such impacts on listed species. Irretrievable impacts could occur if individuals or populations grow more slowly as a result of displacement from the Lease Area.
Terrestrial and coastal habitats and fauna	No	No	Although local mortality could occur, BOEM does not anticipate population-level impacts on other terrestrial and coastal fauna. The Project could alter habitat during construction and operations but could restore the habitat after conceptual decommissioning.
Sea turtles	No	Yes	Irreversible impacts on sea turtles could occur if one or more individuals of species listed under the ESA were injured or killed; however, mitigation measures would reduce or eliminate the potential for impacts on listed species. Irretrievable impacts could occur if individuals or populations grow more slowly as a result of displacement from the Lease Area.
Wetlands and other WOTUS	No	No	BOEM does not expect activities to cause loss of or major impacts on existing wetlands or other WOTUS.
Commercial fisheries and for-hire recreation fishing	No	Yes	Based on the anticipated duration of construction and installation and O&M, BOEM does not anticipate impacts on commercial fisheries to result in irreversible impacts. The Project could alter habitat during construction and operations, limit access to fishing areas during construction, or reduce vessel maneuverability during operations. However, the conceptual decommissioning of the Project would reverse those impacts. Irretrievable impacts could occur due to the loss of use of fishing areas at an individual level.
Cultural resources	Yes	Yes	Although unlikely, unanticipated removal or disturbance of previously unidentified cultural resources onshore and offshore could result in irreversible or irretrievable impacts.
Demographics, employment, and economics	No	No	Based on the anticipated duration of construction and installation and O&M, BOEM does not anticipate that contractor needs, housing needs, and supply requirements would lead to an irretrievable loss of workers for other projects or increase housing and supply costs.
Environmental justice	No	No	Potential environmental justice impacts, if any, would be short term and localized.
Land use and coastal infrastructure	Yes	Yes	Land use required for construction and operation activities, such as the land proposed for the interconnection facility, could result in a minor irreversible impact. Construction activities could result in a minor irretrievable impact due to the temporary loss of use of the land for otherwise typical activities. Onshore facilities may or may not be decommissioned.

Resource Area	Irreversible Impacts	Irretrievable Impacts	Explanation
Navigation and vessel traffic	No	Yes	Based on the anticipated duration of construction and installation and O&M, BOEM does not anticipate impacts on vessel traffic to result in irreversible impacts. Irretrievable impacts could occur due to changes in transit routes, which could be less efficient during the life of the Project.
Other marine uses	No	No	BOEM does not anticipate the potential impacts to be irreversible or irretrievable.
Recreation and tourism	No	No	Construction activities near the shore could result in a minor, temporary loss of use of the land for recreation and tourism purposes, but these impacts would not be irreversible or irretrievable.
Visual resources	No	Yes	Viewshed changes would persist for the life of the Project, until conceptual decommissioning is complete.

4.3 RELATIONSHIP BETWEEN THE SHORT-TERM USE OF THE HUMAN ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The CEQ's NEPA implementing regulations (40 CFR 1502.16) require that an EIS address the relationship between short-term use of the environment and the potential impacts of such use on the maintenance and enhancement of long-term productivity. Such impacts could occur as a result of a reduction in the flexibility to pursue other options in the future, or assignment of a specific area (land or marine) or resource to a certain use that would not allow other uses, particularly beneficial uses, to occur at a later date. An important consideration when analyzing such effects is whether the short-term environmental effects of the action would result in detrimental effects to long-term productivity of the affected areas or resources.

As assessed in Chapter 3, BOEM anticipates that most of the potential adverse effects associated with the Proposed Action would occur during construction activities, and would be temporary and minor or moderate as defined in Sections 3.3–3.5. Table 4.1.1-1 and Table 4.2.1-1 identify unavoidable, irretrievable, or irreversible impacts that would be associated with the Project. However, BOEM expects most of the marine and onshore environments to return to normal long-term productivity levels after Project conceptual decommissioning. Based on these findings, BOEM also anticipates that the Proposed Action would not result in impacts that would significantly narrow the range of future uses of the environment.

Additionally, the Project would provide several long-term benefits:

- Promotion of clean and safe development of domestic energy sources and clean energy job creation
- Promotion of renewable energy to help ensure geopolitical security; combat climate change; and provide electricity that is affordable, reliable, safe, secure, and clean
- Delivery of power to the South Fork of Suffolk County, Long Island, to contribute to New York's renewable energy requirements
- Increased habitat for certain fish species

APPENDIX A

Required Environmental Permits and Consultations

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CONTENTS

Tables

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REQUIRED ENVIRONMENTAL PERMITS AND CONSULTATIONS

Introduction

This appendix discusses required permitting and public, agency, and Tribal involvement in the preparation of the South Fork Wind Farm and South Fork Export Cable Project environmental impact statement (EIS). This involvement included formal consultations, cooperating agency exchanges, and a public scoping comment period.

Authorizations and permits are listed in Table A-1, and cooperating or participating federal agencies are described below. The Bureau of Ocean Energy Management (BOEM) has completed the following interagency milestones to date for the Project:

- Permitting timetable: August 21, 2020
- Purpose and need: August 28, 2020
- Alternatives carried forward for evaluation: September 18, 2020

Other Federal and State Review

Table A-1 provides a discussion of other federal and state reviews required, including legal authority, jurisdiction of the agency, and the regulatory process involved.

Table A-1. Cooperating Agencies, Required Environmental Permits, and Consultations for the Project

Agency/Regulatory Authority	Cooperating Agency Status	Permit/Approval	Status
Federal			
BOEM	Lead federal agency	Construction and operations plan approval	Originally filed on June 29, 2018; updates submitted on May 24, 2019; February 2020; and May 7, 2021
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service	Cooperating agency	Incidental Harassment Authorization or Letter of Authorization	Filed on September 15, 2020
U.S. Department of Defense, U.S. Army Corps of Engineers	Cooperating agency	Clean Water Act (CWA) Section 404/Rivers and Harbors Act of 1899 Section 10 Individual Permit	Filed on December 23, 2020
U.S. Department of Homeland Security, U.S. Coast Guard	Cooperating agency	Private Aids to Navigation authorization	To be filed (TBF)
U.S. Department of the Interior, Bureau of Safety and Environmental Enforcement	Cooperating agency	None	Not applicable
U.S. Environmental Protection Agency	Cooperating agency	Outer Continental Shelf Air Permit	Filed on February 1, 2019
State (portions of the Project within state jurisdiction)*			
Commonwealth of Massachusetts Office of Coastal Zone Management	Cooperating agency	Concurrence with the Coastal Zone Management Program Federal Consistency Determination pursuant to the following: Coastal Zone Management Act (16 USC 1451 et seq., 15 CFR 930; 30 CFR 585.611(b), 627(b)) Massachusetts General Law (21A, Subpart 4A) Massachusetts Coastal Zone Management Program Policies (310 Code of Massachusetts Regulations 20.00 and 21.00)	Issued on June 11, 2021
State of Rhode Island Coastal Resources Management Council	Cooperating agency	Coastal Zone Management Act Consistency Certification	Issued on July 1, 2021
State of Rhode Island Department of Environmental Management	Cooperating agency	None	Not applicable
New York Department of State, Division of Coastal Resources	None	Coastal Zone Management Act (16 USC 1451 et seq.) State Executive Law Article 42, Title 19 New York Codes, Rules and Regulations (NYCRR) Part 600	Issued on May 27, 2021

Agency/Regulatory Authority	Cooperating Agency Status	Permit/Approval	Status
New York State Department of Environmental Conservation (NYSDEC)	None	State Pollutant Discharge Elimination System (SPDES) General Permit GP-0-20-001 for Stormwater Discharges from Construction Activity, pursuant to 6 NYCRR 750–757[1]	TBF
		Water quality certification pursuant to Environmental Conservation Law (ECL) Article 15 (Water Resources) Title 5 (Protection of Water) (CWA Section 401, 16 USC 1451)	TBF
		ECL Article 15 Protection of Waters Permit (excavation and fill activities) and ECL Article 25 (Tidal Wetlands). These are permits/approvals that must be filed with the NYSDEC for the Montauk operations and maintenance facility.	TBF
		The following statutory and regulatory standards apply pursuant to the ECL and its implementing regulations in 6 NYCRR for construction of the South Fork Export Cable: 1) ECL Articles 11, 13, and 25 and their implementing regulations regarding marine resources, such as fisheries and habitat; 2) ECL Article 11 and 6 NYCRR 182, relating to threatened and endangered Atlantic sturgeon; 3) ECL Article 17 and 6 NYCRR 700–706, relating to water quality; 4) ECL Article 15 and 6 NYCRR 608, regarding water quality and excavation and fill activities; and 5) ECL Article 27 and 6 NYCRR 360, et seq., relating to disposal and management of solid waste	TBF
New York State Department of Public Service	None	Certificate of Environmental Compatibility and Public Need, pursuant to Article VII of the New York Public Service Law (16 NYCRR 85–88), Article 15 (6 NYCRR 608 and 621), and Article 25 (6 NYCRR 661)	Issued on March 18, 2021
		Environmental Management and Construction Plan, pursuant to Article VII (16 NYCRR 85–88)	Filed April 21, 2021
		Section 68 Petition (permission to exercise the grants of municipal rights), pursuant to Article VII (Section 68(1))	Filed May 3, 2021
		Water Quality Certification, pursuant to Section 401 of the CWA and Implementing Regulations (6 NYCRR 701, 702, 704, 754, and 800–941)	Filed on September 14, 2018
New York State Department of Transportation - Region 10	None	Utility Work Permit - Form Perm 32, pursuant to New York State Highway Law (Article 3, design 2)	3–6 months prior to construction start
New York Office of General Services	None	New York Public Lands Law, Article 2, Section 3 responsible for the granting of easements, rights-of-way or other permissive instruments to grant permission for the use of the underwater lands.	TBF

[1] An individual SPDES permit is not expected because construction activities over 1 acre are covered under GP-0-20-001, unless they are determined to be an ineligible activity, as listed in Part 1, Subparagraph F of GP-0-20-001.

Agency/Regulatory Authority	Cooperating Agency Status	Permit/Approval	Status
Local*			
Town of East Hampton	Cooperating agency	Township of East Hampton Section 246-2 – Placement of boats, floats, moorings and anchors	TBF
Trustees of the Freeholders and Commonalty of the Town of East Hampton	Cooperating agency	None	Not applicable
Village of East Hampton	None	Coastal Erosion Permit	TBF
		Excavation/Utility Work Permit	TBF
		Design and Site Plan Application	TBF

* State and local agencies are considered cooperating agencies under the National Environmental Policy Act.

Cooperating Agencies

As part of the National Environmental Policy Act (NEPA) process, BOEM invited other federal agencies and state, Tribal, and local governments to consider becoming cooperating agencies in the preparation of the EIS. According to Council on Environmental Quality guidelines, qualified agencies and governments are those with “jurisdiction by law” or “special expertise” (40 CFR 1501.6). BOEM asked potential cooperating agencies to consider their authority and capacity to assume the responsibilities of a cooperating agency and to be aware that an agency's role in the environmental analysis neither enlarges nor diminishes the final decision-making authority of any other agency involved in the NEPA process. BOEM also provided potential cooperating agencies participating in the FAST-41 process with a written summary of expectations for cooperating agencies, including time schedules and critical action dates, milestones, responsibilities, scope, detail of cooperating agencies’ contributions, and availability of pre-decisional information.

Cooperating agency status is provided in Table A-1. More specific details regarding federal agency roles and expertise are described below.

National Marine Fisheries Service

The National Marine Fisheries Service (NMFS) is serving as a cooperating agency pursuant to 40 CFR 1501.6 because the scope of the Proposed Action and alternatives involves activities that could affect marine resources under their jurisdiction by law and special expertise. As applicable, permits and authorizations are issued pursuant to the Marine Mammal Protection Act, as amended (MMPA; 16 USC 1361 et seq.); the regulations governing the taking and importing of marine mammals (50 CFR part 216); the Endangered Species Act (ESA; 16 USC 1531 et seq.); and the regulations governing the taking, importing, and exporting of threatened and endangered species (50 CFR part 222–226). In accordance with 50 CFR part 402, NMFS also serves as the consulting agency under Section 7 of the ESA for federal agencies proposing actions that may affect marine resources listed as threatened or endangered. NMFS has additional responsibilities to conserve and manage fishery resources of the United States, which include the authority to engage in consultations with other federal agencies pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and 50 CFR part 600 when proposed actions may adversely affect essential fish habitat (EFH). MMPA is the only authorization for NMFS that requires NEPA compliance, which will be met via adoption of BOEM’s EIS and issuance of the record of decision (ROD).

NMFS has multiple roles in the NEPA process and EIS for this major federal action. First, NMFS has a responsibility to serve as a cooperating agency based on its technical expertise and legal jurisdiction over multiple trust resources. NMFS’ role is to provide expert advice regarding the action’s impact with respect to essential fish habitats, as defined in the MSA, listed threatened and endangered species and designated critical habitat listed under the ESA, marine mammals protected by the MMPA, and commercial and recreational fisheries managed under the MSA.

Second, NMFS intends to adopt the EIS in support of its authorization decision after reviewing it and determining it to be sufficient. NMFS is required to review applications for Incidental Take Authorizations (ITAs) under the MMPA, as amended (16 USC 1361 et seq.), and issue an ITA if appropriate. South Fork Wind, LLC (SFW) has submitted an application to NMFS for an ITA in conjunction with the construction and operations plan (COP), for take, as defined by the MMPA, of marine mammals incidental to Project construction and associated activities. The decision to issue an ITA under the MMPA is considered a major federal action requiring NEPA review. Therefore, NMFS has an independent responsibility to comply with NEPA. Consistent with the regulations published by the Council on Environmental Quality (40 CFR 1501.7(g)), NMFS intends to rely on the information and analyses in BOEM’s EIS to fulfill its NEPA obligations for ITA issuance, if applicable. NMFS intends to adopt the final EIS for this purpose.

Bureau of Safety and Environmental Enforcement

The Bureau of Safety and Environmental Enforcement (BSEE) is serving as a cooperating agency pursuant to 40 CFR 1501.6 because the scope of the Proposed Action and alternatives involves activities that could affect marine resources under their jurisdiction by law and special expertise.

U.S. Coast Guard

The U.S. Coast Guard is serving as a cooperating agency pursuant to 40 CFR 1501.6 because the scope of the Proposed Action and alternatives involves activities that could affect navigation and safety issues that fall under their jurisdiction by law and special expertise.

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) is serving as a cooperating agency pursuant to 40 CFR 1501.6 because the scope of the Proposed Action and alternatives involves activities that could affect resources under their jurisdiction by law and special expertise. The EPA is responsible for issuing an Outer Continental Shelf (OCS) permit for the Project under the Clean Air Act.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACE) is serving as a cooperating agency pursuant to 40 CFR 1501.6 because the scope of the Proposed Action and alternatives involves activities that could affect resources under their jurisdiction by law and special expertise. As applicable, permits and authorizations are issued pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. As an offshore wind energy project, the Project needs to be situated offshore in the water. The fill activities associated with the Project consist of the inter-array cable armoring at the base of the wind turbine generator (WTG) foundations, protective cable armoring for the South Fork Export Cable, dredging planned for the potential operations and maintenance facility at Montauk, and construction of a temporary cofferdam. Issuance of Section 10 or Section 404 permits requires NEPA compliance, which will be met via adoption of BOEM's EIS and issuance of the ROD.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) is serving as a participating agency for the Project. The USFWS also serves as the consulting agency under Section 7 of the ESA for federal agencies proposing actions that may affect terrestrial resources listed as threatened or endangered.

Consultations

The following section provides a summary and status of BOEM consultations as part of the Project (ongoing, complete, and the opinion or finding of each consultation). Section 1.3.1 of the COP provides a discussion of other federal and state consultation processes being led by SFW (Jacobs Engineering Group Inc. [Jacobs] 2021).

Coastal Zone Management Act

The Coastal Zone Management Act requires that federal actions within and outside the coastal zone that have reasonably foreseeable effects on any coastal use or natural resource of the coastal zone be consistent with the enforceable policies of a state's federally approved coastal management program. On October 22, 2018, SFW submitted a federal consistency certification with the New York State Department of State –

Division of Coastal Resources, Commonwealth of Massachusetts Office of Coastal Zone Management, and the State of Rhode Island Coastal Resources Management Council per 15 CFR 930.76 Subpart E. SFW received their consistency decision as follows for each state:

- Massachusetts: July 15, 2021
- New York: May 27, 2021
- Rhode Island: July 1, 2021

The COP provides the necessary data and information under 15 CFR 930.58 (Jacobs 2021). The states' concurrence is required before BOEM could approve, or approve with conditions, the COP per 30 CFR 585.628(f) and 15 CFR 930.130(1).

Endangered Species Act

Section 7(a)(2) of the ESA of 1973, as amended (16 USC 1531 et seq.), requires that each federal agency ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of those species. When the action of a federal agency could affect a protected species or its critical habitat, that agency is required to consult with either the NMFS or the USFWS, depending upon the jurisdiction of the services. Pursuant to 50 CFR 402.07, BOEM has accepted designation as the lead federal agency for the purposes of fulfilling interagency consultation under Section 7 of the ESA for listed species under the jurisdiction of NMFS and USFWS. BOEM will consult on the proposed activities considered in this EIS with both NMFS and USFWS for listed species under their respective jurisdictions. Draft biological assessments were submitted to NMFS and USFWS on January 8, 2020. BOEM completed the USFWS consultation by March 4, 2021, and the NMFS consultation on July 8, 2021.

Government-to-Government Consultation with Federally Recognized Indian Tribes

Executive Order (EO) 13175 commits federal agencies to engage in government-to-government consultation with Tribes, and Secretarial Order No. 3317 requires U.S. Department of the Interior agencies to develop and participate in meaningful consultation with federally recognized Tribes where a Tribal implication may arise. A June 29, 2018, memorandum outlines BOEM's current Tribal consultation policy (BOEM 2018). This memorandum states that "consultation is a deliberative process that aims to create effective collaboration and informed Federal decision-making" and is in keeping with the spirit and intent of the National Historic Preservation Act (NHPA) and NEPA, executive and secretarial orders, and U.S. Department of the Interior policy (BOEM 2018). BOEM implements Tribal consultation policies through formal government-to-government consultation, informal dialogue, collaboration, and engagement.

BOEM conducted government-to-government consultations with the Narragansett Indian Tribe, the Mashantucket Pequot Tribal Nation, and the Mohegan Tribe of Indians of Connecticut in an overview of planned offshore wind development projects off southern New England, including the South Fork project, in August 2018.

In October 2018, individual email invitations to participate in the scoping process for this EIS were sent to the federally recognized Narragansett Indian Tribe, Mashpee Wampanoag Tribe, Mashantucket Pequot Tribal Nation, Mohegan Tribe of Indians of Connecticut, and Shinnecock Indian Nation. Although no comments were received from the Tribes during the scoping period, the draft EIS was posted on BOEM's website for their review and comment. BOEM also conducted government-to-government consultations with the Mashpee Wampanoag Tribe in February 2019.

Between January 15 and 17, 2020, BOEM met again with the Mohegan Tribe of Indians of Connecticut, the Mashantucket Pequot Tribal Nation, and the Narragansett Indian Tribe to discuss multiple BOEM actions, including the Proposed Action. Concerns expressed by representatives from the Tribes present included possible effects on marine mammals, other marine life, and the Nantucket Sound Traditional Cultural Property (TCP). One Tribe emphasized the importance of open sea views to the east during sunrise, as well as the night sky, while others emphasized their long historical association with the sea and islands off southern New England and the critical role of fishing and shellfish gathering. All of the Tribes emphasized the importance of understanding the interconnected nature of the human world, the sea, and the living things in both worlds.

On July 21, 2020, BOEM and the BSEE conducted three separate meetings with the Mashantucket Pequot Tribal Nation, the Wampanoag Tribe of Gay Head (Aquinnah), and the Mashpee Wampanoag Tribe. These meetings generally focused on developing mitigation measures for offshore wind project impacts, funding, and best practices. Concerns expressed by representatives from the Tribes present included project effects and layout, a desire to redefine the Nantucket Sound TCP boundaries, recommendations for mitigation measures, aboriginal rights and titles, communication with developers, and cumulative effects of the present and future offshore wind projects in the area.

On July 27, 2020, BOEM held a government-to-government meeting with the Mashantucket Pequot Tribal Nation, Mashpee Wampanoag Tribe, and the Wampanoag Tribe of Gay Head (Aquinnah). Concerns voiced by the representatives from the Tribes included site avoidance, Tribal staffing, best practices, and additional Tribal involvement. This meeting concluded with some action items for BOEM, including providing additional information on marine life and electrocution risk and terrestrial and marine analysis methods, a review of previous documents, scheduling a future meeting concerning environmental studies with the National Oceanic and Atmospheric Administration (NOAA), and following up with the Advisory Council on Historic Preservation (ACHP) regarding sharing the location of marine archaeological data with consulting parties during NHPA Section 106 reviews.

On August 20, 2020, BOEM consulted with the Delaware Tribe, Mashantucket Pequot Tribal Nation, Mashpee Wampanoag Tribe, and the Wampanoag Tribe of Gay Head (Aquinnah) to discuss the impacts of offshore wind developments on marine mammals. This included an overview of the consultation process and environmental review, the BOEM Environmental Studies program and process, existing and upcoming studies related to the North Atlantic right whales, and the marine mammal analysis and findings noted in the supplemental EIS. The meeting concluded with some action items for BOEM, including to provide the above-referenced consulting parties with additional reports and to research funding options to provide tuition assistance for Tribal members interested in participating in the Protected Species Observer training certificate program.

On March 12, 2021, BOEM consulted with the Mashpee Wampanoag Tribe and the Wampanoag Tribe of Gay Head (Aquinnah) to discuss the proposed nomination of a TCP district to the National Register of Historic Places (NRHP) off the coast of Massachusetts. The TCP district proposed by the two Wampanoag Tribes would encompass the lands and waters associated with the Wampanoag culture hero Moshup, including the Nantucket Sound TCP and the Vineyard Sound-Moshup's Bridge TCP identified during consultations for the Project. The representatives from the Tribes informed BOEM that the proposed TCP district was best described as a cultural landscape: a geographic area, including both cultural and natural resources and the wildlife therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. The representatives from the Tribes stated that, in their opinion, any nomination should not be limited to the activities and lands associated with Moshup but also include detailed documentation of Wampanoag history in the area, such as their participation in the whaling industry, detailing the role the Wampanoag peoples have played in the history of the region. In a subsequent meeting on April 15, 2021, BOEM informed the representative from the Wampanoag Tribe of

Gay Head (Aquinnah) that BOEM's Office of Environmental Programs, Studies Program had developed a proposal for a collaborative ethnographic and historic research project with the Wampanoag Tribe of Gay Head (Aquinnah) and Mashpee Wampanoag Tribe to collect, document, and report information that could be used by the Tribes to complete an NRHP nomination for the proposed TCP district.

On April 9, 2021, BOEM held a government-to-government consultation meeting with representatives from the Delaware Tribe of Indians, Mashantucket Pequot Tribal Nation, Mashpee Wampanoag Tribe, and the Wampanoag Tribe of Gay Head (Aquinnah). Most of the meeting focused on topics and issues applicable to all proposed offshore wind off the coast of New England, including the Project. During the meeting, representatives from the Tribes voiced concerns about potential Project-specific and cumulative impacts to water quality; marine mammals; coastal habitats; benthic communities; culturally, economically, and historically significant fisheries and shellfish populations; chemical pollutants; the financial and time burden on Tribes of participating in multiple, simultaneous offshore wind project reviews; visual impacts on TCPs; and preserving the marine and terrestrial environments for future generations, particularly the current and future ability of Tribal youth to perform sacred ceremonies and have safe havens for traditional cultural practices in the future. In addition to discussing these concerns, representatives from the Tribes also recommended that BOEM consider creating a single offshore export cable corridor for all projects off the coasts of Rhode Island and Massachusetts and requested that BOEM consult with federally recognized Tribes on all proposed offshore wind projects as a single federal action, rather than on a project-by project basis.

BOEM continues to consult with these and other Tribes on developments in offshore wind. Additional government-to-government consultations are planned for the future.

As part of COP development, SFW also conducted prior coordination with engaged Tribes, State Historic Preservation Officers, and other stakeholders identified as having potential to inform the design process (see COP Table 1.4-1).

Marine Mammal Protection Act

The MMPA was enacted to protect and conserve marine mammals and established a general moratorium on the taking and importation of marine mammals, with certain enumerated exceptions. Unless an exception applies, the act prohibits persons or vessels subject to the jurisdiction of the United States from taking any marine mammal in waters or on lands under the jurisdiction of the United States or on the high seas (16 USC 1372(a)(1), (a)(2)). Section 101(a) of the act provides the prohibitions for the incidental taking of marine mammals. The incidental take of a marine mammal falls under three categories: mortality, serious injury, or harassment (i.e., injury and/or disruption of behavioral patterns). Sections 101(a)(5)(A) and (D) of the act provide the exceptions to the prohibition on take, which give NMFS the authority to authorize the incidental but not intentional take of small numbers of marine mammals, provided certain determinations are made and statutory and regulatory procedures are met. Entities seeking to obtain authorization for the incidental take of marine mammals under NMFS jurisdiction must submit such a request (in the form of an application). Incidental take authorizations (ITA) may be issued as either 1) regulations and associated letters of authorization or 2) incidental harassment authorizations when a proposed action will not result in a potential for serious injury and/or mortality or where any such potential can be negated through required mitigation measures. NMFS also promulgated regulations to implement the provisions of the MMPA governing the taking and importing of marine mammals (50 CFR 216) and produced Office of Management and Budget (OMB)–approved application instructions (OMB Number 0648-0151) that prescribe the procedures necessary to apply for permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the MMPA. Once NMFS determines an application is adequate and complete, NMFS has a corresponding duty to determine whether and how to authorize take of marine mammals incidental to the activities described in the application. To authorize the incidental take of marine mammals, NMFS evaluates the best available scientific information to determine whether the take would have a negligible impact on the affected marine mammal species or stocks and an unmitigable impact on their availability for taking for subsistence uses. NMFS must also prescribe the "means of effecting the least practicable adverse impact" on the affected species or stocks and their habitat, and on the availability of those species or stocks for subsistence uses, as well as monitoring and reporting requirements.

NMFS received an application for an ITA from SFW on September 5, 2020. As outlined above, NMFS reviews applications to determine whether to issue an authorization for the activities described in the application. The proposed incidental harassment authorization was published in the *Federal Register* on February 5, 2021 (BOEM 2021a). The public comment period was open from February 5, 2021, through March 10, 2021.

National Historic Preservation Act

The NHPA (54 USC 306108 et seq.) requires federal agencies to consider the effects of their undertakings on historic properties, to the maximum extent possible plan and act to minimize harm to National Historic Landmarks (NHLs), and afford the ACHP an opportunity to comment. BOEM has determined that approving a COP constitutes an undertaking subject to Section 106 of the NHPA and is implementing the Section 106 Process (36 CFR 800). The construction of WTGs, installation of electrical support cables, and development of staging areas are ground- or seabed-disturbing activities that could directly affect archaeological resources. The presence of WTGs could also introduce visual elements out of character with the historic setting of historic structures or landscapes; in cases where historic setting is a contributing element of historic properties' eligibility for the NRHP, the Project could affect those historic properties, including NHLs. NHLs that may be affected by the undertaking will be addressed according to Section 110(f) of the NHPA, pursuant to 36 CFR 800.10.

BOEM is using the public scoping process to fulfill the public involvement requirements under NEPA as well as to seek public involvement in its Section 106 review, pursuant to 36 CFR 800.2(d)(3).

BOEM initiated review under Section 106 of the NHPA on April 7, 2019, with letters sent to identify consulting parties for this undertaking. Letters were then sent on June 29, 2020, to initiate consultation with those parties previously identified for the undertaking. Consultation is ongoing to define the area of potential effects (APE) for the Project, to identify historic properties within the APE, and to assess effects of the undertaking on identified historic properties. BOEM held an initial consultation meeting with consulting parties on September 29, 2020, to discuss the APE and the identification of historic properties within the APE; a second consultation meeting with consulting parties on March 11, 2021, to discuss the potential effects on historic properties; and a third consultation meeting on June 29, 2021, for the discussion of adverse effects and their resolution. BOEM is developing a memorandum of agreement with consulting parties to resolve adverse effects to NRHP-listed or NRHP-eligible properties resulting from the Project, including applying special requirements (36 CFR 800.10) for protecting NHLs as necessary.

The NEPA and NHPA process will be coordinated by BOEM as the evaluation of the COP proceeds, with a summary included in the ROD for the final EIS. In accordance with the regulations for the NEPA and NHPA Section 106 processes, these will further be coordinated with the requirements of other statutes. Specifically, the Vineyard Sound and Moshup's Bridge TCP is not limited to NHPA review and would be considered further by BOEM under EO 13007 and the American Indian Religious Freedom Act. EO 13007, "Indian Sacred Sites" (61 *FR* 26771-26772), directs federal land management agencies to accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites. BOEM management actions within the OCS may not directly affect Indian sacred sites; however, BOEM recognizes its undertakings could affect the physical integrity or ceremonial use of Indian sacred sites located on submerged federal lands on the OCS. As stated previously in the Government-to-Government Consultation with Federally Recognized Indian Tribes section, BOEM is also consulting with Indian Tribes on these matters in accordance with EO 13175.

Magnuson-Stevens Fishery Conservation and Management Act

Pursuant to Section 305(b) of the MSA, federal agencies are required to consult with NMFS on any action that may result in adverse effects on EFH. NMFS regulations implementing the EFH provisions of the act can be found at 50 CFR 600. As provided for in 50 CFR 600.920(b), BOEM has accepted designation as the lead agency for the purposes of fulfilling EFH consultation obligations under Section 305(b) of the act. Certain OCS activities authorized by BOEM may result in adverse effects on EFH and, therefore, require consultation with NMFS. BOEM has developed an EFH assessment (BOEM 2021b) concurrent with this EIS and transmitted that EFH assessment to NMFS on April 8, 2021. BOEM's EFH assessment determined that the Proposed Action would not adversely affect quality and quantity of EFH for several species of managed fish. BOEM and NMFS completed the EFH consultation by June 7, 2021.

Development of Environmental Impact Statement

This section provides an overview of the development of the EIS, including public scoping, cooperating agency involvement, and distribution of the EIS for public review and comment.

Scoping

On October 19, 2018, BOEM issued a notice of intent (NOI) to prepare an EIS consistent with the regulations implementing NEPA (42 USC 4321 et seq.) to assess the potential impacts of the Proposed Action and alternatives (83 *Federal Register* 53104). The notice of intent began the public scoping process for identifying issues and potential alternatives for consideration in the EIS. BOEM held three public scoping meetings near the Project to solicit feedback and identify issues and potential alternatives for consideration in the EIS. Throughout the scoping process, federal agencies; state, local, and Tribal governments; and the general public had the opportunity to help BOEM identify potential significant resources and issues, impact-producing factors, reasonable alternatives (e.g., size, geographic, seasonal, or other restrictions on construction and siting of facilities and activities), and potential mitigation measures to be analyzed in the EIS, as well as provide additional information. The formal scoping period lasted from October 19 through November 10, 2018.

BOEM accepted comment submissions on the NOI via the following mechanisms:

- Electronic submissions received via www.regulations.gov on docket number BOEM-2018-0010
- Electronic submissions received via email to a BOEM representative
- Hard copy comment letters submitted to BOEM via traditional mail
- Hard copy comment cards and/or letters received during each of the public scoping meetings
- Comments submitted verbally at each of the public scoping meetings

BOEM held three public scoping meetings at the following locations and dates:

- November 5, 2018, American Legion Post 419, Amagansett, New York
- November 7, 2018, UMASS Dartmouth SMAST East, New Bedford, Massachusetts
- November 8, 2018, Narragansett Community Center, Narragansett, Rhode Island

Summary of Scoping Comments

BOEM reviewed and considered, as appropriate, all scoping comments in the development of the draft EIS and used the comments to identify alternatives for analysis. A scoping summary report (SWCA Environmental Consultants 2019) summarizing the submissions received and the methods for analyzing them is available on BOEM's website at https://www.boem.gov/South-Fork/. In addition, all public scoping submissions received can be viewed online at http://www.regulations.gov by typing "BOEM-2018-0010" in the search field. As detailed in the scoping summary report, the resource areas or NEPA topics most referenced in the scoping comments include alternatives; commercial fisheries and for-hire recreation fishing; finfish, invertebrates, and EFH; NEPA process and engagement; and socioeconomics.

Distribution of the Draft Environmental Impact Statement for Review and Comment

On January 8, 2021, BOEM published a notice of availability for the draft EIS consistent with the regulations implementing NEPA to assess the potential impacts of the Proposed Action and alternatives (BOEM 2021c). The draft EIS was made available in electronic form for public viewing at https://www.boem.gov/South-Fork, and hard copies and/or compact discs were delivered to entities as requested. The notice of availability commenced the public review and comment period of the draft EIS. BOEM held three virtual public hearings to solicit feedback and identify issues for consideration in preparing the final EIS. Throughout the public review and comment period, federal agencies; state, local, and Tribal governments; and the general public had the opportunity to provide comments on the draft EIS in various ways, including the following:

- In hard copy form, delivered by hand or by mail, enclosed in an envelope labeled "South Fork COP EIS" and addressed to Program Manager, Office of Renewable Energy, Bureau of Ocean Energy Management, 45600 Woodland Road, Sterling, Virginia 20166. Comments must be received or postmarked no later than February 22, 2021.
- Through the regulations.gov web portal by navigating to http://www.regulations.gov and searching for docket number "BOEM-2020-0066." Click the "Comment Now!" button to the right of the document link. Enter your information and comment, then click "Submit."
- By attending one of the EIS public meetings at the locations and dates listed in the notice of availability and providing written or verbal comments.

The topics most referenced during the draft EIS comment period were commercial fisheries and recreational fishing, cumulative impacts, mitigation, marine mammals, finfish, invertebrates, and EFH.

BOEM reviewed and has considered all public submissions in the development of the final EIS except those from anonymous sources. BOEM's evaluation of public submissions focused on those comments within the submissions that were identified as substantive. EIS Appendix I describes the public comment processing methodology and definitions and also includes responses to the substantive comments received on the draft EIS. In addition, all public comment submissions received on the draft EIS can be viewed online at http://www.regulations.gov by typing "BOEM-2020-0066" in the search field.

Distribution of the Final Environmental Impact Statement for Review and Comment

The EIS is available in electronic form for public viewing at https://www.boem.gov/South-Fork/. Hard copies and/or digital versatile disks of the EIS can be requested by contacting the Program Manager, Office of Renewable Energy Programs in Sterling, Virginia. Publication of the final EIS initiates a minimum 30-day mandatory waiting period, during which BOEM is required to pause before issuing a ROD. The ROD will state clearly whether BOEM intends to approve, approve with conditions, or disapprove the COP for construction, operation, and eventual decommissioning of the Project. EIS notification lists for the Project are provided in Tables A-2 through A-4.

NOTIFICATION LIST

Table A-2. Federal Agencies

Agency	Contact	Location
Cooperating Federal Agencies		
EPA	Tim Timmermann	Boston, Massachusetts
NOAA, NMFS	Sue Tuxbury	Gloucester, Massachusetts
U.S. Coast Guard	George Detweiler	Washington, D.C.
U.S. Coast Guard	Michele DesAutels	Boston, Massachusetts
U.S. Coast Guard	Sarah Geoffrion	East Providence, Rhode Island
U.S. Department of the Interior, BSEE	Sherry Hunter	Sterling, Virginia
USACE	Robert Vietri	New York, New York
Participating Federal Agencies		
USFWS	Steve Papa	New York, New York

Table A-3. State and Local Agencies or Other Interested Parties

Agency	Contact	Location
Cooperating State and Local Agencies		
Commonwealth of Massachusetts Office of Coastal Zone Management	Robert Beori	Boston, Massachusetts
State of Rhode Island Coastal Resources Management Council	Jeff Willis	Wakefield, Rhode Island
State of Rhode Island Department of Environmental Management	Janet Coit	Providence, Rhode Island
Town of East Hampton	John Wagner	East Hampton, New York
Trustees of the Freeholders and Commonalty of the Town of East Hampton	Francis Bock	Amagansett, New York

Table A-4. Tribes and Native Organizations

Tribes and Native Organizations	State
Mashantucket Pequot Tribal Nation	Connecticut
Mashpee Wampanoag Tribe	Massachusetts
Mohegan Tribe of Indians of Connecticut	Connecticut
Narraganset Indian Tribe	Rhode Island
Shinnecock Indian Nation	New York
Wampanoag Tribe of Gay Head (Aquinnah)	Massachusetts

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APPENDIX B

List of Preparers and Reviewers, References Cited, and Glossary

CONTENTS

Tables

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LIST OF PREPARERS AND REVIEWERS

Table B-1. Bureau of Ocean Energy Management Contributors

Name	Role/Resource Area
National Environmental Policy Act (NEPA) Coordinator	
Boatman, Mary	NEPA compliance
Resource Scientists and Contributors	
Baker, Arianna	Navigation and vessel traffic
Baker, Kyle	Marine mammals and sea turtles
Barnett, Connie	Cultural resources
Bedard, Justin	Government to government
Bigger, David	Birds; bats; terrestrial and coastal fauna; wetlands
Brune, Genevieve	Land use and coastal infrastructure
Carrier, Brandi	Cultural resources
Chaiken, Emma	Demographics, employment, and economics; recreation and tourism; land use and coastal infrastructure; commercial fisheries and for-hire recreational fishing;
Cody, Mary	Marine mammals; sea turtles
Draher, Jennifer	Water quality
Hesse, Jeffrey T.	Military uses
Hoffman, Willie	Cultural resources
Hooker, Brian	Benthic, finfish, invertebrates, and essential fish habitat; commercial fisheries and for-hire recreational fishing
Howson, Ursula	Benthic, finfish, invertebrates, and essential fish habitat; commercial fisheries and for-hire recreational fishing; terrestrial and coastal fauna; wetlands
Jensen, Mark	Demographics, employment, and economics; recreation and tourism; land use and coastal infrastructure; commercial fisheries and for-hire recreational fishing
McCarty, John	Visual
Morin, Michelle	Chief, Environment Branch for Renewable Energy; NEPA compliance
Stromberg, Jessica	Project coordinator
Slayton, Ian	Air quality

Table B-2. Reviewers

Name	Title	Agency
Brown, William	Chief Environmental Officer	U.S. Bureau of Ocean Energy Management (BOEM)
Giordano, Juliette	Lead Environmental Protection Specialist	Bureau of Safety and Environmental Enforcement
Melendez-Arreaga, Pedro	Solicitor	Department of Interior, Office of the Solicitor
Timmerman, Timothy	Director	Environmental Protection Agency Region 1, Office of Environmental Review
Engler, Lisa	Director	Massachusetts Office of Coastal Zone Management
Crocker, Julie	Endangered Fish Branch Chief, GARFO Protected Resources Division	National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service

Name	Title	Agency
Tuxbury, Susan	Fishery Biologist/Wind Program Coordinator, GARFO Habitat and Ecosystems Services Division	NOAA National Marine Fisheries Service
Coit, Janet	Director	Rhode Island Department of Environmental Management
Boyd, James	Deputy Director	Rhode Island Coastal Resource Management Council
Ciochetto, David	Principal Ocean Engineer	Rhode Island Coastal Resource Management Council
Skenyon, Justin	Principal Ocean Engineer	Rhode Island Coastal Resource Management Council
Handell, Naomi Jacek, Christine	Project Manager, USACE, New York District Regulatory Branch-Eastern Section Project Manager, USACE New England District	U.S. Army Corps of Engineers
DesAutels, Michele	District 1 Agency Point of Contact	U.S. Coast Guard

Table B-3. Consultants

Name	Role/Resource Area
Project Management/Coordinators	
Burnett, Coleman, SWCA	National Environmental Policy Act lead
Fluder, Joseph; SWCA	Corporate sponsor; all sections
Hartmann, Christine; SWCA	Deputy project manager; all sections
Logan, Lauri; SWCA	Administrative record
Smith, Earl; SWCA	Geographic information systems
Wilmot, Susan; SWCA	Project manager; all sections
Subject Matter Experts	
Berger, Chris; Confluence	Marine mammals; Sea turtles
Blair, Patrick; SWCA	Recreation and tourism
Bockey, Chris; SWCA	Visual
Bush, Diane; SWCA	Editor
Downs, Michael; Northern Economics	Environmental justice
Doyle, Eric, Confluence	Benthic, finfish, invertebrates, and essential fish habitat; marine mammals; other marine uses
Fisher, Michael; Northern Economics	Navigation and vessel traffic
Greenberg, Gary; Northern Economics	Geographic information systems technician for commercial fisheries, environment justice, and navigation
Gregory, Melanie; SWCA	Bats
Hartley, Marcus; Northern Economics	Commercial fisheries and for hire recreational fishing; demographics, employment, and economics
Hogel, Adrian; SWCA	Birds; bats; terrestrial and coastal faunas; wetlands
Jamieson, Bill; SWCA	Air quality
Jemsek, Jack; SWCA	Water quality
Karpov, Alex; Confluence	Marine mammals

Name	Role/Resource Area
Klewicki, Laura; SWCA	Water quality
McArthur, Kerrie, Confluence	Benthic, finfish, invertebrates, and essential fish habitat
Meaders, Marlene; Confluence	Benthic, finfish, invertebrates, and essential fish habitat
McDonald (Muething), Kelly; Confluence	Marine mammals
Novak, Grant; Confluence	Benthic, finfish, invertebrates, and essential fish habitat; Marine mammals; other marine uses
Paulson, Merlyn; SWCA	Visual
Phillips, Scott; SWCA	Cultural resources
Rausch, Ryan; SWCA	Recreation and tourism
Sato, Irene; Confluence	Benthic, finfish, invertebrates, and essential fish habitat
Schug, Donald; Northern Economics	Commercial fisheries and for hire recreational fishing; environmental justice
Smith, Debbi; SWCA	Formatter and 508 accessibility
Sohm, Brad; SWCA	Air quality
Sunby, Paul; SWCA	Birds
Tucker Burfitt, Linda; SWCA	Editor
Watts, Gordon; Tidewater Atlantic Research	Cultural resources
Wheeler, Letitia; Confluence	Land use and coastal infrastructure
Wynn, Jen; SWCA	Appendix E

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GLOSSARY

Term	Definition
affected environment	Environment as it exists today that could be impacted by the proposed Project
ancient submerged landform feature	A landform as it was in ancient times
algal blooms	Rapid growth of the population of algae, also known as algae bloom
allision	A moving ship running into a stationary ship
anthropogenic	Generated by human activity
archaeological resource	Historical place, site, building, shipwreck, or other archaeological site on the American landscape
automatic identification system	Automatic tracking system used on vessels to monitor ship movements and avoid collision
baleen whale	A cetacean with baleens (whalebones) instead of teeth
below grade	Below ground level
benthic	Related to the bottom of a body of water
benthic resources	The seafloor surface, the substrate itself, and the communities of bottom-dwelling organisms that live within these habitats
Cetacea	Order of aquatic mammals made up of whales, dolphins, porpoises, and related lifeforms
coastal habitat	Coastal areas where flora and fauna live, including salt marshes and aquatic habitats
coastal waters	Waters in nearshore areas where bottom depth is less than 98.4 feet
coastal zone	The lands and waters starting at 3 nautical miles from the land and ending at the first major land transportation route
commercial fisheries	Areas or entities raising and/or catching fish for commercial profit
commercial-scale wind energy facility	Wind energy facility usually greater than 1 megawatt that sells the produced electricity
criteria pollutant	One of six common air pollutants for which the U.S. Environmental Protection Agency sets National Ambient Air Quality Standards: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, or sulfur dioxide
critical habitat	Geographic area containing features essential to the conservation of threated or endangered species
cultural resource	Historical districts, objects, places, sites, buildings, shipwrecks, and archeological sites on the American landscape, as well as sites of traditional, religious, or cultural significance to cultural groups, including Native American tribes
cumulative impacts	Impacts that could result from the incremental impact of a specific action, such as the proposed Project, when combined with other past, present, or reasonably foreseeable future actions or other projects; can occur from individually minor, but collectively significant actions that take place over time
demersal	Living close to the ocean floor
design envelope	The range of proposed Project characteristics defined by the applicant and used by the Bureau of Ocean Energy Management (BOEM) for purposes of environmental review and permitting
dredging	Removal of sediments and debris from the bottom of lakes, rivers, harbors, and other water bodies
duct bank	Underground structure that houses the onshore export cables, which consists of polyvinyl chloride (PVC) pipes encased in concrete
ecosystem	Community of interacting living organisms and nonliving components (such as air, water, soil)

Term	Definition
environmental protection measure (EPM)	Measure proposed in COP to avoid or minimize potential impacts
electromagnetic field	A field of force produced by electrically charged objects and containing both electric and magnetic components
endangered species	A species that is in danger of extinction in all or a significant portion of its range
Endangered Species Act–listed species	Species listed under the Endangered Species Act
ensonified	The process of filling with sound
environmental consequences	The potential impacts that the construction, operations, maintenance, and decommissioning of the proposed Project would have on the environment
environmental justice communities	Minority and low-income populations affected by the proposed Project
essential fish habitat	“Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (50 Code of Federal Regulations 600)
export cables	Cables connecting the wind facility to the onshore electrical grid power
finfish	Vertebrate and cartilaginous fishery species, not including crustaceans, cephalopods, or other mollusks
for-hire commercial fishing	Commercial fishing on a for-hire vessel, i.e. a vessel on which the passengers make a contribution to a person having an interest in the vessel in exchange for carriage
for-hire recreational fishing	Fishing from a vessel carrying a passenger for hire who is engaged in recreational fishing
foundation	The bases to which the wind turbine generators and offshore substation are installed on the seabed. Three types of foundations have been considered and reviewed for the Project: jacket, monopile, or gravity-based structure. Monopile is the selected foundation type for the Project.
hard-bottom habitat	Benthic habitats comprised of hard-bottom (e.g., cobble, rock, and ledge) substrates
historic property	Prehistoric or historic district, site, building, structure, or object that is eligible for or already listed in the National Register of Historic Places. Also includes any artifacts, records, and remains (surface or subsurface) related to and located within such a resource
horizontal directional drilling	Trenchless technique for installing underground cables, pipes, and conduits using a surface-launched drilling rig
hull	Watertight frame or body of a ship
inter-array cables	Cables connecting the wind turbine generators to the electrical service platforms
interconnection facility	Substation connecting the proposed Project to the existing bulk power grid system
invertebrate	Animal with no backbone
jack-up vessel	Mobile and self-elevating platform with buoyant hull
jet plow	Method of submarine cable installation equipment that primarily uses water jets to fluidize soil, temporarily opening a channel to enable the cable to be lowered under its own weight or be pushed to the bottom of the trench via a cable depressor.
knot	Unit of speed equaling 1 nautical mile per hour
landing site	The shoreline landing site at which the offshore cable transitions to onshore
Lease Area	The entire area that Deepwater Wind New England, LLC purchased from BOEM
marine mammal	Aquatic vertebrate distinguished by the presence of mammary glands, hair, three middle ear bones, and a neocortex (a region of the brain)
marine waters	Waters in offshore areas where bottom depth is more than 98.4 feet
mechanical cutter	Method of submarine cable installation equipment that involves a cutting wheel or excavation chain to cut a narrow trench into the seabed allowing the cable to sink under its own weight or be pushed to the bottom of the trench via a cable depressor.

Term	Definition
mechanical plow	Method of submarine cable installation equipment that involves pulling a plow along the cable route to lay and bury the cable. The plow's share cuts into the soil, opening a temporary trench which is held open by the side walls of the share, while the cable is lowered to the base of the trench via a depressor. Some plows may use additional jets to fluidize the soil in front of the share.
monopile or monopile foundation	A long steel tube driven into the seabed that supports a tower
nautical mile	A unit used to measure sea distances and equivalent to approximately 1.15 miles
offshore South Fork Export Cable	Export cables located in state or marine waters
offshore substation	The interconnection point between the wind turbine generators and the export cable; the necessary electrical equipment needed to connect the inter-array cables to the offshore export cables
onshore South Fork Export Cable	Export cables located on land
operations and maintenance facilities	Would include offices, control rooms, warehouses, shop space, and pier space
outer continental shelf	All submerged land, subsoil, and seabed belonging to the United States but outside of states' jurisdiction
pile	A type of foundation akin to a pole
pile driving	Installing foundation piles by driving them into the seafloor
pinnipeds	Carnivorous, semiaquatic, fin-footed marine mammals, also known as seals
plume	Column of fluid moving through another fluid
private aids to navigation	Visual references operated and maintained by the U.S. Coast Guard, including radar transponders, lights, sound signals, buoys, and lighthouses, that support safe maritime navigation
Project	The siting and development of the South Fork Wind Farm and the South Fork Export Cable
protected species	Endangered or threatened species that receive federal protection under the Endangered Species Act of 1973 (as amended)
right-of-way	Registered easement on private land that allows access by another entity
scour protection	Protection consisting of rock and stone that would be placed around all foundations to stabilize the seabed near the foundations as well as the foundations themselves
sessile	Attached directly by the base
soft-bottom habitat	Benthic habitats include soft-bottom (i.e., unconsolidated sediments) and hard-bottom (e.g., cobble, rock, and ledge) substrates, as well as biogenic habitat (e.g., eelgrass, mussel beds, and worm tubes) created by structure-forming species
South Fork Wind Farm (SFWF)	The work area containing all proposed wind turbine generators, offshore substations, and inter-array cables
substrate	Earthy material at the bottom of a marine habitat; the natural environment that an organism lives in
suspended sediments	Very fine soil particles that remain in suspension in water for a considerable period of time without contact with the bottom. Such material remains in suspension due to the upward components of turbulence and currents, and/or by suspension.
threatened species	A species that is likely to become endangered within the foreseeable future
tidal energy project	Project related to the conversion of the energy of tides into usable energy, usually electricity
transition vault	Underground concrete transition vault that to be constructed at the landing site and inside of which offshore and shore South Fork Export Cable would be spliced together.
trawl	A large fishing net dragged by a vessel at the bottom or in the middle of sea or lake water

Term	Definition
turbidity	A measure of water clarity
vibracore	Technology/technique for collecting core samples of underwater sediments and wetland soils
viewshed	Area visible from a specific location
visual resource	The visible physical features on a landscape, including natural elements such as topography, landforms, water, vegetation, and manmade structures
wetland	Land saturated with water; marshes; swamps
wind energy	Electricity from naturally occurring wind
wind energy area	Areas with significant wind energy potential and defined by BOEM
wind turbine generator	Component that puts out electricity in a structure that converts kinetic energy from wind into electricity

APPENDIX C

Additional Figures

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CONTENTS

Figures

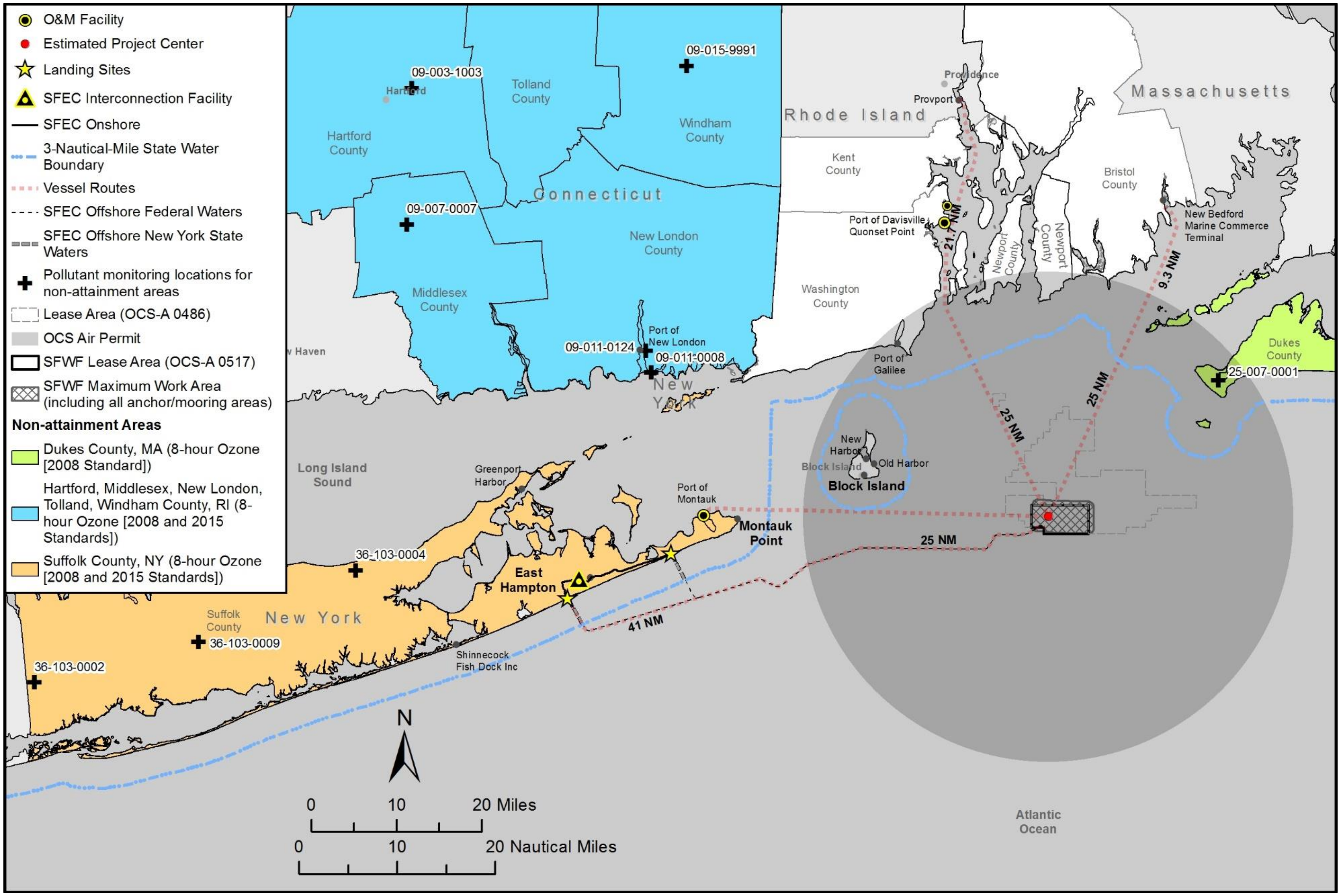

Figure C-1. Air quality information.

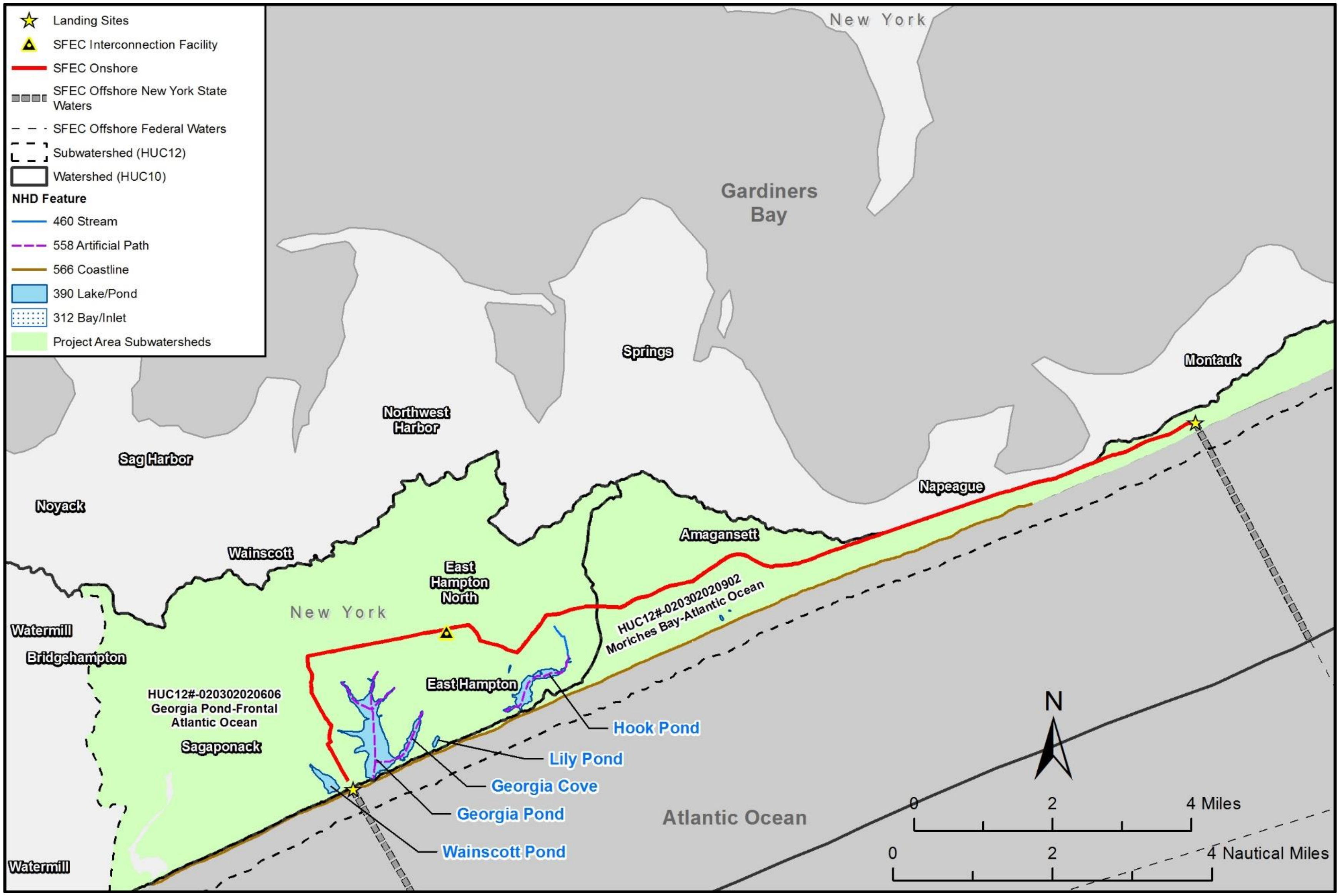

Figure C-2. Onshore watershed boundaries.

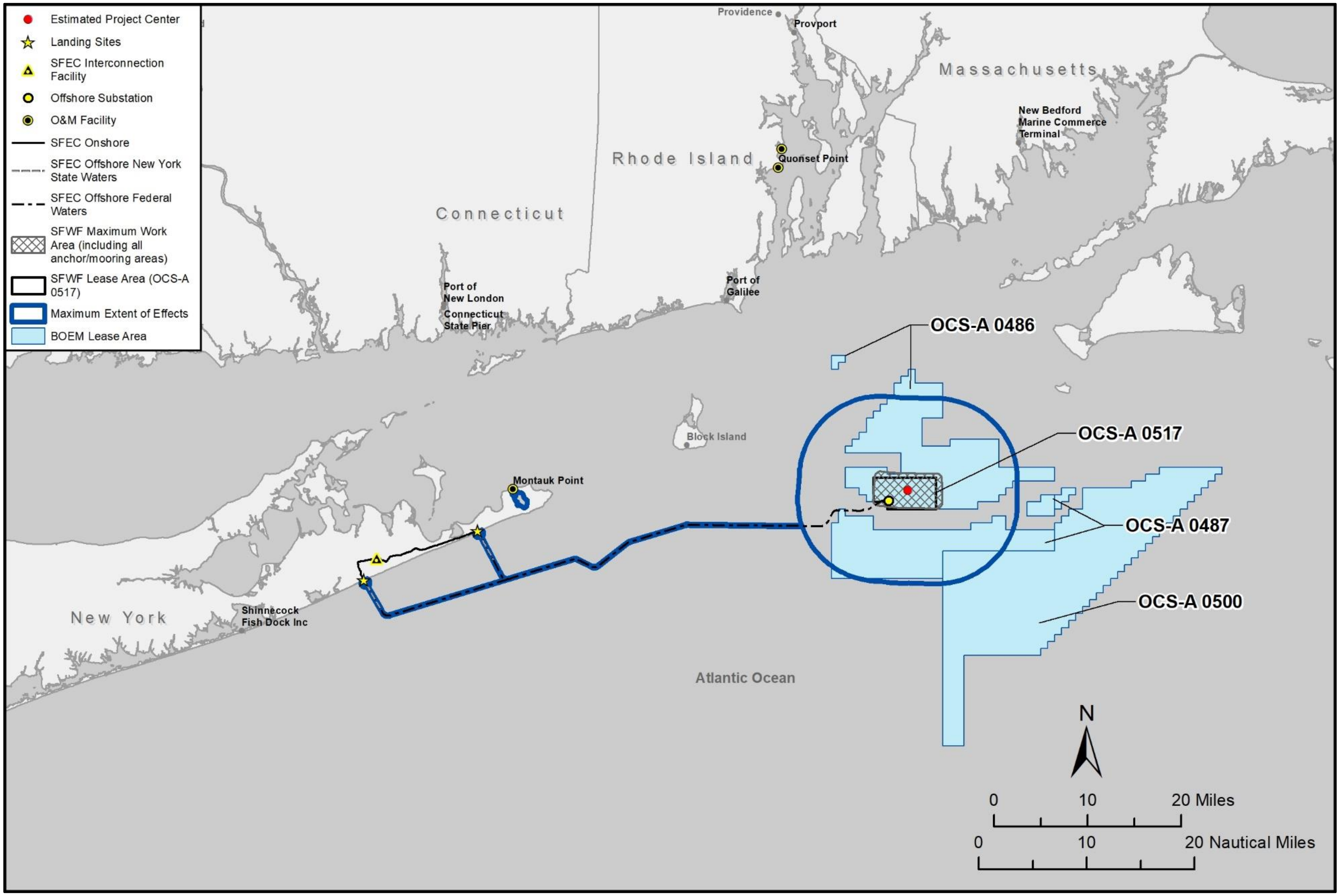

Figure C-3. Maximum extent of Project effects for essential fish habitat, invertebrates, and finfish.

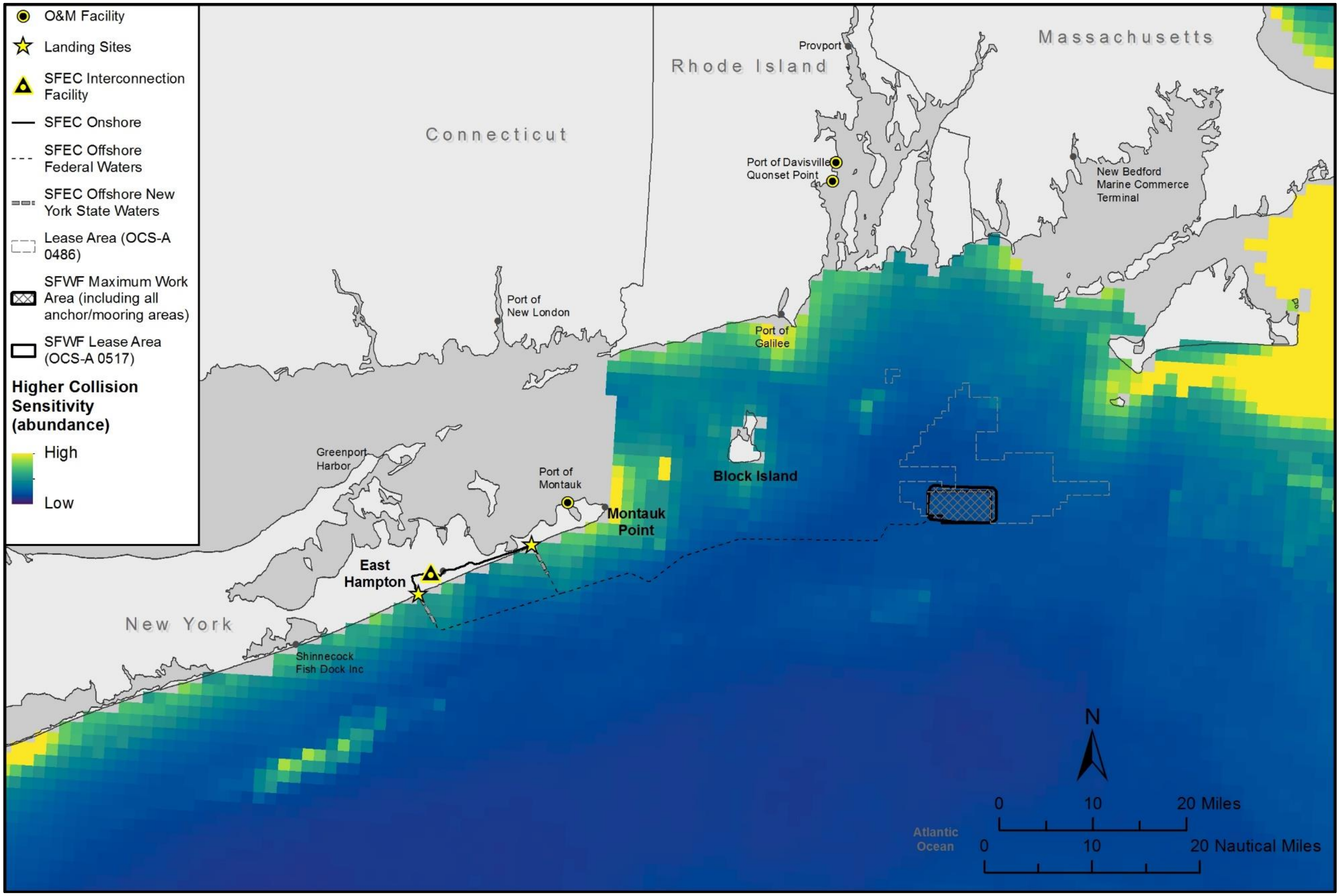

Figure C-4. Total avian relative abundance distribution for the higher collision sensitivity species group (Northeast Regional Ocean Council 2019).

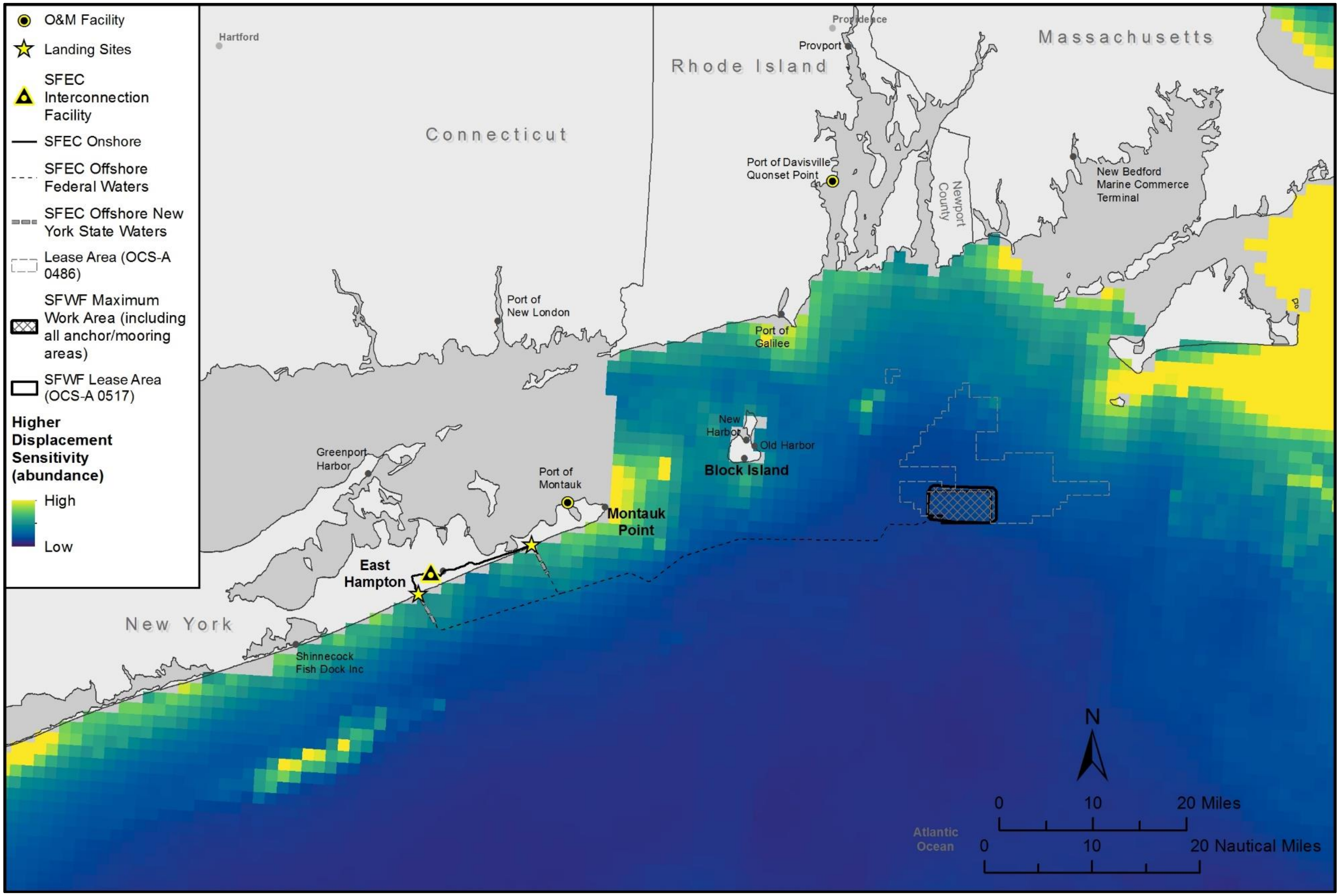

Figure C-5. Total avian relative abundance distribution for the higher displacement sensitivity species group (Northeast Regional Ocean Council 2019).

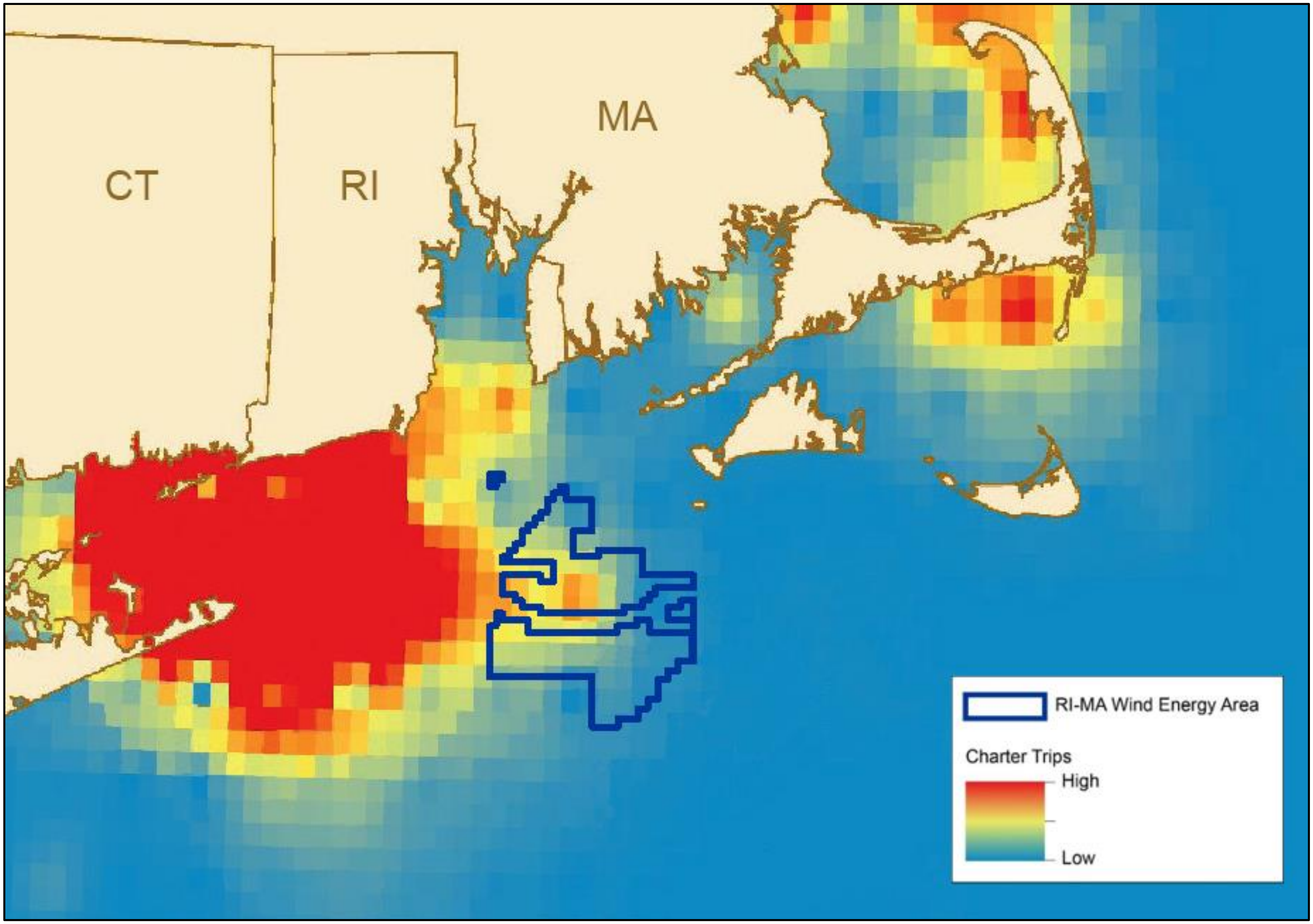

Figure C-6. Vessel trip report data for charter vessels (2001–2010). Figure adapted from BOEM (2019).

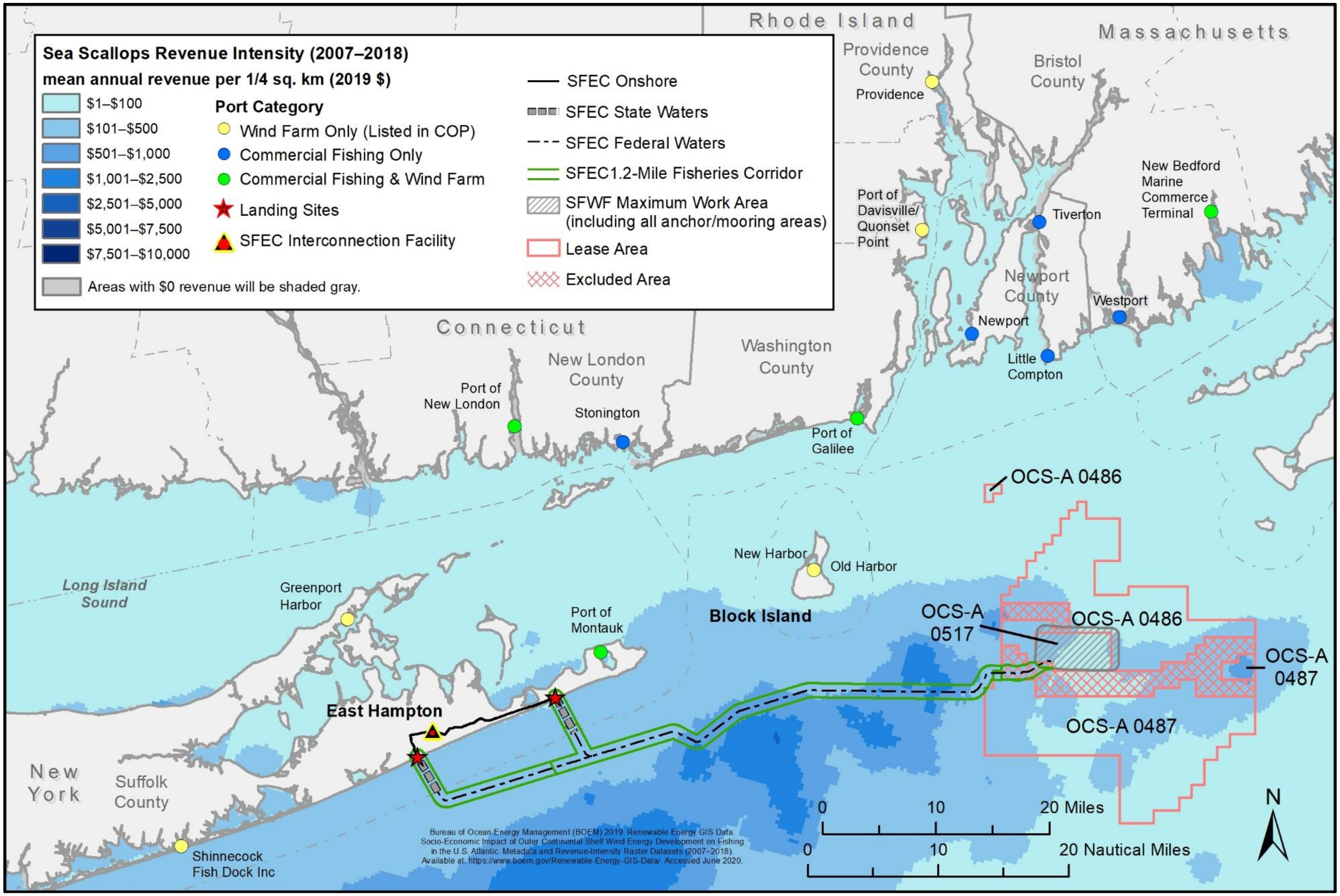

Figure C-7. Intensity of average annual revenue of federally permitted vessels: Sea Scallop Fishery Management Plan (2007–2018).

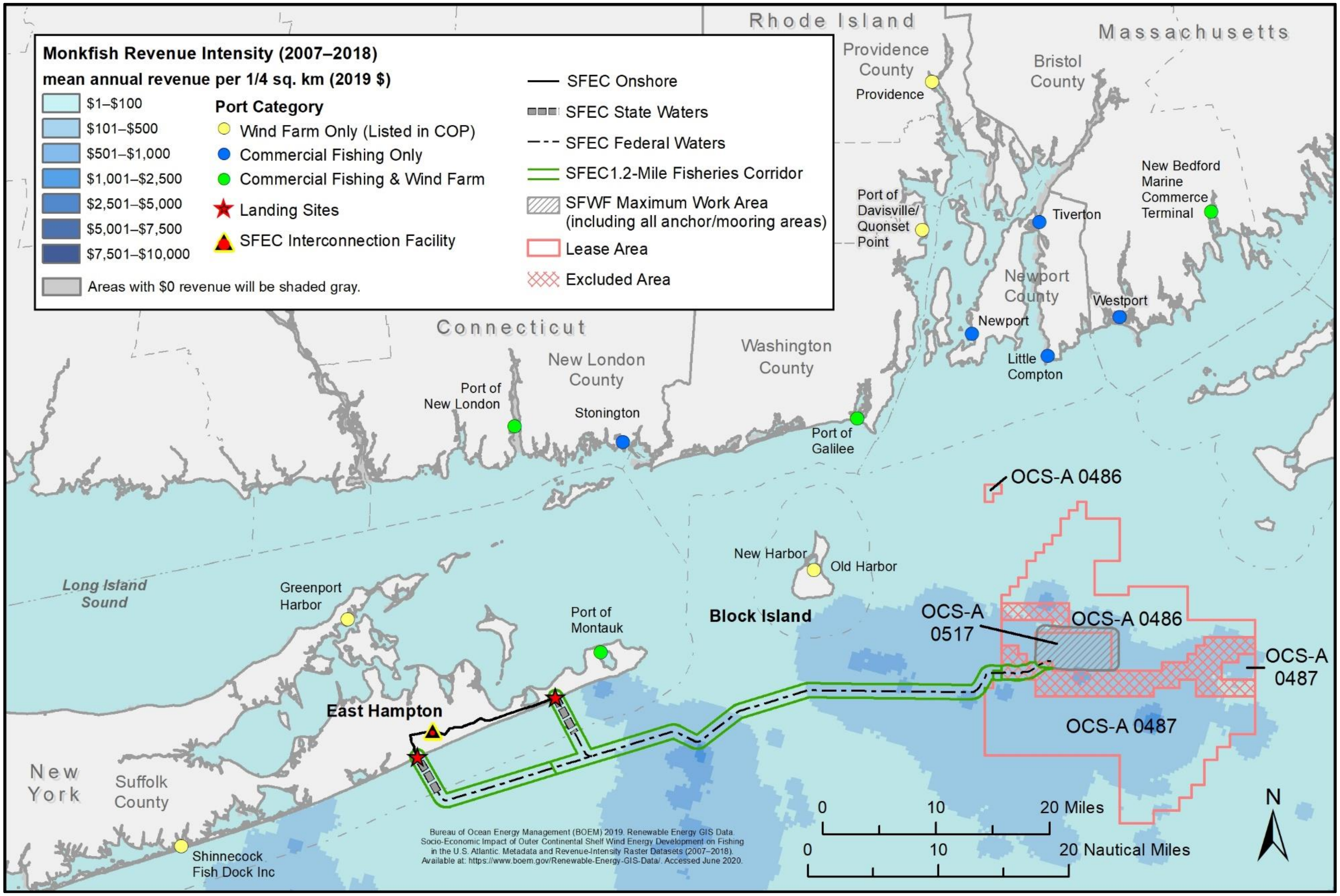

Figure C-8. Intensity of average annual revenue of federally permitted vessels: Monkfish Fishery Management Plan (2007–2018).

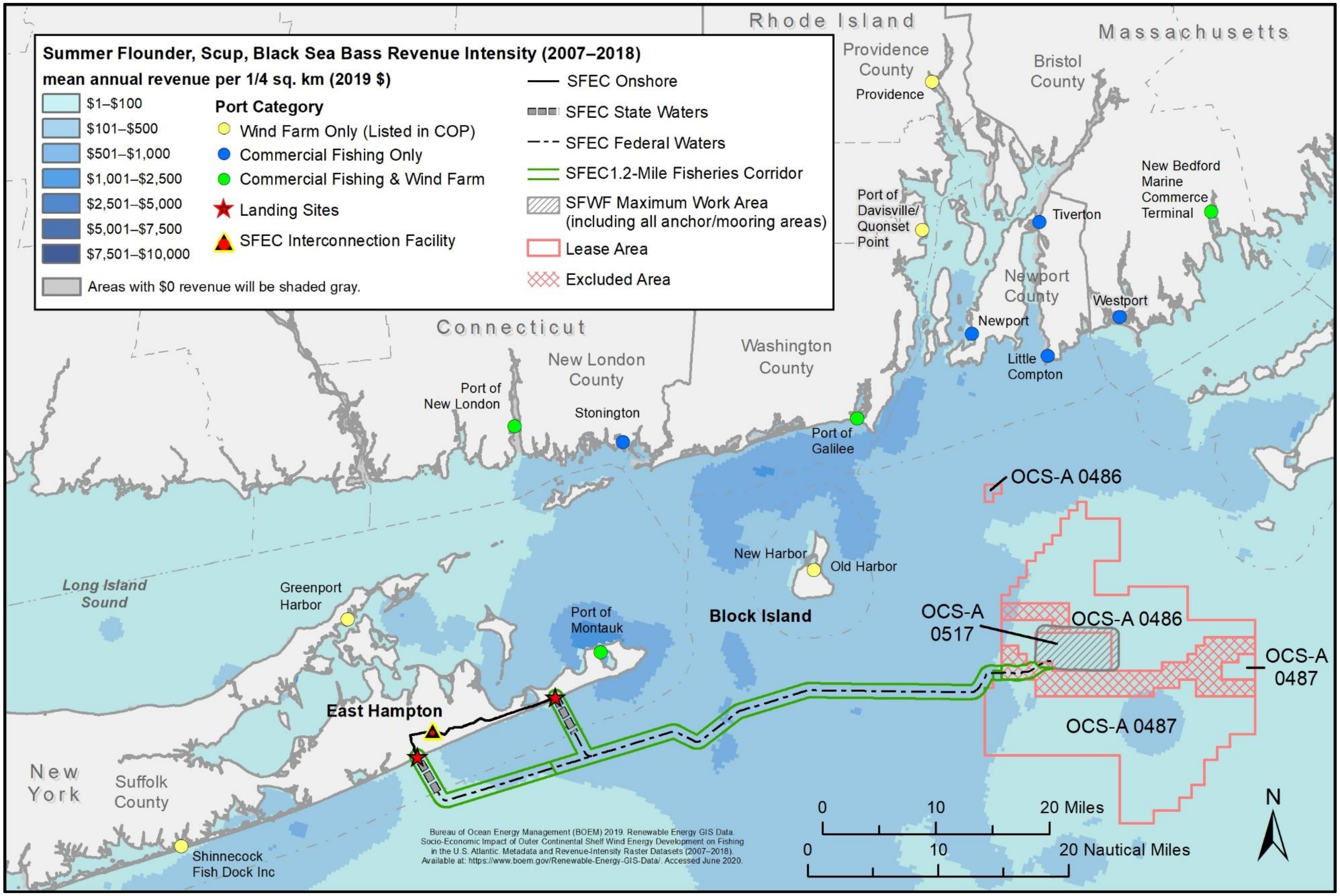

Figure C-9. Intensity of average annual revenue of federally permitted vessels: Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (2007–2018).

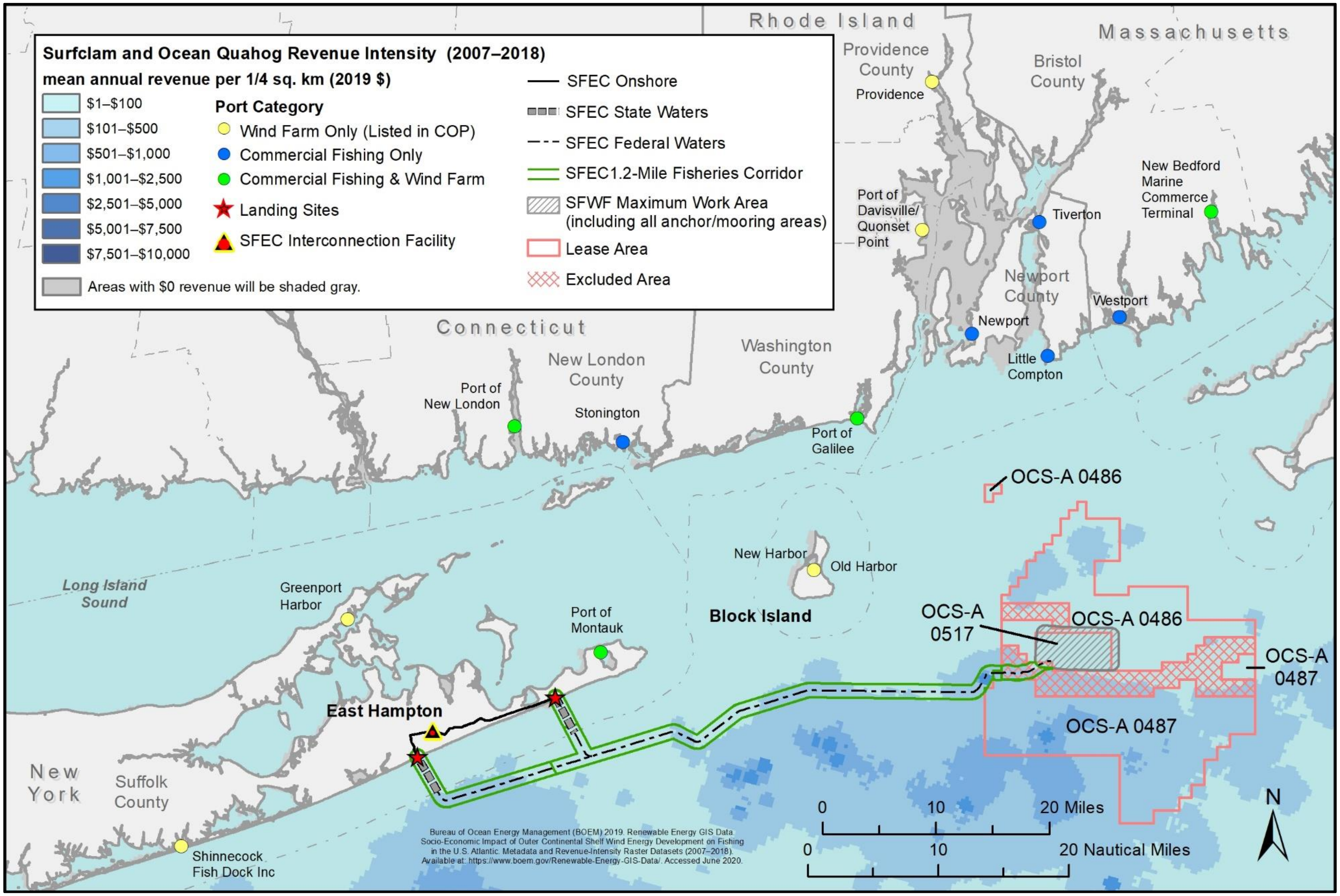

Figure C-10. Intensity of average annual revenue of federally permitted vessels: Surfclam and Ocean Quahog Fishery Management Plan (2007–2018).

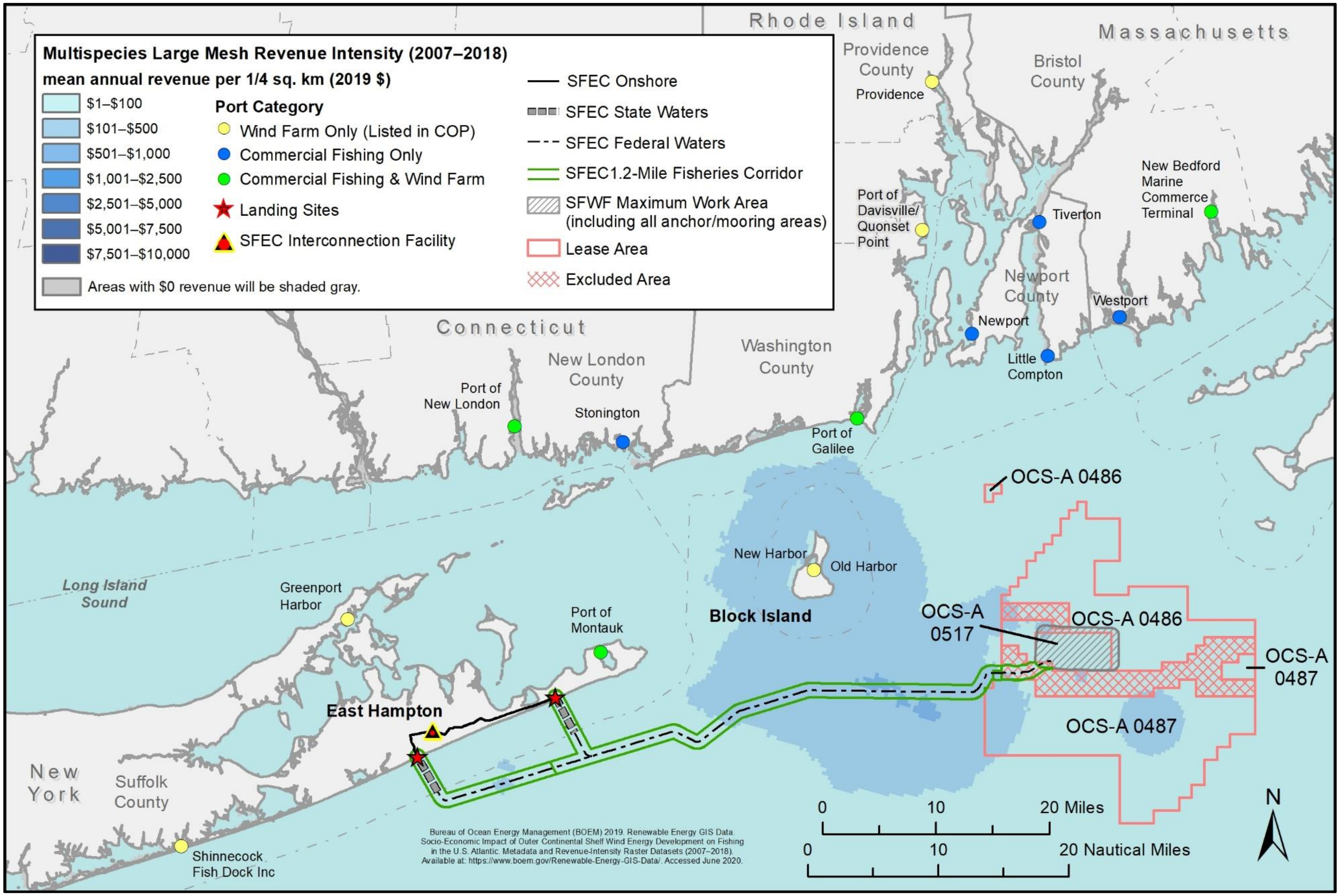

Figure C-11. Intensity of average annual revenue of federally permitted vessels: Multispecies Large Mesh Fishery Management Plan (2007–2018).

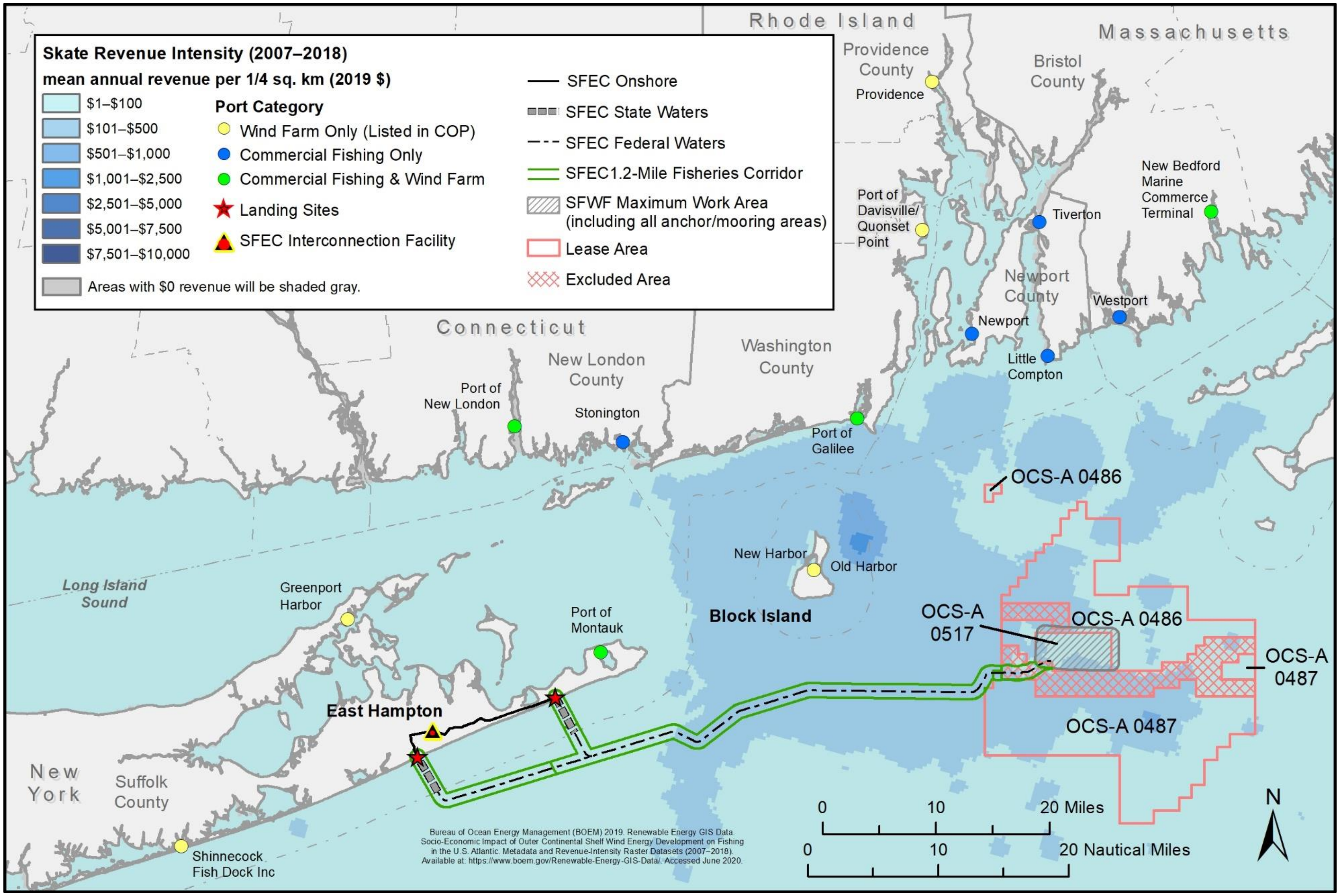

Figure C-12. Intensity of average annual revenue of federally permitted vessels: Skate Fishery Management Plan (2007–2018).

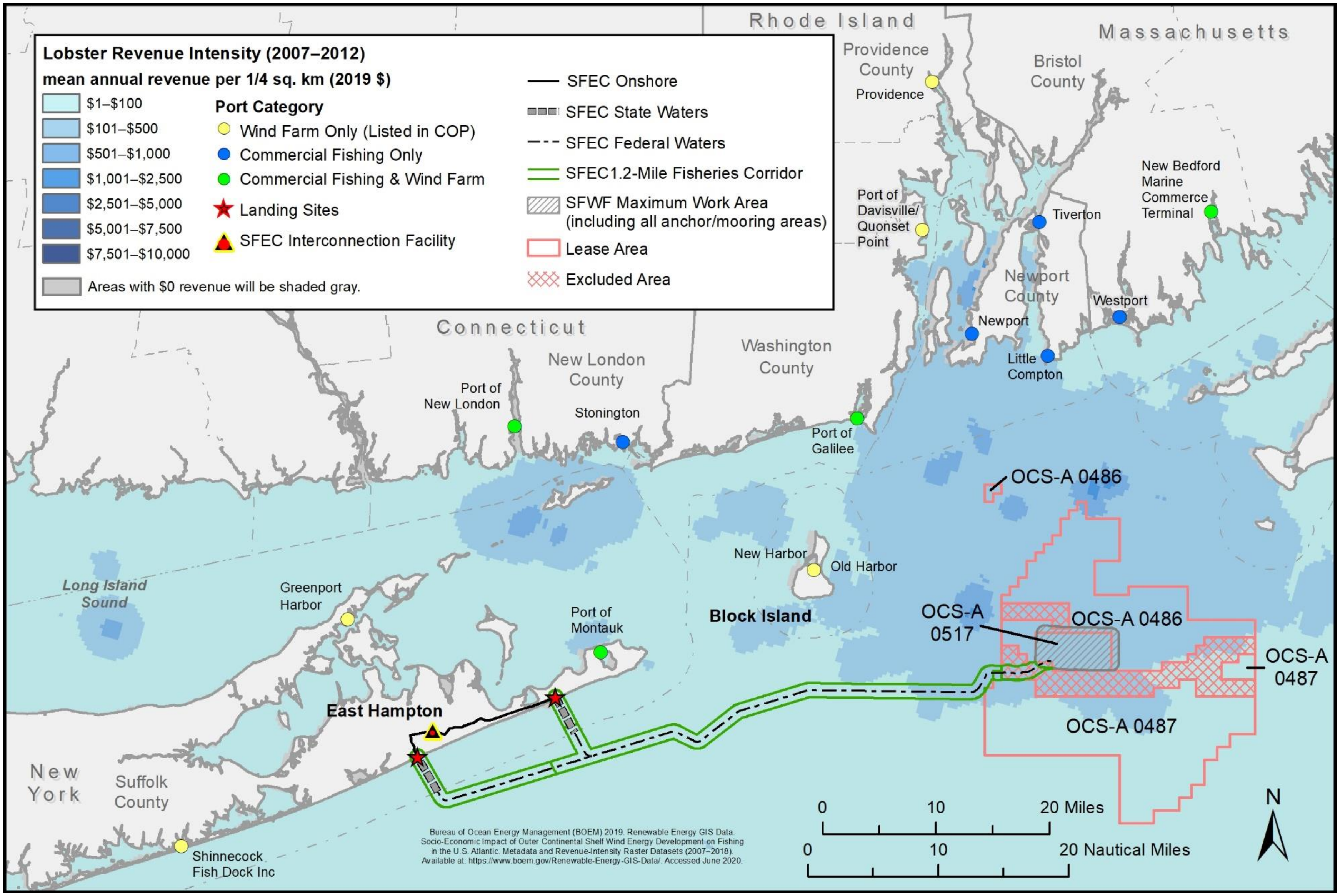

Figure C-13. Intensity of average annual revenue of federally permitted vessels: Lobster Fishery Management Plan (2007–2012).

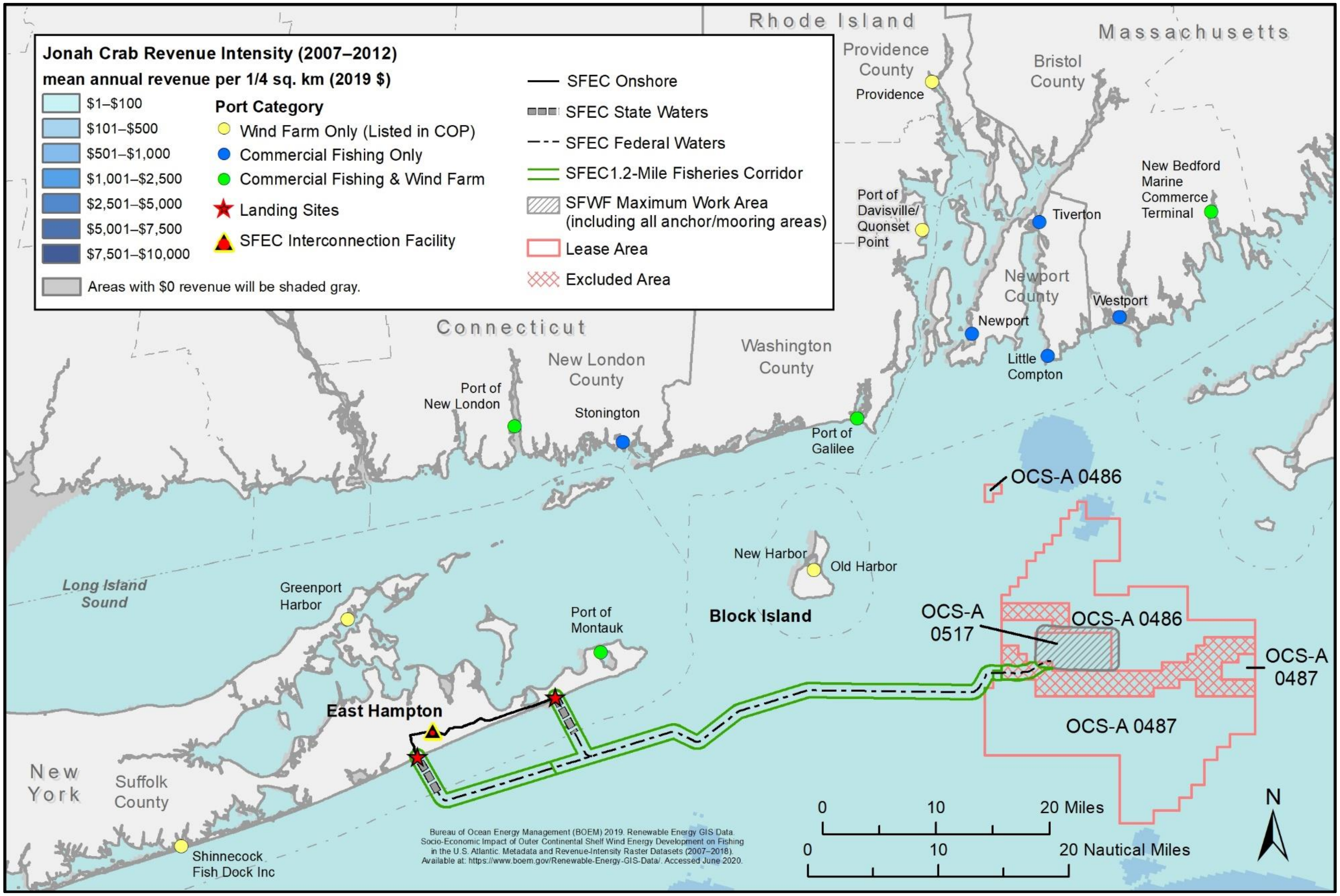

Figure C-14. Intensity of average annual revenue of federally permitted vessels: Jonah Crab Fishery Management Plan (2007–2012).

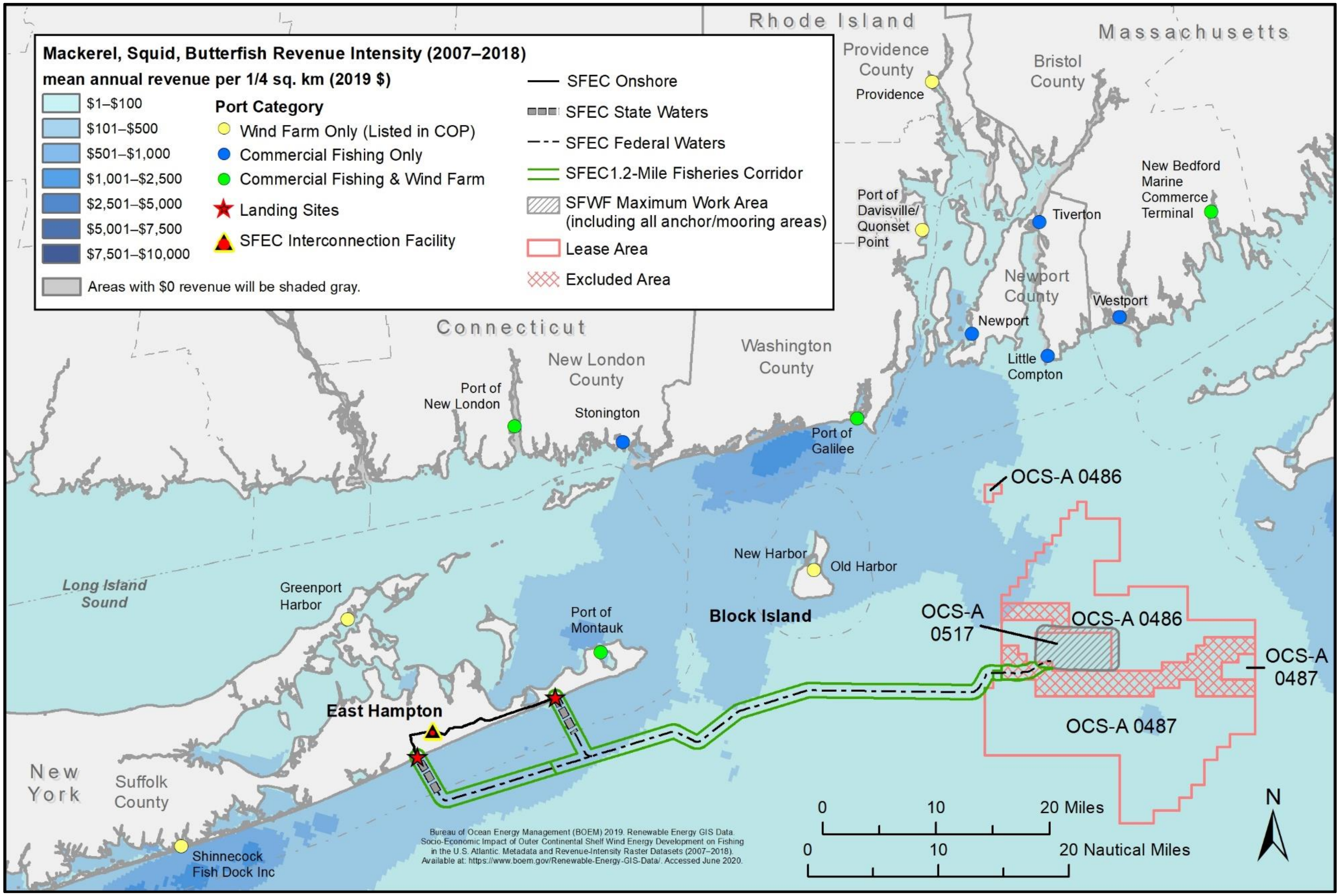

Figure C-15. Intensity of average annual revenue of federally permitted vessels: Mackerel, Squid, and Butterfish Fishery Management Plan (2007–2018).

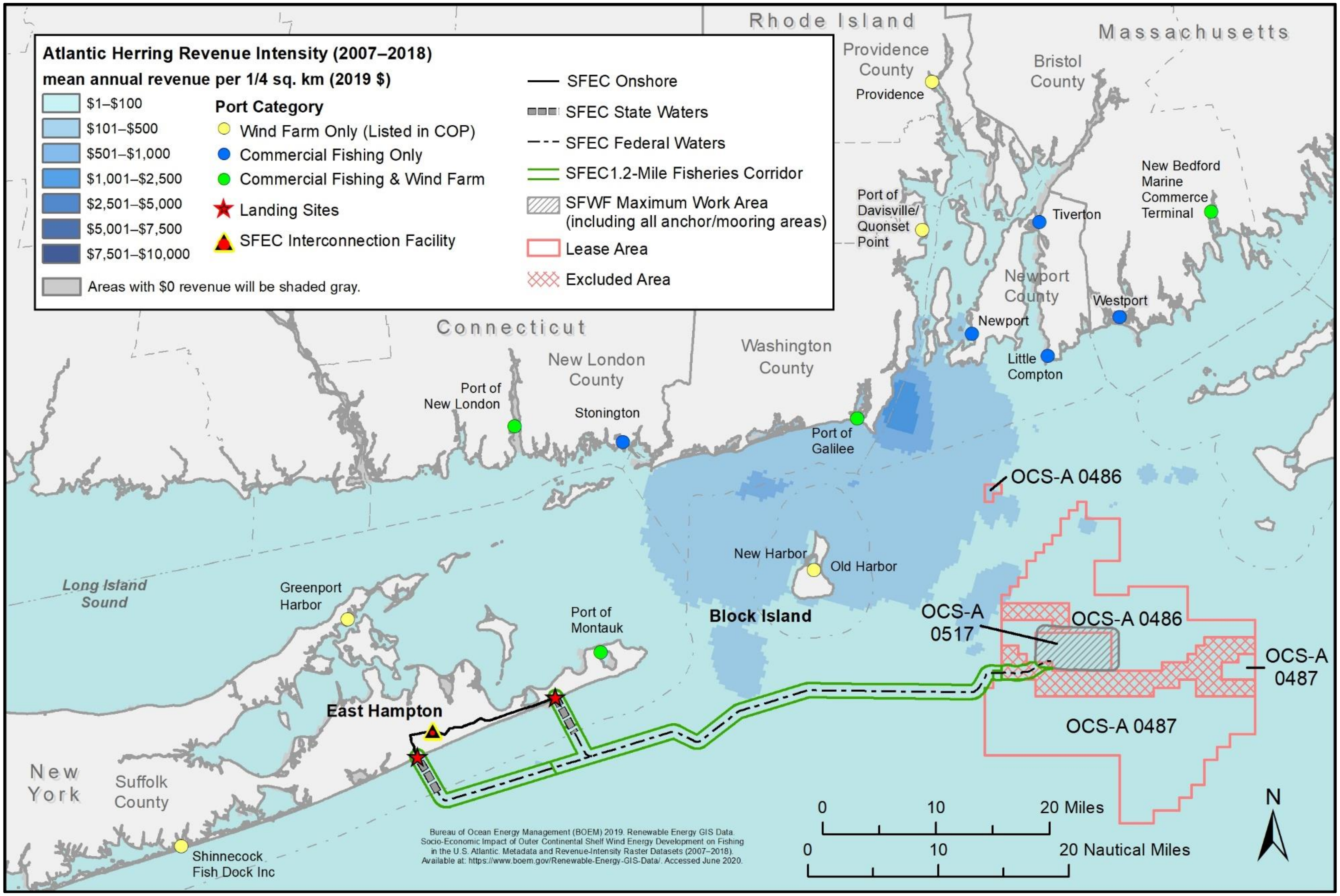

Figure C-16. Intensity of average annual revenue of federally permitted vessels: Atlantic Herring Fishery Management Plan (2007–2018).

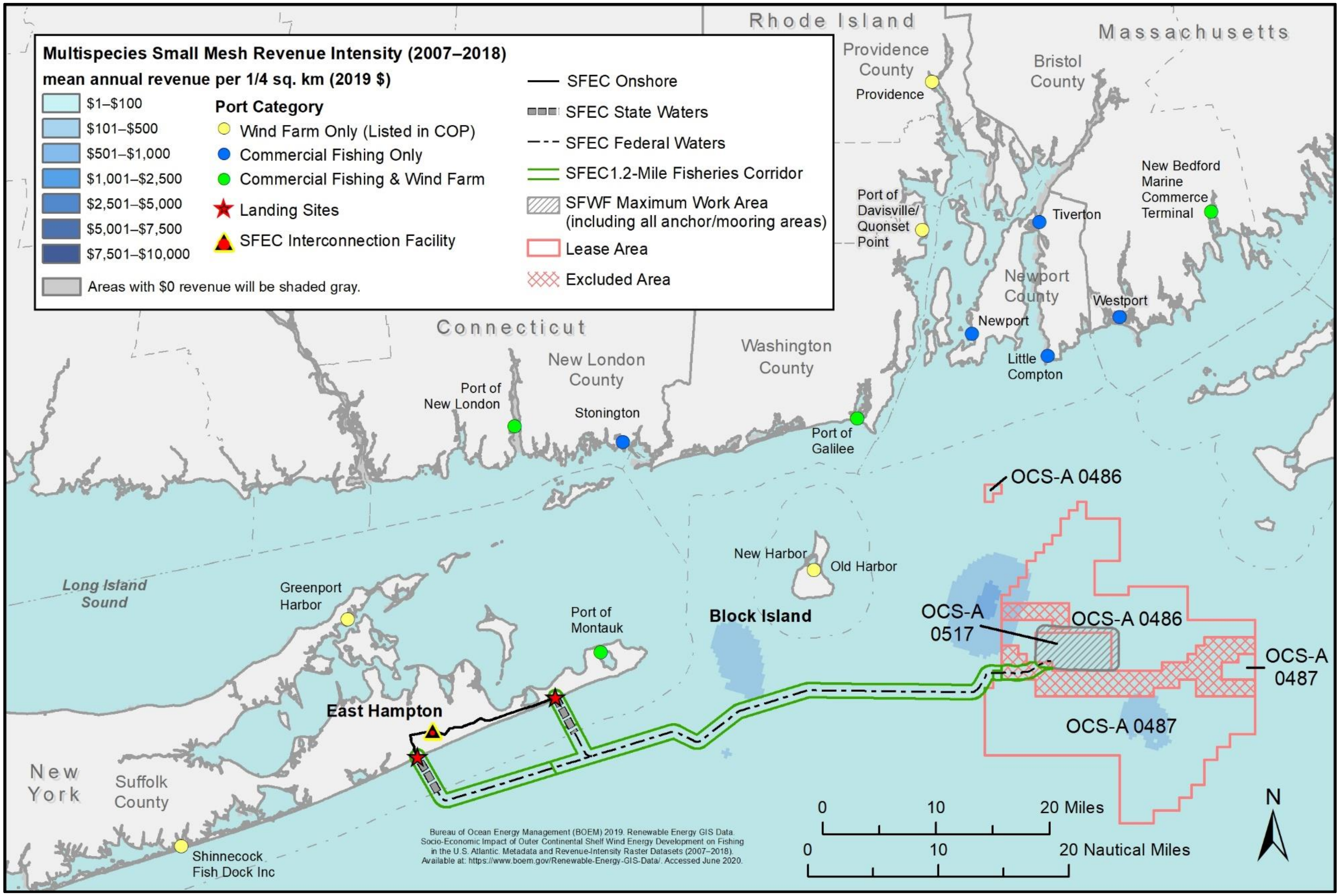

Figure C-17. Intensity of average annual revenue of federally permitted vessels: Multispecies Small Mesh Fishery Management Plan (2007–2018).

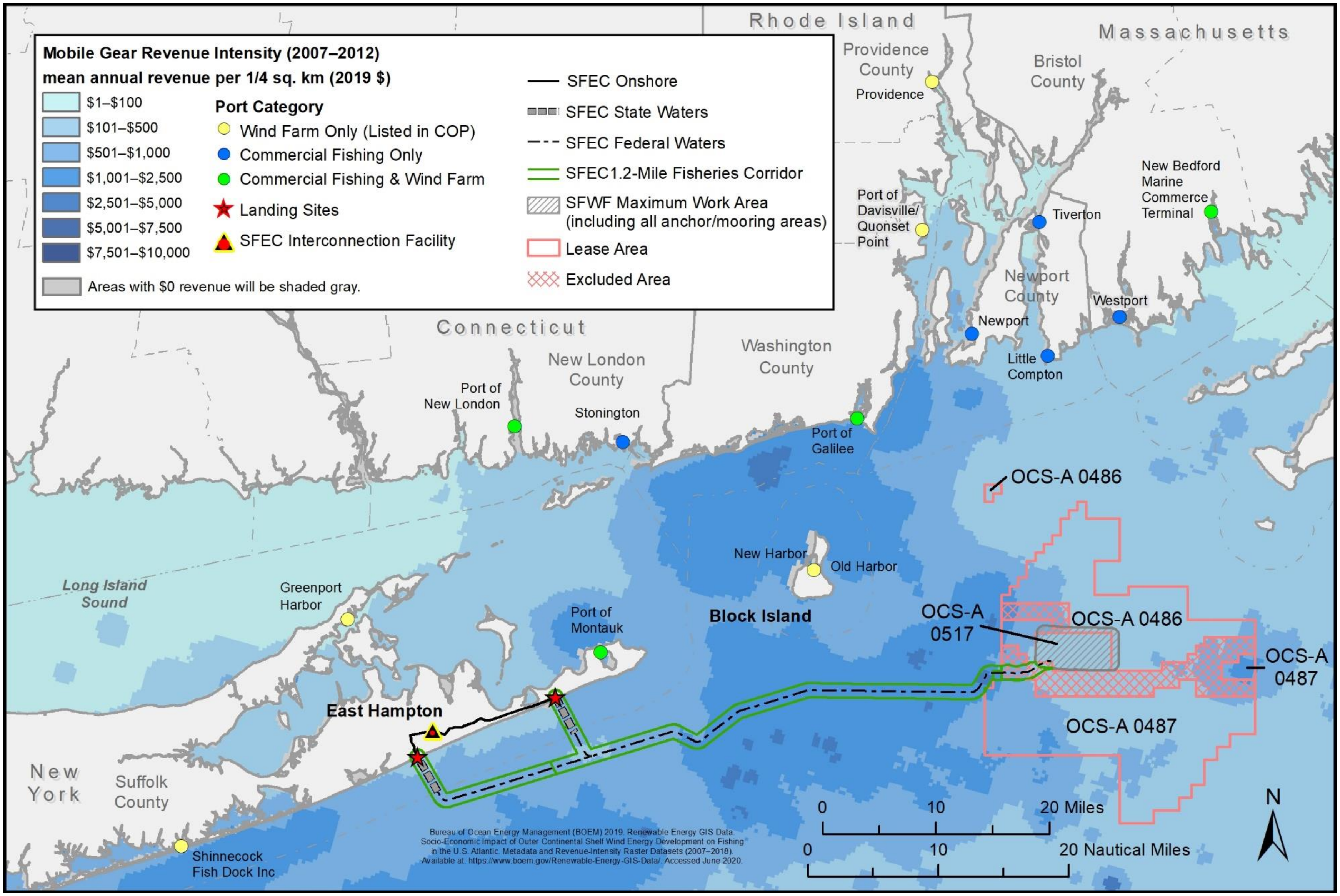

Figure C-18. Intensity of average annual revenue of federally permitted vessels: mobile gears (2007–2012).

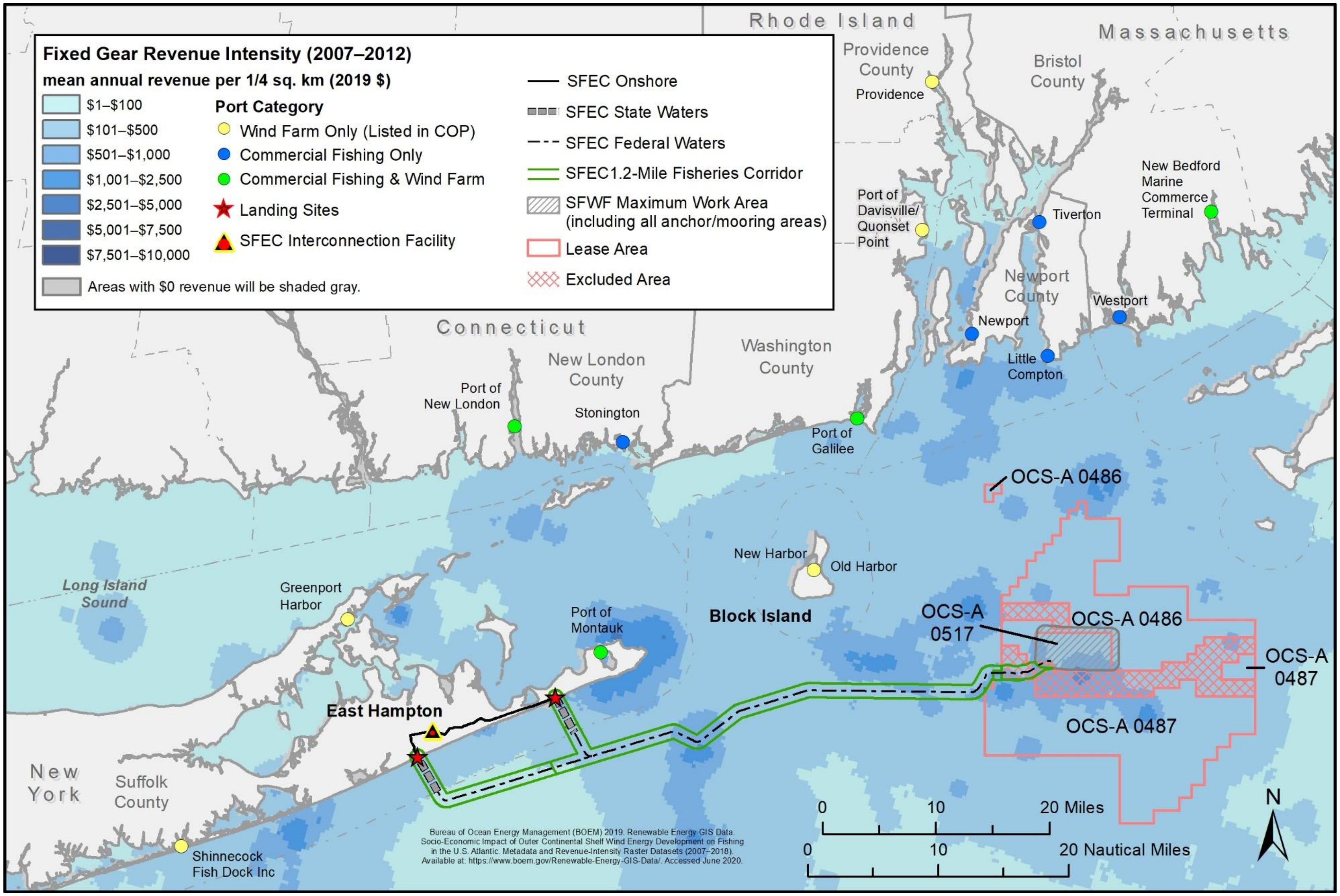

Figure C-19. Intensity of average annual revenue of federally permitted vessels: fixed gears (2007–2012).

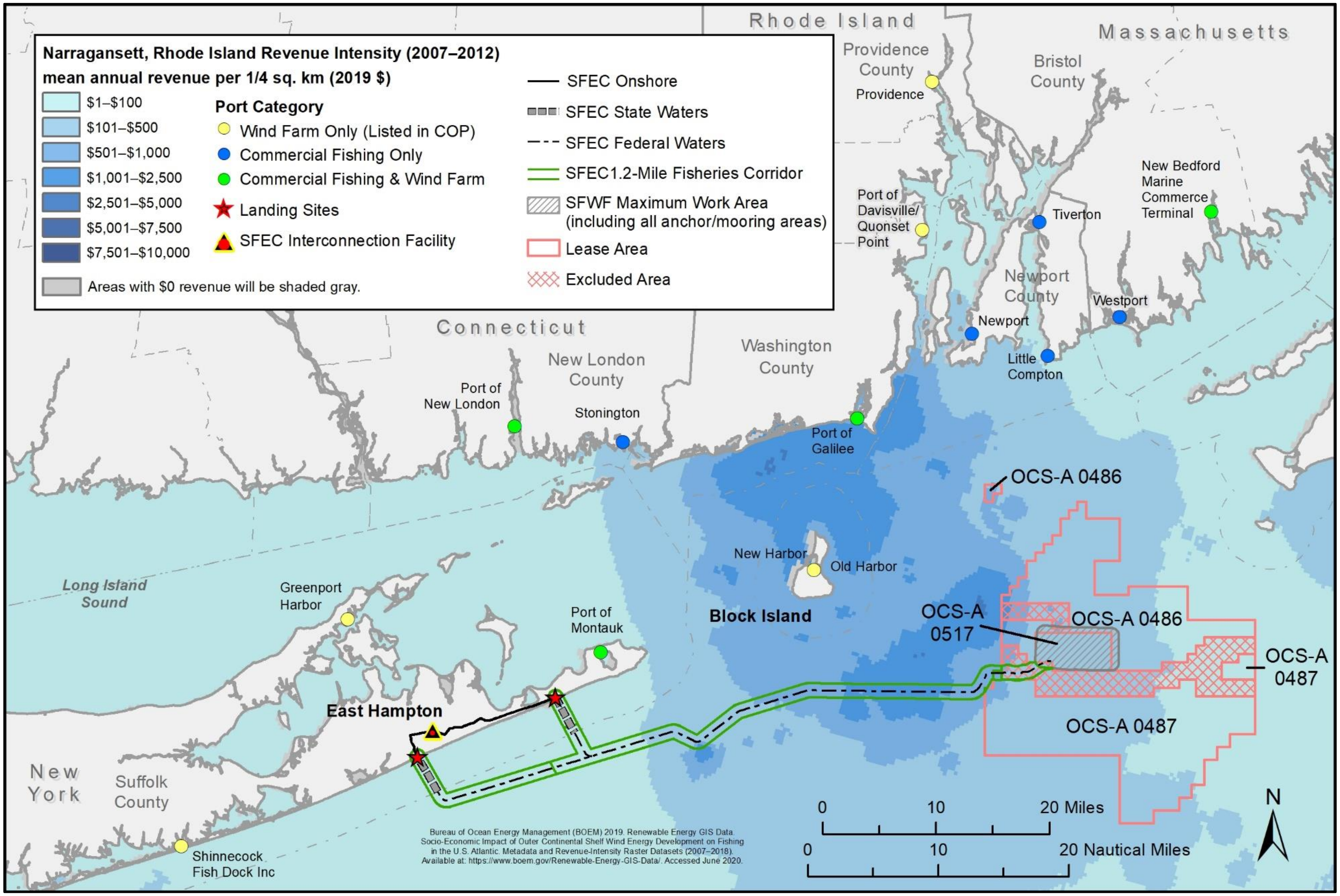

Figure C-20. Intensity of average annual revenue of federally permitted vessels: Narragansett, Rhode Island (2007–2012).

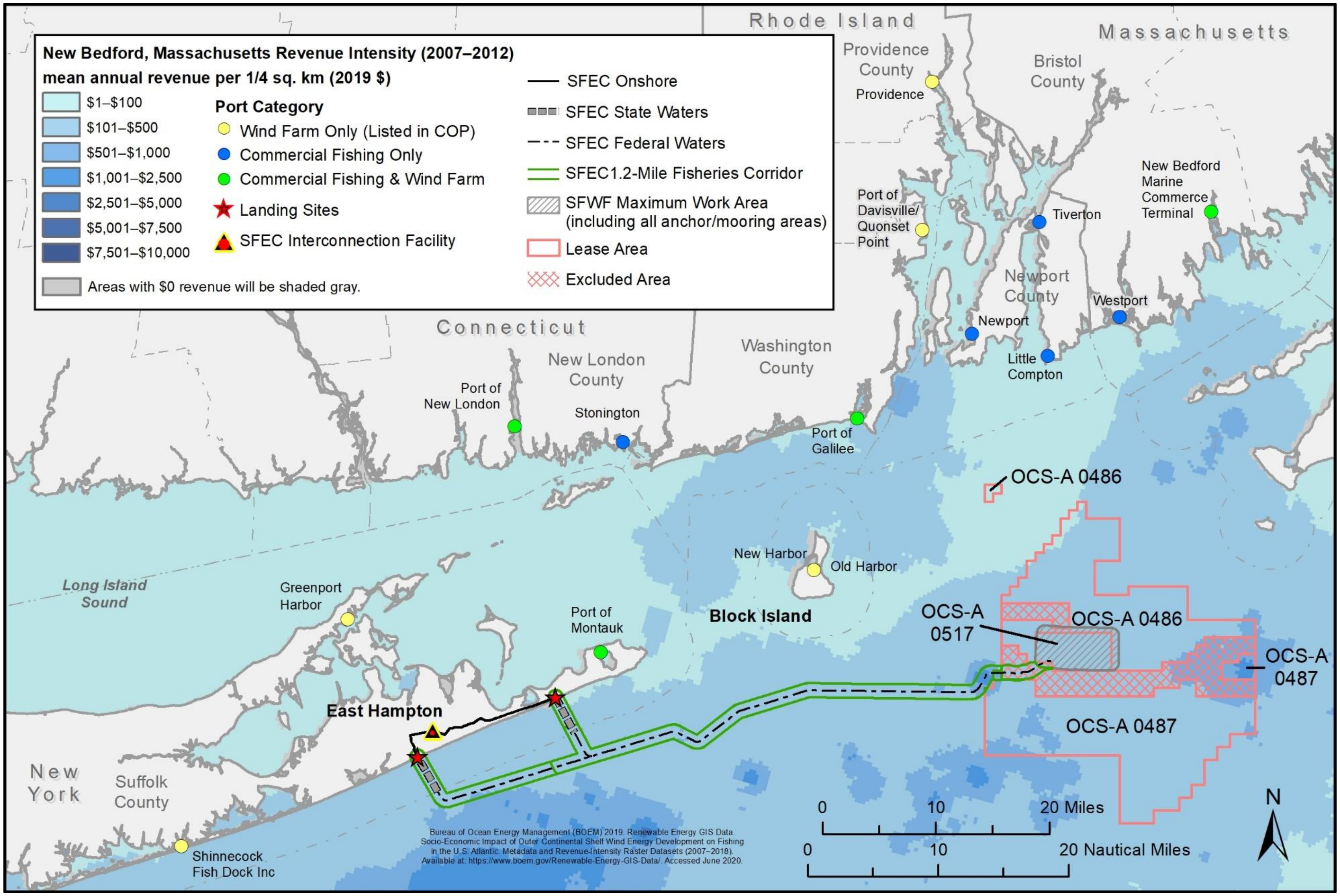

Figure C-21. Intensity of average annual revenue of federally permitted vessels: New Bedford, Massachusetts (2007–2012).

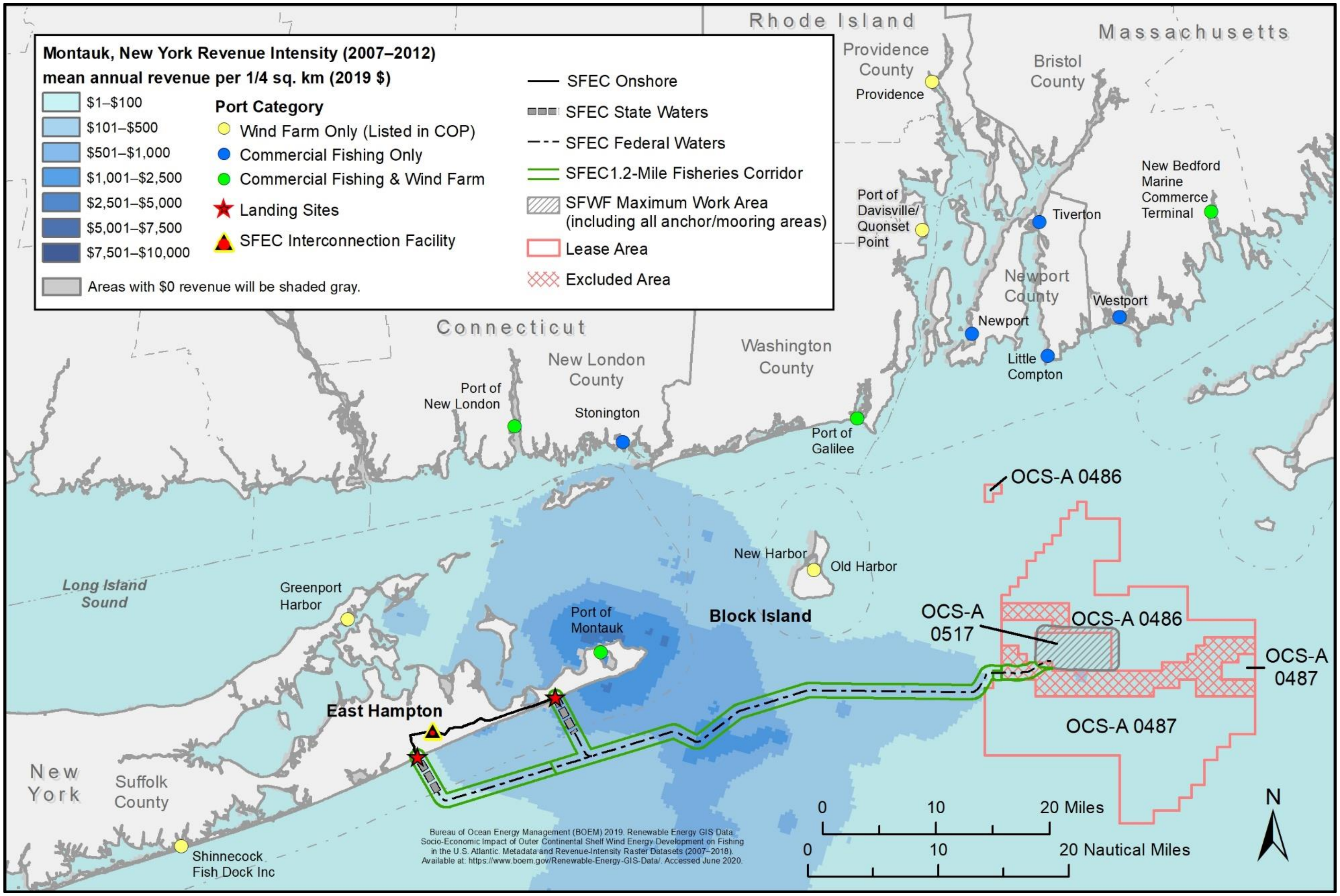

Figure C-22. Intensity of average annual revenue of federally permitted vessels: Montauk, New York (2007–2012).

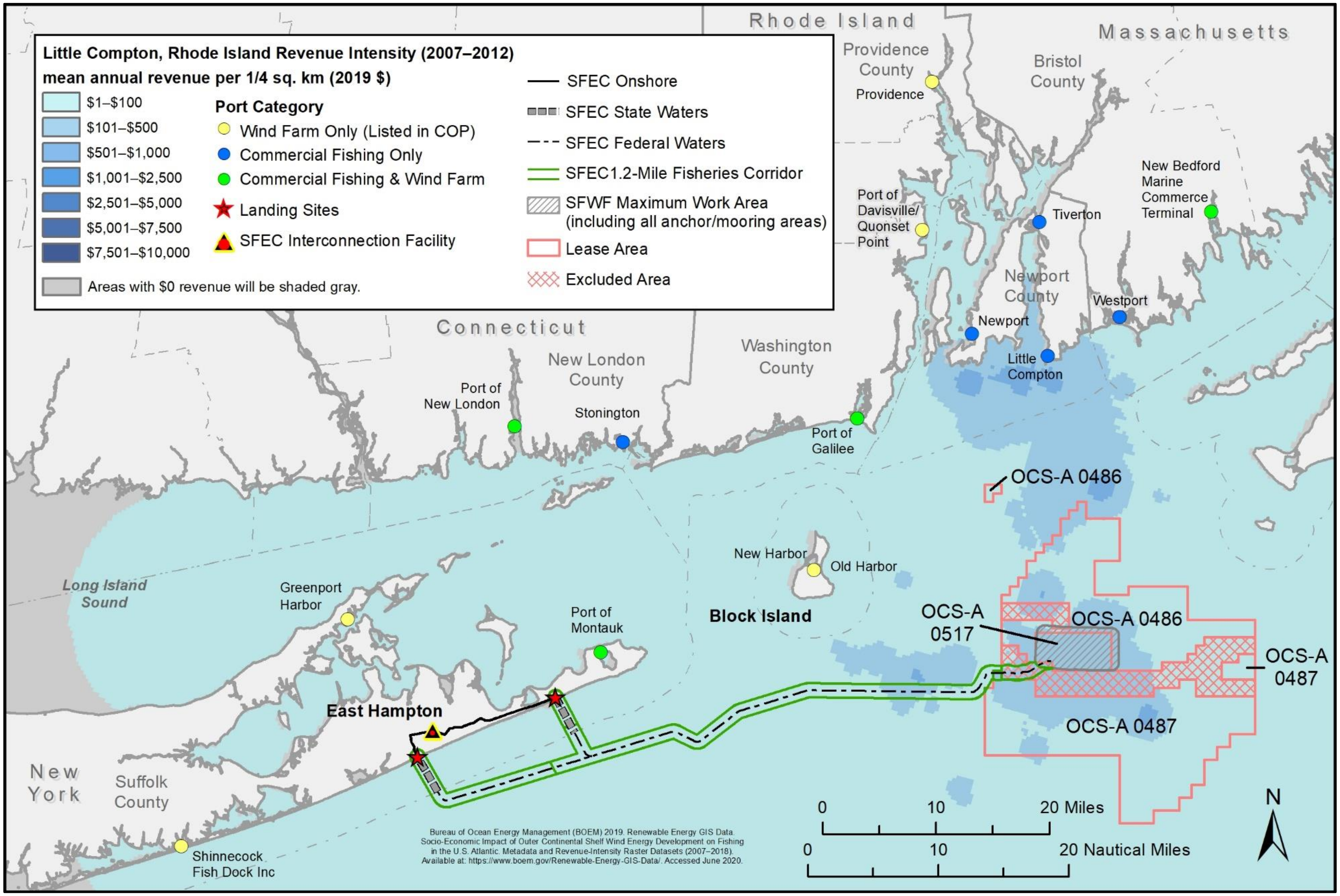

Figure C-23. Intensity of average annual revenue of federally permitted vessels: Little Compton, Rhode Island (2007–2012).

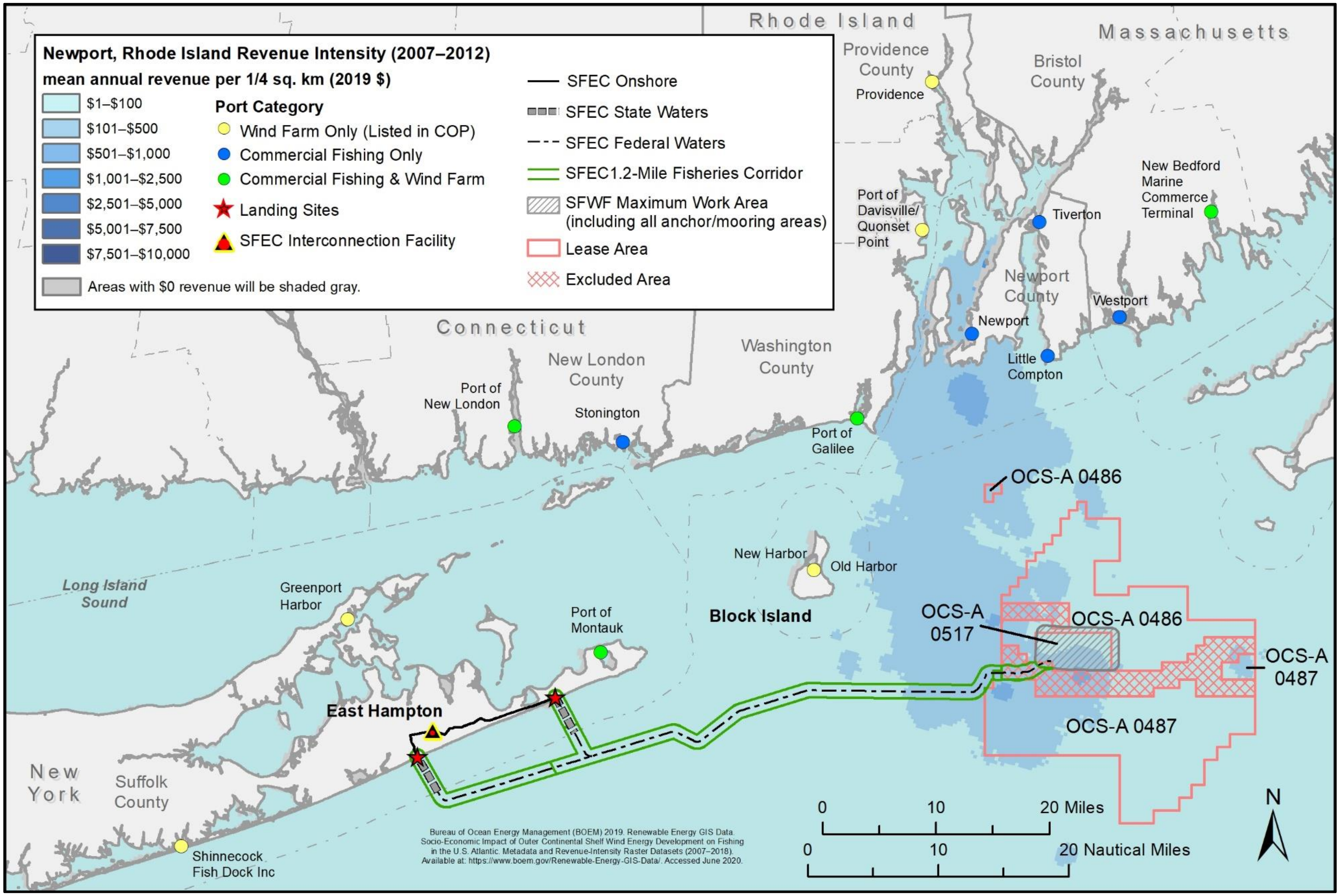

Figure C-24. Intensity of average annual revenue of federally permitted vessels: Newport, Rhode Island (2007–2012).

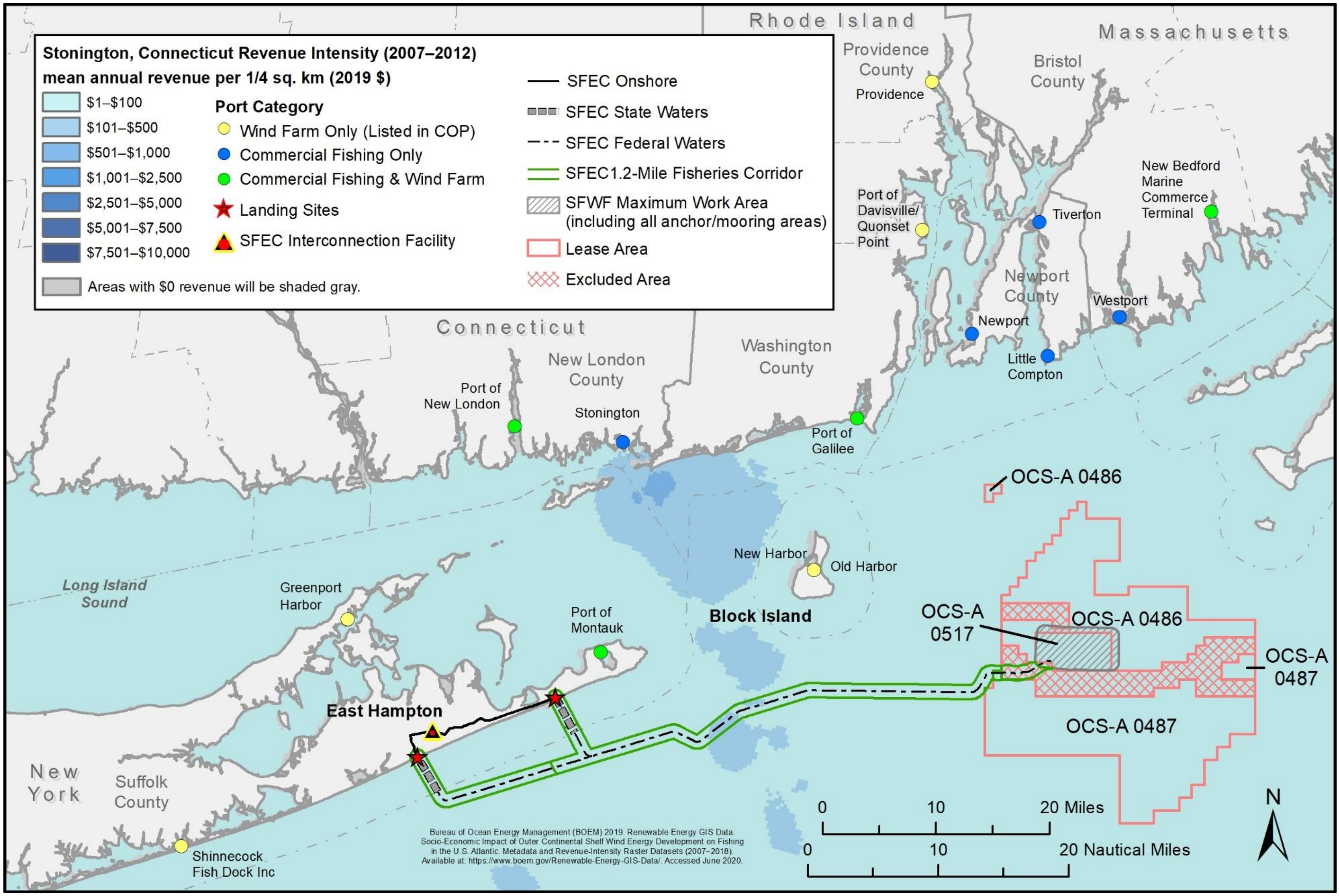

Figure C-25. Intensity of average annual revenue of federally permitted vessels: Stonington, Connecticut (2007–2012).

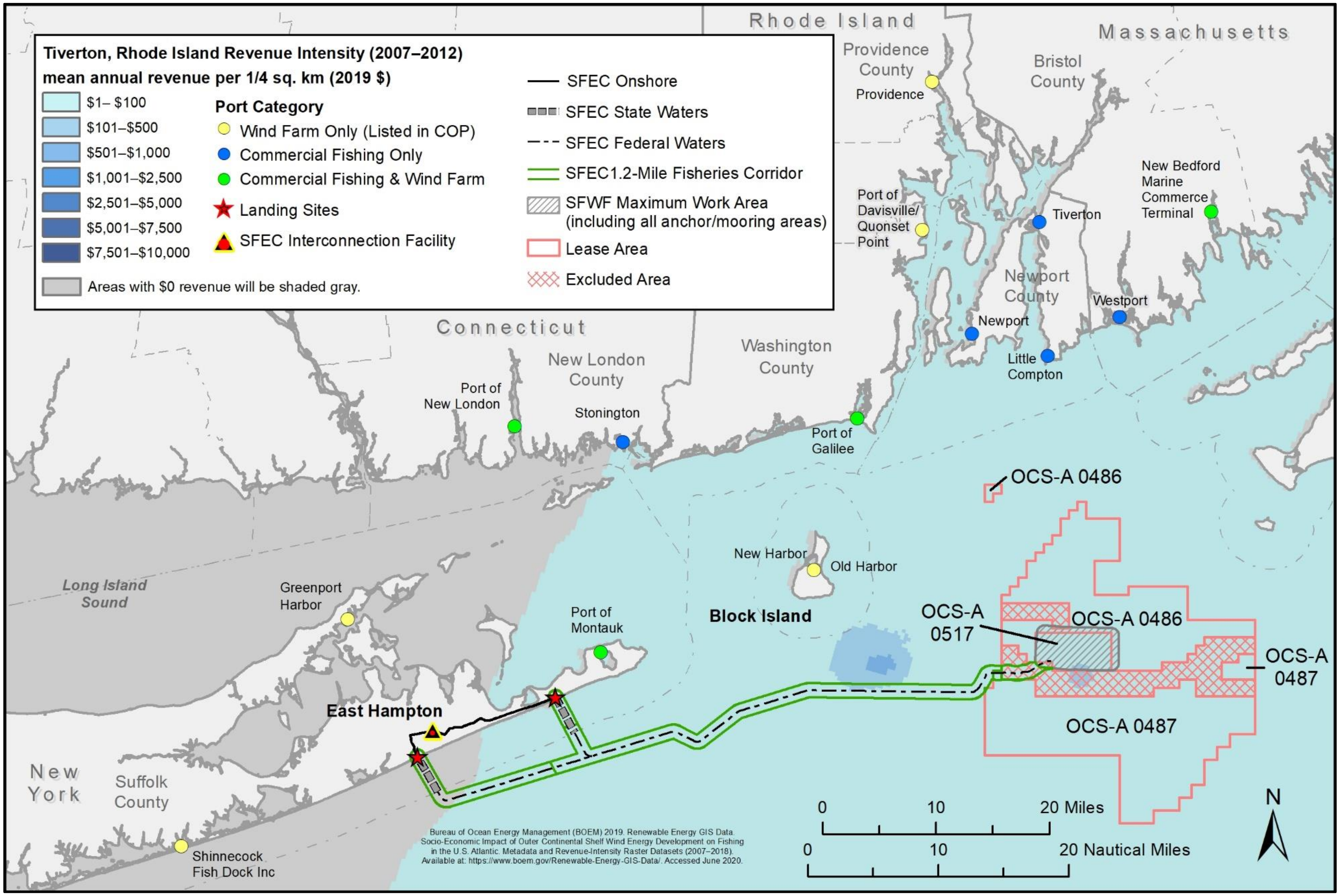

Figure C-26. Intensity of average annual revenue of federally permitted vessels: Tiverton, Rhode Island (2007–2012).

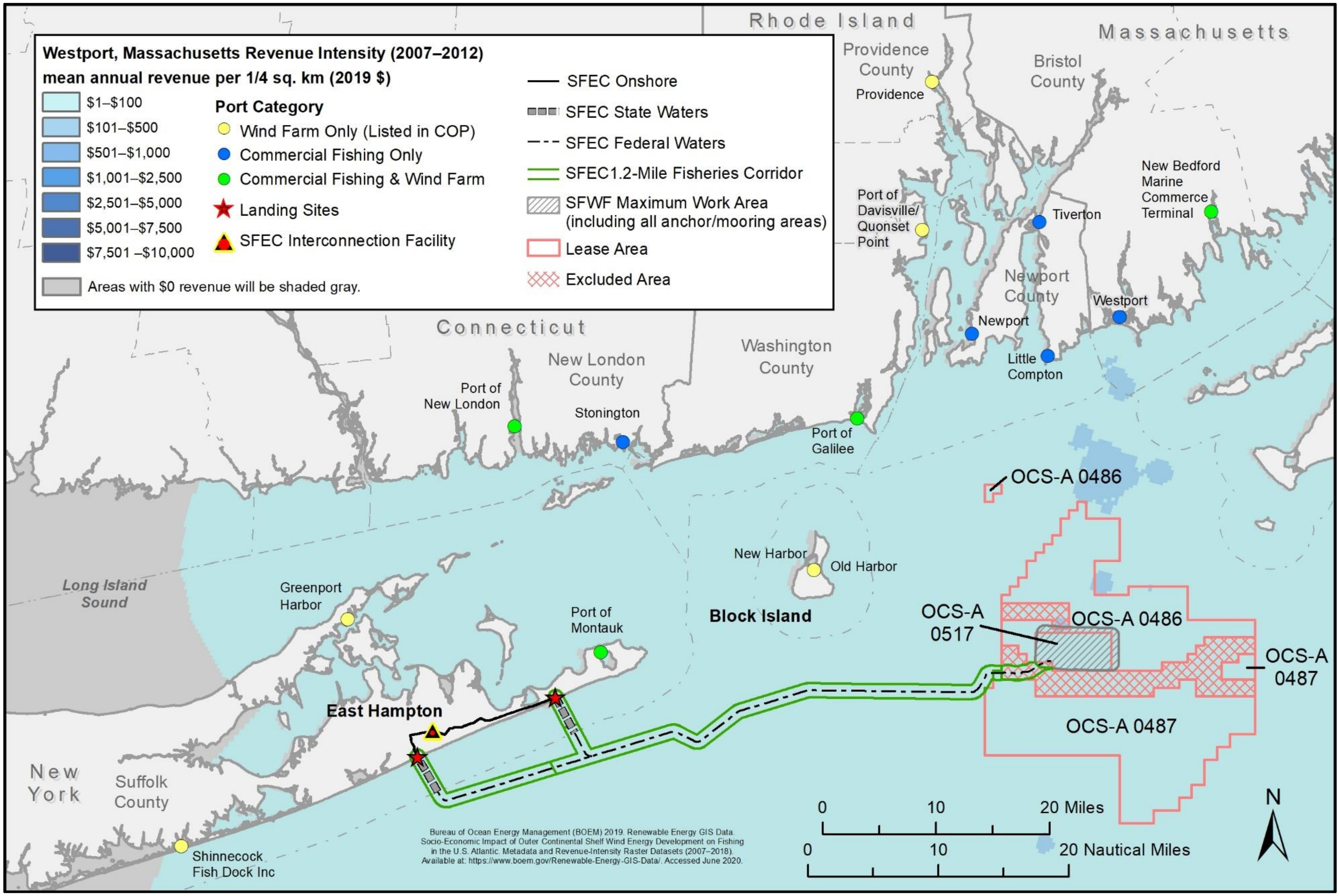

Figure C-27. Intensity of average annual revenue of federally permitted vessels: Westport, Massachusetts (2007–2012).

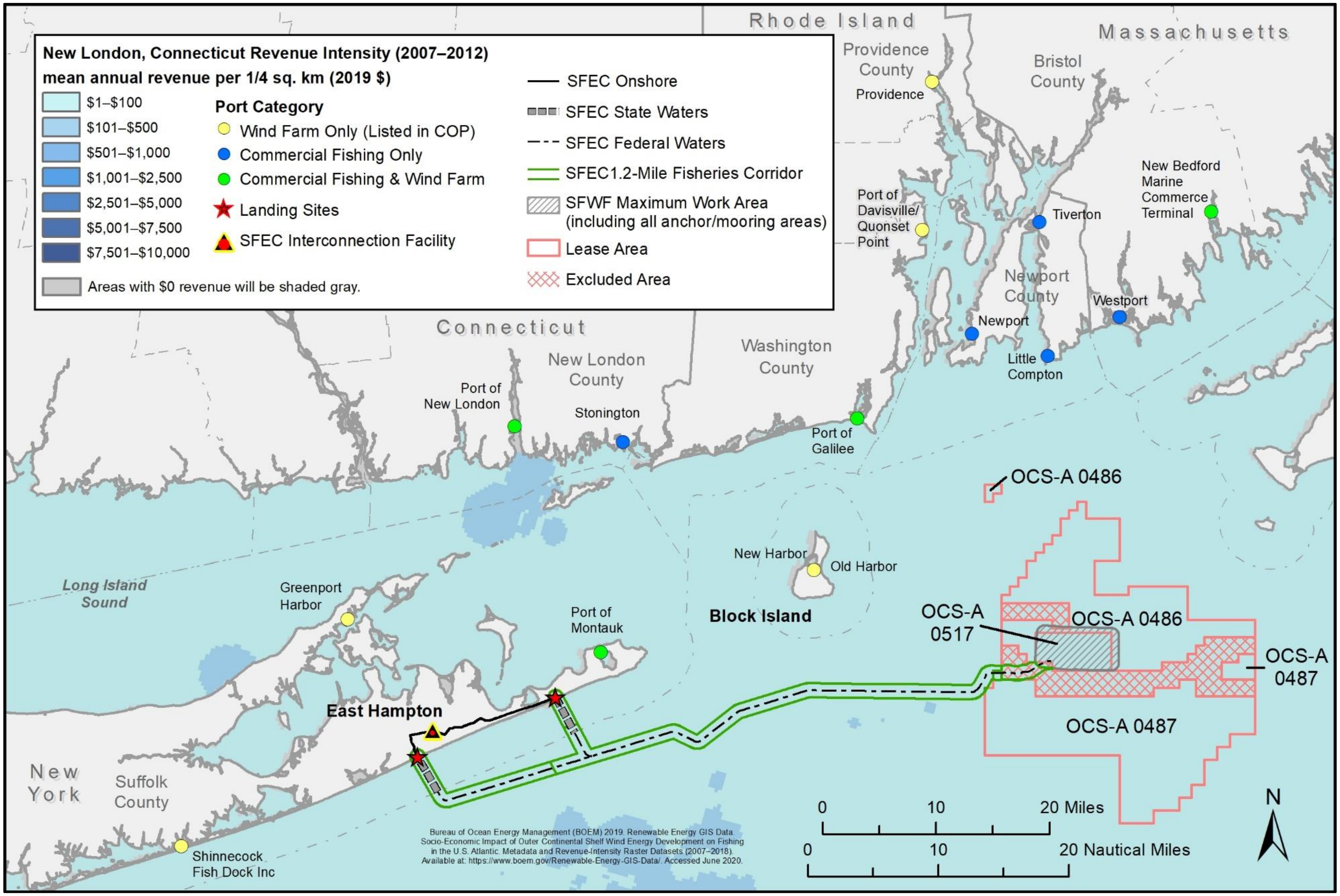

Figure C-28. Intensity of average annual revenue of federally permitted vessels: New London, Connecticut (2007–2012).

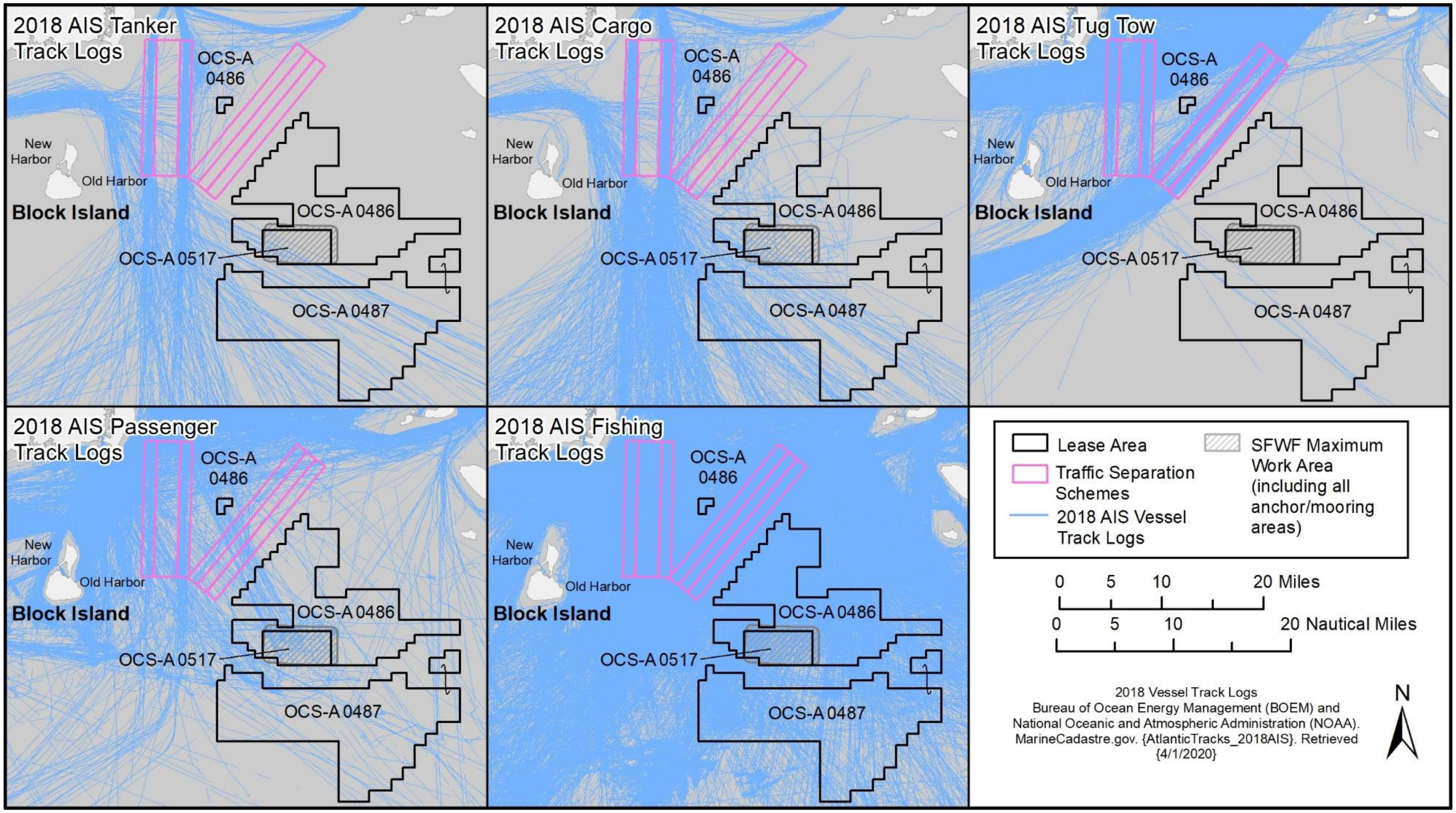

Figure C-29a. Vessel traffic near the Lease Area.

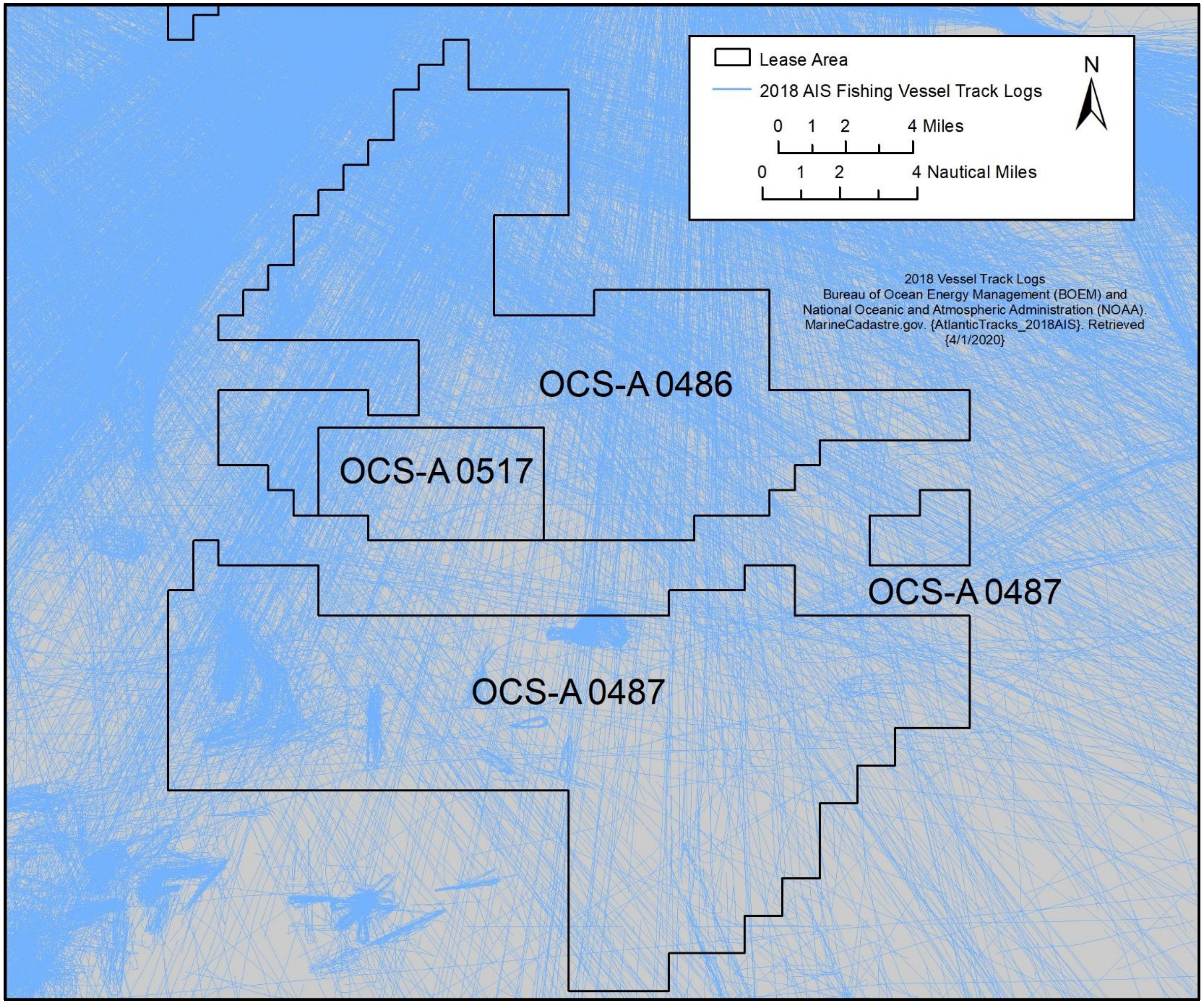

Figure C-29b. Detail of fishing vessel traffic near the Lease Area.

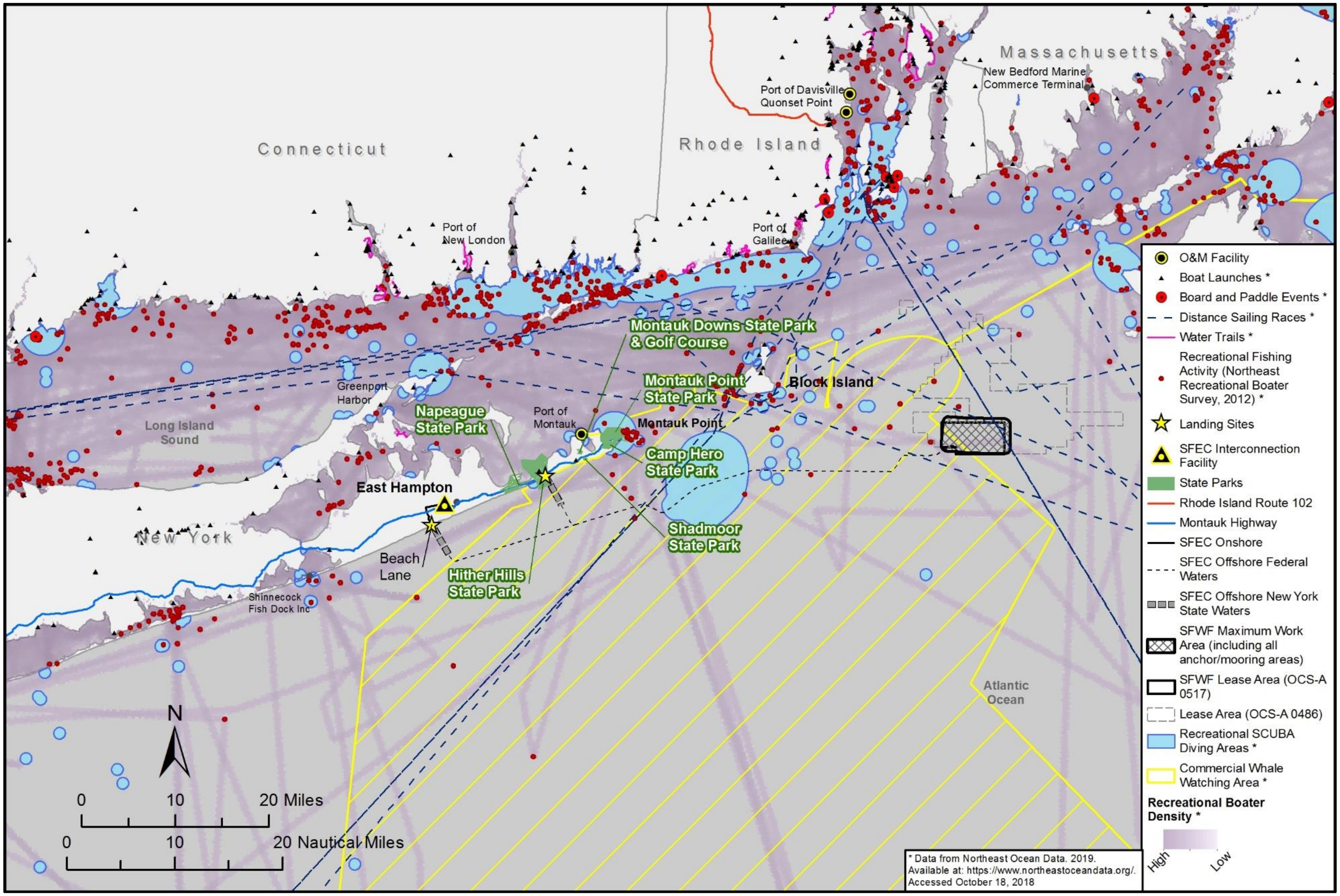

Figure C-30. Recreation and tourism information.

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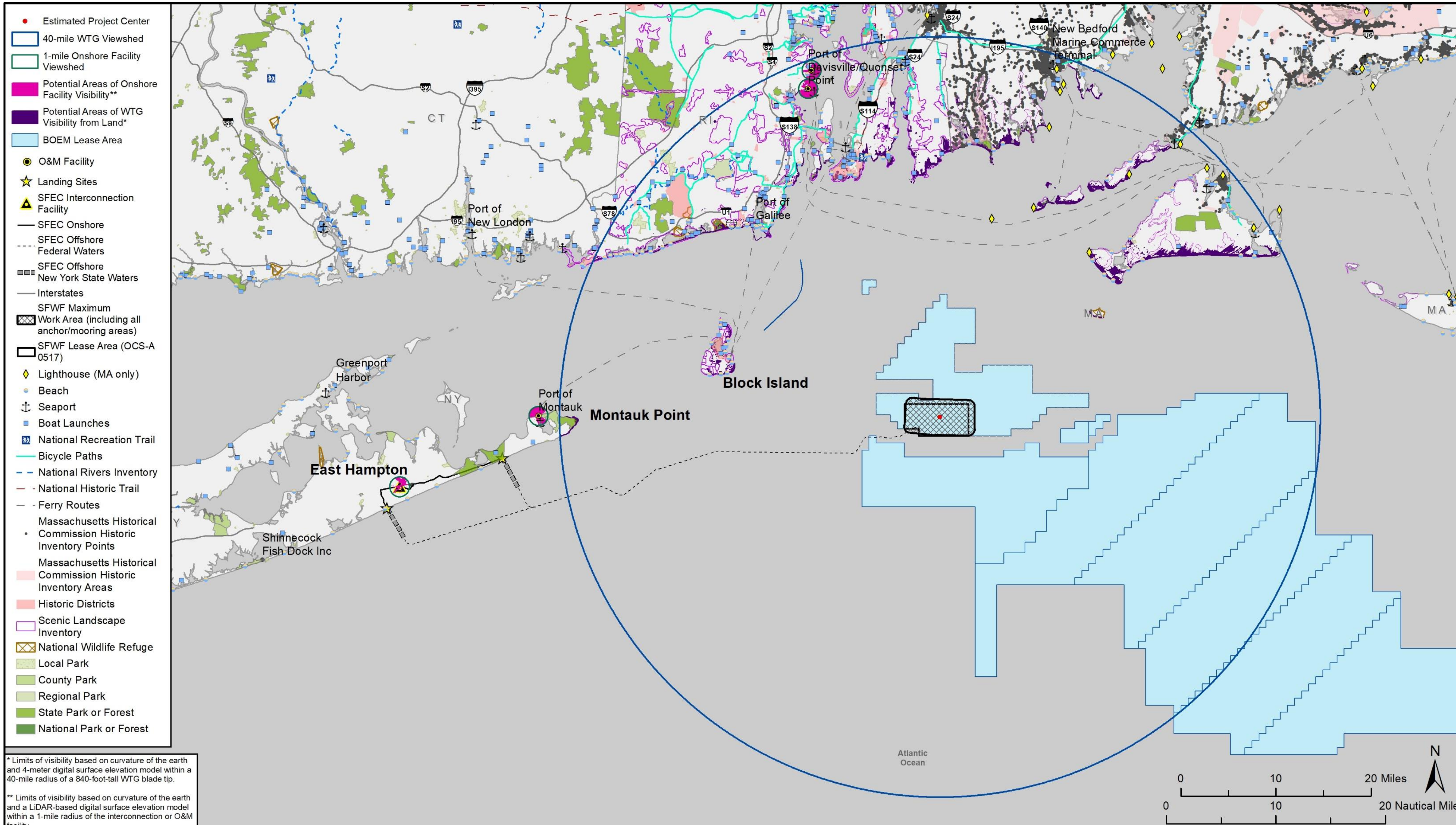

Figure C-31. Visual resources information.

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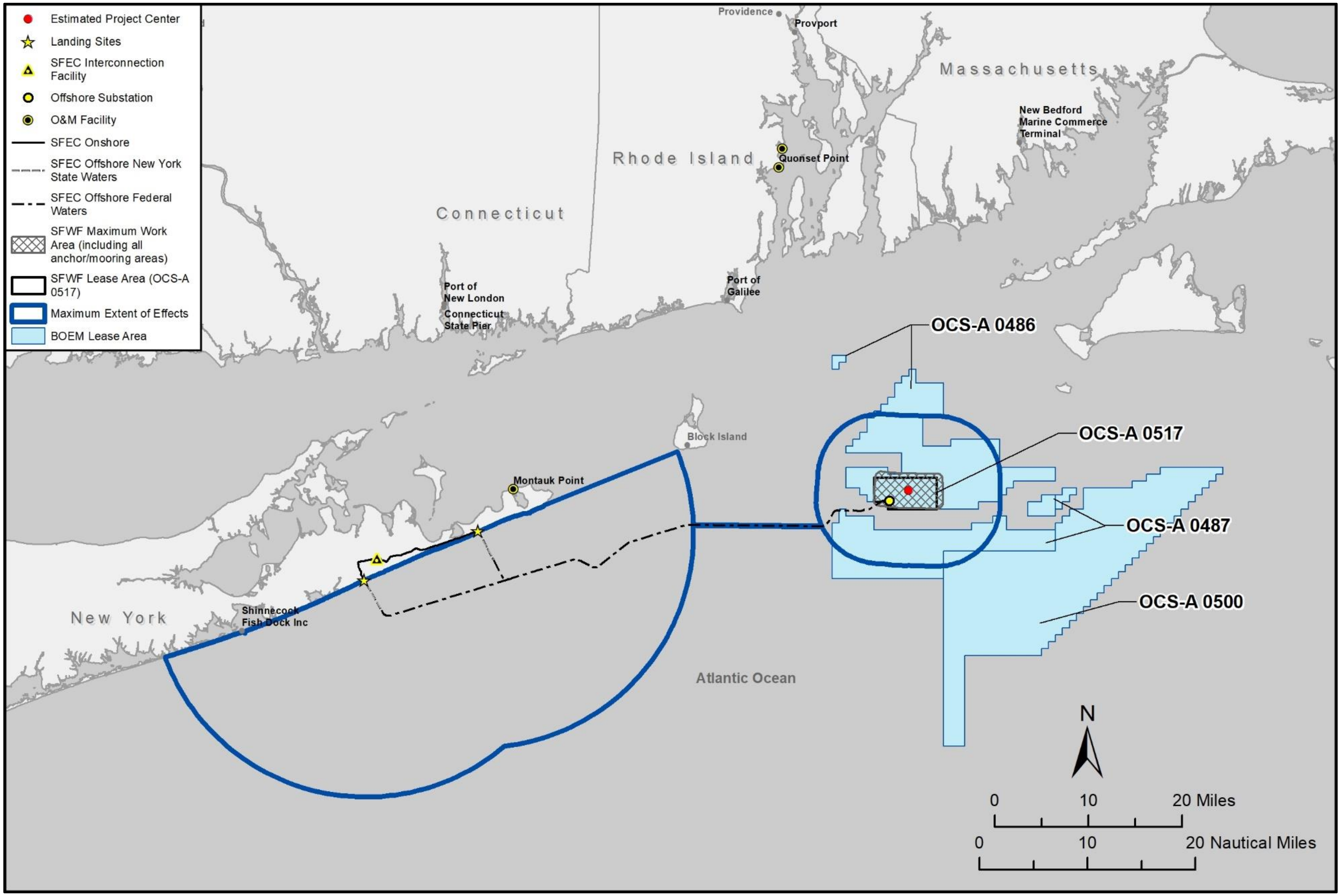

Figure C-32. Maximum extent of effects for marine mammals.

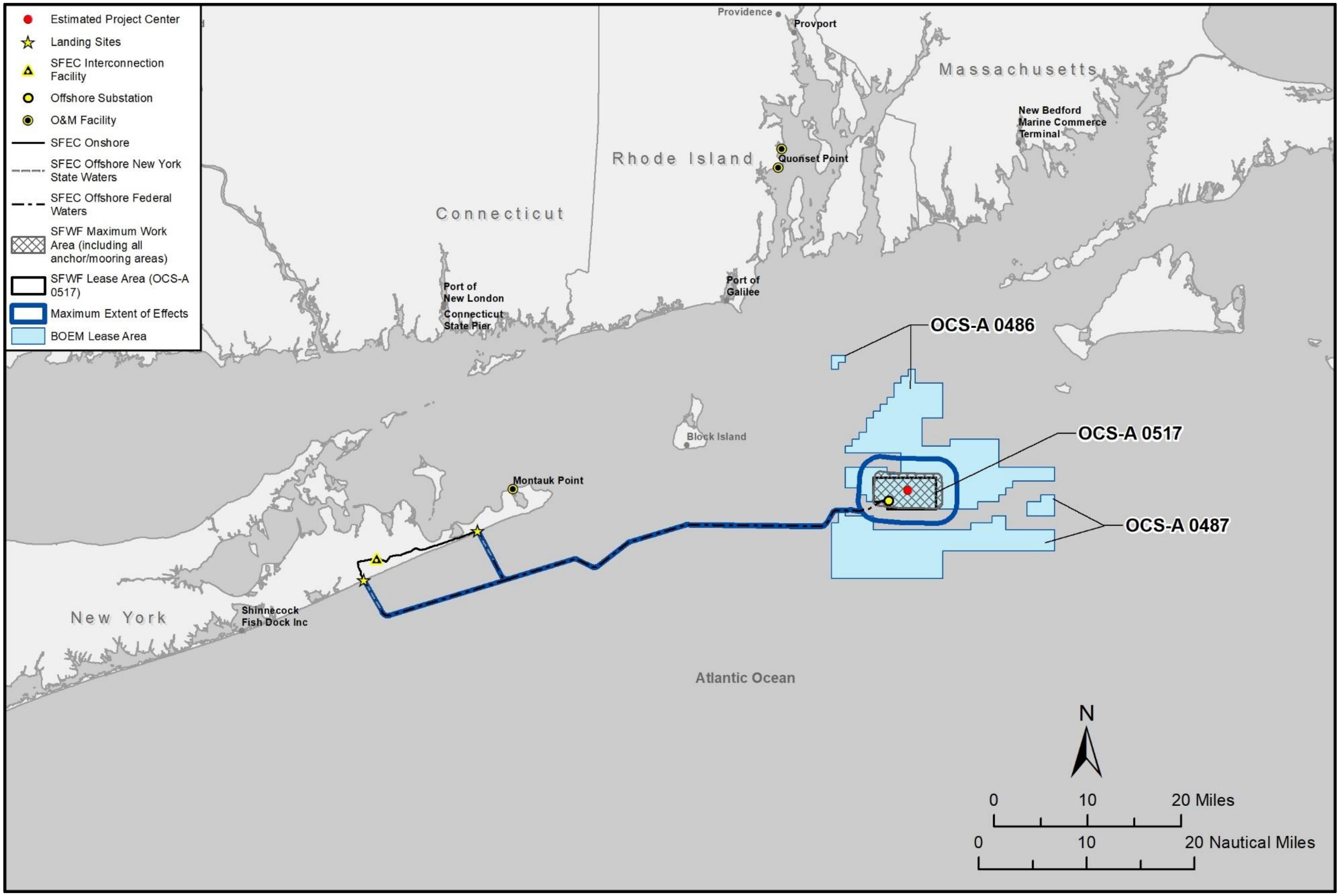

Figure C-33. Maximum extent of effects for sea turtles.

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Northeast Regional Ocean Council. 2019. Northeast Ocean Data. Available at: https://www.northeastoceandata.org/data-explorer/?birds|stressor-groups. Accessed January 2019.

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APPENDIX D

Project Design Envelope and Maximum-Case Scenario

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Tables

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Table D-1. Maximum-Case Scenario List of Parameter Specifications

Design Parameter	Minimum Design Size	Maximum Design Size	3.3.1 Air Quality	3.3.2 Water Quality	3.4.1 Bats	3.4.2 Benthic, Essential Fish Habitat, Invertebrates, and Finfish	3.4.3 Birds	3.4.4 Marine Mammals	3.4.5 Other Terrestrial and Coastal Habitats and Fauna	3.4.6 Sea Turtles	3.4.7 Wetlands and Other Waters of the United States	3.5.1 Commercial Fisheries and For-Hire Recreational Fishing	3.5.2 Cultural Resources	3.5.3 Demographics, Employment, and Economics	3.5.4 Environmental Justice	3.5.5 Land Use and Coastal Infrastructure	3.5.6 Navigation and Vessel Traffic	3.5.7 Other Uses (marine, military use, aviation, offshore energy)	3.5.8 Recreation and Tourism	3.5.9 Visual Resources
WIND FARM																				
Wind farm capacity	90 megawatt (MW)	180 MW*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WIND TURBINE GENERATOR (WTG) AND FOUNDATION																				
Turbine size	6 MW	12 MW	X	X	X	X	X	X		X		X	X				X	X	X	X
Number of WTG positions	11	Up to 15	X	X	X	X	X	X		X		X	X				X	X	X	X
Distance between positions	1 nautical mile (nm) between WTGs on an east–west, north–south grid	1 nm between WTGs on an east–west, north–south grid	X	X	X	X	X	X		X		X	X				X	X	X	X
Total tip height	577 feet mean sea level (MSL)	840 feet MSL			X		X					X	X				X	X	X	X
Hub height	331 feet MSL	472 feet MSL			X		X					X	X				X	X	X	X
Rotor diameter	492 feet MSL	735 feet MSL			X		X					X	X				X	X	X	X
Rotor swept zone area	190,117 square feet	424,173 square feet			X		X					X	X				X	X	X	X
Blade length	246 feet	358 feet			X		X					X	X				X	X	X	X
Platform level/interface level height for monopile	66 feet MSL	75 feet MSL			X		X					X	X				X	X	X	X
Tip clearance/air gap	85 feet MSL	105 feet MSL			X		X					X	X				X	X	X	X
Foundation construction method	Pile driving	Pile driving	X	X	X	X	X	X		X		X	X				X	X	X	X
Foundation and WTG vessel type	Jack-up vessel or derrick barge, vessel on dynamic positioning with feeder barges	Jack-up vessel or derrick barge, vessel on dynamic positioning with feeder barges	X	X	X	X	X	X		X		X	X				X	X	X	X
WTG coloring	RAL 9010 Pure White	RAL 7035 Light Grey					X						X				X	X	X	X
Federal Aviation Administration aviation obstruction lighting	Two synchronized L-864 aviation red flashing obstruction lights—WTG nacelle; 30 flashes per minute (fpm) will be utilized for air navigation lighting	Two synchronized L-864 aviation red flashing obstruction lights—WTG nacelle; 30 flashes per minute will be utilized for air navigation lighting. For wind turbines above 699 feet: the additional level of lights should consist of a minimum of three L-810 flashing red lights configured to flash in unison with the two L-864 red flashing lights located at the top of the nacelle at a rate of 30 fpm (± 3 fpm).			X		X					X	X				X	X	X	X

Design Parameter	Minimum Design Size	Maximum Design Size	3.3.1 Air Quality	3.3.2 Water Quality	3.4.1 Bats	3.4.2 Benthic, Essential Fish Habitat, Invertebrates, and Finfish	3.4.3 Birds	3.4.4 Marine Mammals	3.4.5 Other Terrestrial and Coastal Habitats and Fauna	3.4.6 Sea Turtles	3.4.7 Wetlands and Other Waters of the United States	3.5.1 Commercial Fisheries and For-Hire Recreational Fishing	3.5.2 Cultural Resources	3.5.3 Demographics, Employment, and Economics	3.5.4 Environmental Justice	3.5.5 Land Use and Coastal Infrastructure	3.5.6 Navigation and Vessel Traffic	3.5.7 Other Uses (marine, military use, aviation, offshore energy)	3.5.8 Recreation and Tourism	3.5.9 Visual Resources
U.S. Coast Guard (USCG) marine navigation lighting (MNL)	Two white flashing obstruction lights (color to be determined depending on structure classification) on each turbine approximately 20 to 23 meters above MSL on opposite corners along the same horizontal plane, each visible from all approach directions to 3 nm	Two white flashing obstruction lights (color to be determined depending on structure classification) on each turbine approximately 20 to 23 meters above MSL on opposite corners along the same horizontal plane, each visible from all approach directions to 3 nm			X		X					X	X				X	X	X	X
USCG MNL lighting	Flashing white light visible to 1 nm for Class C structure (to be determined by USCG)	Flashing white light visible to 5 nm for Class A structure (to be determined by USCG)			X		X					X	X				X	X	X	X
WTG foundation coloring	Yellow from water line to height of at least approximately 50 feet	Yellow from water line to height of at least approximately 50 feet			X		X					X	X				X	X	X	X
Navigational warning sounds/signals	Sensor-operated foghorns audible between 0.5 and 2.0 nm and automatic identification system (AIS) transponders	Sensor-operated foghorns audible between 0.5 and 2.0 nm and AIS transponders			X	X	X	X				X					X	X	X	
MONOPILE FOUNDATION																				
Number of monopile foundations	12	Up to 16	X	X	X	X	X	X		X		X	X				X	X	X	X
Monopile diameter	36 feet	36 feet	X	X	X	X	X	X		X		X	X				X	X	X	X
Number of piles per foundation	1	1	X	X		X		X		X		X	X				X	X	X	X
Seabed footprint—no scour protection—per foundation	1,025 square feet	1,025 square feet	X	X		X		X		X		X	X				X	X	X	X
Seabed footprint—with scour protection—per foundation	39,765 square feet	39,765 square feet	X	X		X		X		X		X	X				X	X	X	X
Seabed preparation per foundation	40,365 square feet	40,365 square feet	X	X		X		X		X		X	X				X	X	X	X
Vessel anchoring/mooring per foundation	2,234,089 square feet	2,234,089 square feet	X	X		X		X		X		X	X				X	X	X	X
Hammer size for monopile foundation	4,000 kilojoules (kj)	4,000 kj	X	X		X		X		X		X	X				X	X	X	X
Max penetration depth into seabed	164 feet	164 feet	X	X		X		X		X		X	X				X	X	X	X
Duration of pile driving (hours/pile)	2 to 4 hours	2 to 4 hours	X	X		X		X		X		X	X				X	X	X	X
Duration of installation (days/foundation)	2 to 4 days	2 to 4 days	X	X		X		X		X		X	X				X	X	X	X

Design Parameter	Minimum Design Size	Maximum Design Size	3.3.1 Air Quality	3.3.2 Water Quality	3.4.1 Bats	3.4.2 Benthic, Essential Fish Habitat, Invertebrates, and Finfish	3.4.3 Birds	3.4.4 Marine Mammals	3.4.5 Other Terrestrial and Coastal Habitats and Fauna	3.4.6 Sea Turtles	3.4.7 Wetlands and Other Waters of the United States	3.5.1 Commercial Fisheries and For-Hire Recreational Fishing	3.5.2 Cultural Resources	3.5.3 Demographics, Employment, and Economics	3.5.4 Environmental Justice	3.5.5 Land Use and Coastal Infrastructure	3.5.6 Navigation and Vessel Traffic	3.5.7 Other Uses (marine, military use, aviation, offshore energy)	3.5.8 Recreation and Tourism	3.5.9 Visual Resources
OFFSHORE SUBSTATION (OSS)																				
Number of OSS	1	1	X	X	X	X	X	X		X		X	X				X	X	X	X
OSS foundation type	Co-located monopile	Stand-alone monopile	X	X		X		X		X		X	X				X	X	X	X
OSS number of piles per foundation	1	1	X	X		X		X		X		X	X				X	X	X	X
OSS foundation construction method	Pile driving	Pile driving	X	X		X		X		X		X	X				X	X	X	X
OSS max height	Stand-alone monopile at 150 to 200 feet	Stand-alone monopile at 150 to 200 feet			X		X					X	X				X	X	X	X
USCG lighting	See monopile turbine requirements	See monopile turbine requirements			X		X					X	X				X	X	X	X
INTER-ARRAY CABLE																				
Inter-array cable capacity	34.5 kilovolts (kV)	66 kV	X	X		X		X		X		X	X				X	X	X	
Number of foundations per inter-array	Up to 3	5	X	X		X		X		X		X	X				X	X	X	
Inter-array cable length	21.4 miles	21.4 miles	X	X		X		X		X		X	X				X	X	X	
Maximum trench depth	10 feet	10 feet	X	X		X		X		X		X	X				X	X	X	
Burial depth	4 feet	6 feet	X	X		X		X		X		X	X				X	X	X	
Installation advancement (length of cable lay per day)	1 to 2 miles	1 to 2 miles	X	X		X		X		X		X	X				X	X	X	
EXPORT CABLE																				
Export cable capacity	138 kV	138 kV	X	X		X		X		X		X	X				X	X	X	
Number of export cables	1	1	X	X		X		X		X		X	X				X	X	X	
Export cable length (OCS + NYS)	61.1 miles	65.5 miles	X	X		X		X		X		X	X				X	X	X	
Burial depth - offshore	4 feet	6 feet	X	X		X		X		X		X	X				X	X	X	
OPERATIONS AND MAINTENANCE FACILITY																				
Montauk, East Hampton, New York	One or more buildings with up to 1,000 square feet of office space and up to 6,600 square feet of storage space	One or more buildings with up to 1,000 square feet of office space and up to 6,600 square feet of storage space	X	X	X	X	X		X	X	X		X			X			X	X
Quonset Point, North Kingstown, Rhode Island (two potential locations at the same facility)	One or more buildings with up to 1,000 square feet of office space and up to 11,000 square feet of storage space	One or more buildings with up to 1,000 square feet of office space and up to 11,000 square feet of storage space	X	X	X	X	X		X	X	X		X			X			X	X

Notes: In this appendix, distances in miles are in statute miles (miles used in the traditional sense) or nautical miles (or nm) (miles used specifically for marine navigation). Statute miles are more commonly used and are referred to simply as miles, whereas nautical miles are referred to by name or by their abbreviation nm.

* Although this EIS evaluates 180 MW as the maximum design feature, it is important to note that interconnection at the East Hampton substation is currently limited to no more than 130 MW, which matches the energy production requirement of the Power Purchase Agreement with Long Island Power Authority.

Table D-2. Maximum-Case Scenario Measurements for South Fork Export Cable Seabed Footprint

Seabed Footprint	Maximum Temporary Seabed Footprint	Maximum Permanent Seabed Footprint	3.3.1 Air Quality	3.3.2 Water Quality	3.4.1 Bats	3.4.2 Benthic, Essential Fish Habitat, Invertebrates, and Finfish	3.4.3 Birds	3.4.4 Marine Mammals	3.4.5 Other Terrestrial and Coastal Habitats and Fauna	3.4.6 Sea Turtles	3.4.7 Wetlands and Other Waters of the United States	3.5.1 Commercial Fisheries and For-Hire Recreational Fishing	3.5.2 Cultural Resources	3.5.3 Demographics, Employment, and Economics	3.5.4 Environmental Justice	3.5.5 Land Use and Coastal Infrastructure	3.5.6 Navigation and Vessel Traffic	3.5.7 Other Uses (marine, military use, aviation, offshore energy)	3.5.8 Recreation and Tourism	3.5.9 Visual Resources
INTER-ARRAY CABLE																				
Inter-array cable seabed disturbance (includes cable installation and boulder relocation)	Up to 340 acres	Up to 2.5 acres	X	X		X		X		X		X	X				X	X	X	
Inter-array cable secondary cable protection	Not applicable (N/A)	Up to 10.2 acres	X	X		X		X		X		X	X				X	X	X	
Inter-array cable protection at approach to foundations	N/A	Up to 7.5 acres	X	X		X		X		X		X	X				X	X	X	
Inter-array cable seabed disturbance	Up to 340 acres	Up to 2.5 acres	X	X		X		X		X		X	X				X	X	X	
EXPORT CABLE																				
South Fork Export Cable (SFEC) – trench width	25 to 43 feet	1 foot	X	X		X		X		X		X	X				X	X	X	
SFEC – Outer Continental Shelf (OCS) submarine cable	555.3 acres	7.0 acres	X	X		X		X		X		X	X				X	X	X	
SFEC – OCS cable joints	N/A	0.1 acre	X	X		X		X		X		X	X				X	X	X	
SFEC – OCS cable protection (for up to 7 crossings)	N/A	0.6 acre	X	X		X		X		X		X	X				X	X	X	
SFEC – OCS secondary cable protection	N/A	7.1 acres	X	X		X		X		X		X	X				X	X	X	
SFEC – New York State (NYS) submarine cable	18 acres	0.4 acre	X	X		X		X		X		X	X				X	X	X	
SFEC – NYS secondary cable protection	N/A	0.2 acre	X	X		X		X		X		X	X				X	X	X	
SFEC – NYS sediment excavation (offshore cofferdam)	850 cubic yards	N/A	X	X		X		X		X		X	X				X	X	X	
SFEC – secondary cable protection (estimated 5% OCS + 2% NYS)	N/A	7.3 acres	X	X		X		X		X		X	X				X	X	X	

Table D-3. Maximum-Case Scenario Measurements for South Fork Export Cable Landing Sites

Design Parameter	Beach Land Route A	Hither Hills Route B	3.3.1 Air Quality	3.3.2 Water Quality	3.4.1 Bats	3.4.2 Benthic, Essential Fish Habitat, Invertebrates, and Finfish	3.4.3 Birds	3.4.4 Marine Mammals	3.4.5 Other Terrestrial and Coastal Habitats and Fauna	3.4.6 Sea Turtles	3.4.7 Wetlands and Other Waters of the United States	3.5.1 Commercial Fisheries and For-Hire Recreational Fishing	3.5.2 Cultural Resources	3.5.3 Demographics, Employment, and Economics	3.5.4 Environmental Justice	3.5.5 Land Use and Coastal Infrastructure	3.5.6 Navigation and Vessel Traffic	3.5.7 Other Uses (marine, military use, aviation, offshore energy)	3.5.8 Recreation and Tourism	3.5.9 Visual Resources
SUMMARY OF EXPORT CABLE SEGMENT LENGTHS																				
South Fork Export Cable (SFEC) - offshore	61.8 miles	49.9 miles	X	X		X		X		X		X	X				X	X	X	
SFEC - Outer Continental Shelf (OCS)	58.3 miles	46.0 miles	X	X		X		X		X		X	X				X	X	X	
SFEC - New York State (includes 500 feet of sea-to-shore on land transition)	3.5 miles	3.5 miles	X	X		X		X		X		X	X				X	X	X	
SFEC - onshore	4.1 miles	11.5 miles	X	X	X		X		X		X		X	X	X	X			X	
Total export cable segments length per landing site	65.9 miles	61.4 miles	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
ONSHORE COMPONENTS																				
Landfall sites	Beach Lane	Hither Hills	X	X	X		X		X		X		X	X	X	X			X	X
Landfall transition method	Horizontal directional drilling (HDD) with cofferdam	HDD with cofferdam	X	X	X		X		X		X		X	X	X	X			X	X
Landfall transition	Underground concrete transition vault	Underground concrete transition vault	X	X	X		X		X		X		X	X	X	X			X	X
Onshore construction location	Underground duct banks of polyvinyl chloride (PVC) pipes encased in concrete	Underground duct banks of PVC pipes encased in concrete	X	X	X		X		X		X		X	X	X	X			X	X
Onshore construction method	Open trench (wide enough to accommodate max 4 feet wide × 8 feet deep conduit) with HDD or other trenchless technology as needed	Open trench (wide enough to accommodate max 4 feet wide × 8 feet deep conduit) with HDD or other trenchless technology as needed	X	X	X		X		X		X		X	X	X	X			X	X
Onshore dimensions	4 conduits wide × 2 deep (or vice versa); 1.6 to 3 feet × 1.8 to 3.3 feet	3 conduits wide × 3 deep; 2.25 feet × 2.5 feet	X	X	X		X		X		X		X	X	X	X			X	X
Onshore cable route	Beach Lane to interconnection facility site	Old Montauk Highway to interconnection facility site	X	X	X		X		X		X		X	X	X	X			X	X
Length of onshore cable	4.1 miles	11.5 miles	X	X	X		X		X		X		X	X	X	X			X	X
Onshore interconnection facility location	One location on Cove Hollow Road in East Hampton, New York	One location on Cove Hollow Road in East Hampton, New York	X	X	X		X		X		X		X	X	X	X			X	X
Onshore interconnection facility site size	228 × 313 feet on 2.377 acres of leased area within existing Long Island Power Authority substation property	228 × 313 feet on 2.377 acres of leased area within existing Long Island Power Authority substation property	X	X	X		X		X		X		X	X	X	X			X	X

Notes: In this appendix, distances in miles are in statute miles (miles used in the traditional sense) or nautical miles (or nm) (miles used specifically for marine navigation). Statute miles are more commonly used and are referred to simply as miles, whereas nautical miles are referred to by name or by their abbreviation nm.

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APPENDIX E

Cumulative Activities Scenario

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CONTENTS

Attachments

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CUMULATIVE ACTIVITIES SCENARIO

Cumulative impacts are the incremental effects of a proposed action on the environment when added to other past, present, or reasonably foreseeable future actions, regardless of which agency or person undertakes the actions (40 CFR 1508.7)[1].

This appendix discusses resource-specific cumulative activities that could occur if Project impacts occur in the same location and timeframe as impacts from other relevant past, present, or reasonably foreseeable future actions. The *Project* here is the construction, operations and maintenance (O&M), and conceptual decommissioning of a wind energy project located within the Bureau of Ocean Energy Management's (BOEM's) Renewable Energy Lease Area OCS-A 0517, approximately 18 statute miles southeast of Block Island, Rhode Island, and 34 statute miles east of Montauk Point, New York.

The geographic analysis area varies for each resource as shown below in Table E-1 and on Figures E-1 through E-17 in Attachment 1. BOEM anticipates that impacts could occur between the start of Project construction in 2022 and the completion of Project decommissioning approximately 2053. The geographic analysis area is defined by the impact-producing factor with the maximum geographic area of impact, for example sound during pile driving. For the mobile resources, bats, birds, finfish and invertebrates, marine mammals, and sea turtles, the species potentially impacted are those that occur within the area of impact of the Proposed Action. The geographic analysis area for these mobile resources is the general range of the species. The purpose of these analysis areas is to capture the cumulative impacts to each of those resources that are impacted by the Proposed Action.

In this appendix, distances in miles are in statute miles (miles used in the traditional sense) or nautical miles (miles used specifically for marine navigation). This appendix uses statute miles more commonly and refers to them simply as *miles*, whereas nautical miles are referred to by name.

[1] On July 16, 2020, the Council on Environmental Quality (CEQ), which is responsible for federal agency implementation of NEPA, updated the regulations for implementing the procedural provisions of NEPA (85 CFR 43304-43376). Since BOEM's NEPA review of the proposed Project began prior to the September 14, 2020, effective date of the updated regulations, this draft environmental impact statement was prepared under the previous version of the regulations (1978, as amended in 1986 and 2005).

Table E-1. Resource-Specific Geographic Analysis Areas

Resource	Geographic Analysis Area	Rationale
Physical Resources		
Air quality*	The Outer Continental Shelf (OCS) permit area (consisting of the South Fork Wind Farm [SFWF], portions of the offshore South Fork Export Cable [SFEC] and all other potentially affected areas within 25 miles of the Lease Area) and all lands within a 15.5-mile radius of potential Project on-land construction areas and port locations (Figure E-1).	The geographic analysis area encompasses the geographic region subject to U.S. Environmental Protection Agency (EPA) review as part of an OCS permit for the Project under the Clean Air Act. The geographic analysis area also considers potential air quality impacts associated with the on-land construction areas and the mustering port(s) outside of the OCS permit area. Given the generally low emissions of the sea vessels and equipment that would be used during proposed construction activities, any potential air quality impacts would likely be within a few miles of the source. BOEM selected the 15.5-mile distance to provide a reasonable buffer.
Water quality	The watersheds and groundwater basins that cross or fall within the project. The geographic analysis area for offshore water quality impacts includes coastal and marine waters within a 10-mile radius of Project components, as well as a 15.5-mile radius of waterways for ports that may be used during the Project (Figure E-2).	The onshore geographic analysis area was chosen to capture the extent of the natural network of waterbodies that could be affected by construction and operation activities of the proposed project. The offshore geographic analysis area was chosen by analyzing a worst-case scenario of an incidental oil discharge under the project, which would equate to the simultaneous release of all oils used by all project components and vessels.
Biological Resources		
Bats	The U.S. coastline from Maine to Florida (Figure E-3). Although some historic anecdotal observations of bats up to 1,212 miles offshore of North America exist, recent offshore observations of tree bats range from 10.5 to 26 miles (Hatch et al. 2013). For this reason, the geographic analysis area for bats consists of the U.S. east coast, from Maine to Florida, to capture migratory species, and extends 100 miles offshore.	The geographic analysis area was established to capture most of the movement range for migratory species. Northern long-eared bats and other cave bats do not typically occur on the OCS. Tree bats are long-distance migrants; their range includes most of the Atlantic coast from Florida to Maine. Although these species have been documented traversing the open ocean and have the potential to encounter wind turbine generators (WTGs), use of offshore habitat is thought to be limited and generally restricted to spring and fall migration. The onshore limit of the geographic scope is intended to cover most of the onshore habitat used by those species that may encounter the Project during most of their life cycles.
Benthic habitat	The maximum work area for the SFWF as well as the construction and operational footprint of the SFEC and potential O&M facilities (Figure E-4a). This includes a 10-mile radius around the Lease Area and a 330-foot buffer on either side of the SFEC.	The geographic analysis area captures the extent of benthic habitat occurring within the footprint of Project activities because benthic habitats do not move or migrate like other biological resources. This area also accounts for some transport of water masses, sediment transport, and for benthic invertebrate larval transport due to ocean currents.
Essential fish habitat, invertebrates, and finfish	The Northeast Shelf Large Marine Ecosystem (LME), which extends from the southern edge of the Scotian Shelf (in the Gulf of Maine) to Cape Hatteras, North Carolina (Figure E-4b).	This area is likely to capture the majority of the movement range for most species in this group.[†]
Birds	The United States coastline from Maine to Florida (see Figure E-3). The offshore limit is 100 miles from the Atlantic shore to capture the migratory movements of most species in this group. The onshore limit is 0.5 mile (0.8 km) inland to cover onshore habitats used by the species that may be affected by offshore components of the proposed Project as well as those species that could be affected by proposed onshore Project components.	The geographic analysis area was established to capture resident species and migratory species that winter as far south as South America and the Caribbean, and those that breed in the Arctic or along the Atlantic Coast that travel through the area.

Resource	Geographic Analysis Area	Rationale
Marine mammals	The Scotian Shelf, Northeast Shelf, and Southeast Shelf LMEs (Figure E-5).	The geographic analysis area is likely to capture most of the movement range for most species in this group.† BOEM notes that potential vessel trips from port locations in the Gulf of Mexico could occur under the Proposed Action. However, whether ports in these regions would be used or not would not be known until additional details are available when contracts are in place. Because BOEM estimates that only up to four vessel trips could occur (but are unlikely), the geographic analysis area was not extended to encompass the Gulf of Mexico.
Terrestrial and coastal habitats and faunas	All onshore Project areas, including a 1.0-mile buffer (Figure E-6).	BOEM expects the resources in this area to have small home ranges. These resources are unlikely to be affected by impacts outside their home ranges.
Sea turtles	The Northeast and Southeast Shelf LMEs (Figure E-7).	This area is likely to capture the majority of the movement range for most species in this group.†
Wetlands and other waters of the United States	The three subwatersheds that overlap the onshore Project (Figure E-8).	This area encompasses the drainage basin and network of surface waterbodies that could be affected by Project construction and O&M activities.
Socioeconomic and Cultural Resources		
Commercial fisheries and for-hire recreation fishing	Waters managed by the New England Fishery Management Council and/or the Mid-Atlantic Fisheries Management Council within the U.S. Exclusive Economic Zone (from 3 to 200 nautical miles from the coastline), plus the state waters of the Commonwealth of Massachusetts, Rhode Island and New York (from 0 to 3 nautical miles from the coastline) (Figure E-9).	The boundaries for the geographic analysis area were developed to consider impacts to federally permitted vessels operating in all fisheries in state and U.S. Exclusive Economic Zone waters.
Cultural resources	Terrestrial cultural resources: The footprint of all onshore Project components, plus the viewshed in which Project facilities could be visible (the area of potential effects for visual impacts analysis) (Figure E-10). Marine cultural resources: The SFWF and offshore SFEC, the adjacent BOEM lease areas OCS-A 0486 and OCS-A 0487, plus a 1,000-foot buffer zone extending from the edge of project components outward and overlapping with the two adjacent lease areas (Figure E-11).	This terrestrial cultural resources geographic analysis area accounts for the footprint of onshore Project development where physical impacts could occur to historic properties and the viewshed within which visibility of the Project could result in an impact on the visual setting of a historic property from construction, O&M, or conceptual decommissioning. The marine cultural resources geographic analysis area encompass offshore locations where BOEM anticipates impacts associated with construction, O&M, and conceptual decommissioning of the Project.
Demographics, employment, and economics	Suffolk County in New York; Providence, Newport, and Washington Counties in Rhode Island; Bristol County in Massachusetts; New London County in Connecticut; Gloucester County in New Jersey; Baltimore County in Maryland; and Norfolk City/County in Virginia. These counties include those with proposed onshore infrastructure, potential port cities, and counties in closest proximity to the Lease Area (Figure E-12).	These counties are the most likely to experience beneficial or negative economic impacts from the proposed Project.
Environmental justice	The same as the demographics, employment, and economics geographic analysis area (see Figure E-12).	The geographic analysis area would be the same as the socioeconomics geographic analysis area, as these counties, and environmental justice communities located within, are the most likely to experience impacts from the proposed Project.

Resource	Geographic Analysis Area	Rationale
Land use and coastal infrastructure	Town of East Hampton and the ports potentially used for Project construction, O&M, and conceptual decommissioning (Figure E-13).[‡]	These areas encompass locations where BOEM anticipates direct and indirect impacts associated with proposed onshore facilities and ports.
Navigation and vessel traffic	Coastal and marine waters within a 10-mile radius of Project components, as well as waterways for ports that may be used during the Project (Figure E-14).	These areas encompass locations where BOEM anticipates direct and indirect impacts associated with Project construction, O&M, and conceptual decommissioning.
Other Uses (marine, military use, aviation, offshore energy, scientific research and surveys)	Marine mineral extraction: Areas within 0.25 mile of the Project and footprints of other cables and wind lease areas in the RI-MA WEA. National security/military use/ aviation and air traffic/ radar systems: An area roughly bounded by Montauk, New York; Providence, Rhode Island; Provincetown, Massachusetts; and within a 10-mile buffer from wind lease areas in the RI-MA WEA (Figure E-15). Aviation and air traffic: Airspace and airports used by regional air traffic. Radar systems: Includes air space used by regional air traffic. Offshore energy: Other known wind energy project locations. Cables and pipelines: area within 1 mile of the Project and other undersea facilities and wind lease areas in the RI-MA WEA. Scientific research and surveys: Same as for finfish, invertebrates, and EFH and includes the footprint of the Proposed Action and all reasonably foreseeable projects between Maine and mid–North Carolina.	These areas encompass locations where BOEM anticipates direct and indirect impacts associated with Project construction, O&M, and conceptual decommissioning. The scientific research and surveys area encompasses the locations where scientific research and surveys are anticipated to occur.
Recreation and tourism	The geographic analysis area includes all Project components, plus a 40-mile radius from the WTG array (Figure E-16).	This geographic analysis area was selected to coincide with the April 2019 SFWF visual impact assessment visual analysis area to address Project visibility from sensitive resources and encompass all locations where BOEM anticipates direct and indirect impacts associated with Project construction, O&M, and conceptual decommissioning.
Visual resources	The area of analysis for cumulative visual impacts uses the 40-mile visual analysis area as defined in the April 2019 SFWF visual impact assessment (Figure E-17).	This geographic analysis area was selected to coincide with the April 2019 SFWF visual impact assessment visual analysis area to address Project visibility from sensitive resources and encompass all locations where BOEM anticipates direct and indirect impacts associated with Project construction, O&M, and conceptual decommissioning.

* BOEM is not proposing to model impacts at Class I areas because no federal Class I areas are located within the geographic analysis area or within the initial screening distance of 100 km from a federal Class I area for sources emitting less than 1,000 tons per year of NOx (U.S. Forest Service, National Park Service, and U.S. Fish and Wildlife Service [2010]).

† LMEs are delineated based on ecological criteria including bathymetry, hydrography, productivity, and trophic relationships among populations of marine species, and the National Oceanic and Atmospheric Administration (NOAA) uses them as the basis for ecosystem-based management.

‡ South Fork Wind, LLC plans to finalize the specific ports during the facility design report phase.

PAST, PRESENT, AND FUTURE REASONABLY FORESEEABLE ACTIVITIES AND PROJECTS

This section includes a list and description of past, present, and reasonably foreseeable projects that could contribute to cumulative impacts. Projects or actions that are considered speculative per the definition provided in 43 CFR 46.30[2] are noted in subsequent tables but excluded from the cumulative impact analysis in Chapter 3.

Cumulative projects and activities described in this section consist of 10 types of actions: 1) other offshore wind energy development activities; 2) undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); 3) tidal energy projects; 4) marine minerals use and ocean-dredged material disposal; 5) military use; 6) marine transportation; 7) fisheries use and management; 8) global climate change; 9) oil and gas activities; and 10) onshore development activities.

BOEM analyzed the possible extent of future other offshore wind energy development activities on the Atlantic Outer Continental Shelf (OCS) to determine reasonably foreseeable cumulative effects measured by installed power capacity. Since the development of the South Fork Wind Farm (SFWF) and South Fork Export Cable (SFEC) Project draft environmental impact statement (EIS), BOEM has received eight additional construction and operations plans, which provide more specific details of projects. The cumulative analysis numbers are refined to include this new information. However, the overall estimates for reasonably foreseeable activities have not changed significantly and the methodology is the same. Table E-2 is updated with the information and represents status of projects as of June 1, 2021. The methodology for developing the scenario is the same as for the Vineyard Wind project, and details of the scenario development are described in the *Vineyard Wind 1 Offshore Wind Energy Project Final Environmental Impact Statement* (BOEM 2021a).

[2] 43 CFR 46.30 – Reasonably foreseeable future actions include those federal and non-federal activities not yet undertaken, but sufficiently likely to occur, that a responsible official of ordinary prudence would take such activities into account in reaching a decision. The federal and non-federal activities that BOEM must take into account in the analysis of cumulative impacts include, but are not limited to, activities for which there are existing decisions, funding, or proposals identified by BOEM. Reasonably foreseeable future actions do not include those actions that are highly speculative or indefinite.

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Table E-2. Offshore Wind Activities on the U.S. Atlantic Coast (dates shown as of June 1, 2021)

Lease Number	States	Lessee/Developer Name	Project Name	Construction Date	Operations Date	Facility Description	BOEM Permitting Stage*	Power Purchase Agreement (PPA)/ Offshore Renewable Energy Certificate (OREC) Status
Active Projects (state)								
N/A (state project)	Rhode Island	Deepwater Wind, LLC (now Ørsted)	Block Island Wind Farm	2015	2016	30 MW (5 WTGs)	N/A	PPA with RI
Active Projects (federal)								
OCS-A 0483	Virginia	Virginia Electric and Power Company (dba Dominion Virginia Power)	Virginia Commercial Offshore Wind (per SAP)	2024–2025	2026	2,640 MW (205 WTGs); one met buoy	SAP approved; SAP submitted; COP in progress	No PPAs signed to date
OCS-A 0486	Rhode Island and Connecticut	Revolution Wind, LLC (Ørsted and Eversource)	Revolution Wind	2023	2023	880 MW (100 WTGs)	COP in progress; SAP approved	PPA with CT and RI
OCS-A 0487; OCS-A 0500 (portions)	New York	Ørsted and Eversource	Sunrise Wind	2024	2024	880 MW (122 WTGs)	COP submitted	OREC awarded by NYSERDA (PPA with NY)
OCS-A 0490 (portion)	Maryland	U.S. Wind Inc.	U.S. Wind (Maryland Offshore Wind Project)	2024	2024	1500 MW (125 WTGs)	COP submitted; SAP approved	OREC awarded by State of Maryland
OCS-A 0497	Virginia	Virginia Department of Mines, Minerals and Energy (Ørsted & Dominion Energy)	Coastal Virginia Offshore Wind	2021	2021	12 MW (two WTGs); one wave/current buoy	Operating	N/A (research)
OCS-A 0498 (portion)	New Jersey	Ocean Wind, LLC (Ørsted & PSEG)	Ocean Wind	2023	2024	1,100 MW (98 WTGs)	COP in progress SAP approved	PPA with NJ
OCS-A 0499	New Jersey	Atlantic Shores Offshore Wind, LLC	Atlantic Shores	2025	2026		SAP approved; COP submitted	No PPA signed to date
OCS-A 0500 (portion)	Massachusetts	Bay State Wind LLC (Ørsted & Eversource)	Bay State Wind	2026	2027	800 MW; two FLIDAR buoys; one met buoy	COP in progress SAP approved	No PPA signed to date
OCS-A 0501 (north)	Massachusetts	Vineyard Wind LLC	Vineyard Wind 1	2023	2023	800 MW (62 WTGs); two met buoys	ROD issued	PPA with MA
OCS-A 0501 (south)	Connecticut	Vineyard Wind LLC	Park City Wind	2024	2026	Up to 1,714 MW (121 WTGs)	COP in progress	PPA with CT
OCS-A 0508	North Carolina, Virginia	Avangrid Renewables, LLC	Kitty Hawk Offshore	2025	2026	Up to 60 WTGs; up to two buoys; and up to two platforms	COP in progress; SAP approved	No PPA signed to date
OCS-A 0512 (phase 1 and phase 2	New York	Equinor Wind US, LLC	Empire Wind Phase 1, Empire Wind Phase 2 (Boardwalk Wind)	2024	2025	816 MW (68 WTGs); two met buoys; one wave/ met buoy; one subsea current meter mooring	COP in progress; SAP approved	PPA with NY
OCS-A 0517	New York	South Fork Wind, LLC (Ørsted & Eversource)	South Fork Wind Farm (Proposed Action)	2023	2023	132 MW (up to 15 WTGs); one met buoy	Final EIS in progress COP received SAP approved	PPA with NY
OCS-A 0519 (portion; includes former OCS-A 0482)	Delaware, Maryland	Skipjack Offshore Energy, LLC (Ørsted)	Skipjack	2023	2023	192 MW (up to 16 WTGs); one met buoy	COP received	OREC awarded by State of Maryland (connection to PJM grid in Delaware)
OCS-A 0521 (north)	Massachusetts	Mayflower Wind Energy, LLC (Shell & EDP Renewables)	Mayflower (north)	2024	2024	Up to 804 MW (101 WTGs); one met buoy	SAP approved	PPA with MA
Future Projects (federal)								
OCS-A 0482	Delaware	GSOE I LLC (Ørsted & PSEG)	Garden State Offshore Energy	Collectively the technical capacity of this is group is 1,080 MW (90 WTGs). The remaining capacity may be used by demand from NJ or MD (see Attachment 4).			SAP approved	PPA with DE and NJ
OCS-A 0519 (remainder)	Maryland/Delaware	Skipjack Offshore Energy, LLC (Ørsted)	To be determined (TBD)				SAP approved	No PPAs signed to date

Lease Number	**States**	**Lessee/Developer Name**	**Project Name**	**Construction Date**	**Operations Date**	**Facility Description**	**BOEM Permitting Stage***	**Power Purchase Agreement (PPA)/ Offshore Renewable Energy Certificate (OREC) Status**
OCS-A 0487 (remainder)	Rhode Island	Sunrise Wind, LLC	TBD	This group is exposed to 2,500 MW of demand -for MA (1,600 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 4,968 MW (see Attachment 4).			SAP approved	No PPAs signed to date
OCS-A 0500 (remainder)	Massachusetts	Bay State Wind LLC (Ørsted & Eversource)	Constitution Wind				SAP approved	No PPAs signed to date
OCS-A 0520	TBD (New England)	Equinor Wind US LLC	Beacon Wind				SAP submitted	No PPA signed to date
OCS-A 0521 (remainder)	Massachusetts	Mayflower Wind Energy, LLC (Shell & EDP Renewables)	TBD				TBD	No PPAs signed to date
OCS-A 0522 (portion)	Massachusetts	Vineyard Wind LLC	Liberty Wind (Vineyard Wind 2)				SAP submitted	No PPAs signed to date
OCS-A 0522 (remainder)	Massachusetts	Vineyard Wind LLC	TBD				TBD	No PPAs signed to date
OCS-A 0498 (remainder)	New Jersey	Ocean Wind, LLC (Ørsted & PSEG)	TBD	This group may support up to approximately 3,480 MW of development (290 WTGs) from NJ and NY.			SAP approved	No PPAs signed to date

Notes: NA = not applicable; TBD = to be determined.

* Under BOEM Permitting Stage, COP status is assumed to be in process, under review, or not yet commenced based on publicly available information.

Offshore Wind Energy Development Activities

Site Characterization Studies

A lessee is required to provide the results of site characterization activities with its site assessment plan (SAP) or COP. For the purposes of the cumulative effects analysis, BOEM makes the following assumptions for survey and sampling activities:

- Site characterization would occur on all existing leases.
- Site characterization would likely take place in the first 3 years following execution of a lease, based on the fact that a lessee would likely want to generate data for its COP at the earliest possible opportunity.
- Lessees would likely survey most or all of the proposed lease area during the 5-year site assessment term to collect required geophysical information for siting of a meteorological tower and/or two buoys and commercial facilities (wind turbines). The surveys may be completed in phases, with the meteorological tower and/or buoy areas likely to be surveyed first.
- Lessee would not use air guns, which are typically used for deep penetration two-dimensional or three-dimensional exploratory seismic surveys to determine the location, extent, and properties of oil and gas resources (BOEM 2016).

Table E-3 describes the typical site characterization surveys, the types of equipment and/or method used, and which resources the survey information would inform.

Table E-3. Site Characterization Survey Assumptions

Survey Type	Survey Equipment and/or Method	Resource Surveyed or Information Used to Inform
High-resolution geophysical surveys	Side-scan sonar, sub-bottom profiler, magnetometer, multi-beam echosounder	Shallow hazards, archaeological, Bathymetric charting, benthic habitat
Geotechnical/ sub-bottom sampling	Vibracores, deep borings, cone penetration tests	Geological
Biological	Grab sampling, benthic sled, underwater imagery/ sediment profile imaging	Benthic habitat
	Aerial digital imaging; visual observation from boat or airplane	Bird
	Ultrasonic detectors installed on survey vessels used for other surveys	Bat
	Visual observation from boat or airplane	Marine fauna (marine mammals and sea turtles)
	Direct sampling of fish and invertebrates	Fish

Source: BOEM (2016).

Site Assessment Activities

After SAP approval, a lessee can evaluate the meteorological conditions, such as wind resources, with the approved installation of meteorological towers and/or buoys. Site assessment activities have been approved or are in the process of being approved for multiple lease areas consisting of one to three meteorological buoys per SAP (see Table E-2). Site assessment would likely take place starting within 1 to 2 years of lease execution, because preparation of an SAP (and subsequent BOEM review) takes time. This cumulative analysis considers these site assessment activities.

Construction and Operation of Offshore Wind Facilities

Table E-2 lists all offshore wind leasing activities that BOEM considers reasonably foreseeable by lease areas and projects, their permitting stage/assessment, and anticipated timeline.

Monitoring and Mitigation

Future offshore wind projects could require monitoring or mitigation as part of BOEM approval in their records of decisions. Although specific measures are too speculative to include at this time, BOEM anticipates that measures could include actions such as passive acoustic monitoring, trawl surveys, acoustic telemetry, and gillnet or ventless trap surveys.

COMMERCIAL FISHERIES CUMULATIVE FISHERY EFFECTS ANALYSIS

Table E-4 depicts future construction schedules of offshore wind projects from Maine to North Carolina including Block Island Wind Farm, which is currently operating in state waters off Rhode Island. Also included are all of the projects that are currently in various stages of planning within BOEM's offshore leases in the U.S. Exclusive Economic Zone from Massachusetts to North Carolina. The table lists 17 future marine wind projects, all of which will require a NEPA process with an environmental impact statement or environmental assessment.[3] The project schedule and project areas shown in Table E-4 serves as the basis of the assessment of potentially affected revenue for the No Action alternative in Section 3.5.1.2.2 as well as the cumulative effects for the Proposed Action, as described in Section 3.5.1.2.3.

The following assumptions have been made with respect to lease areas and portions of lease areas that are included in the assessment, noting that unless noted in the bulleted list below, the entire lease area for a project listed in Table E-4 is included in the quantitative analysis of commercial fishing revenues at risk:

- Vineyard Wind 1 occupies only the northwestern portion of OCS-A 0501 and could affect 51% of the commercial fishing revenue generated in the lease area (NMFS 2021).
- Sunrise Wind will be built in the southeastern portion of the lease area and is assumed by the analysts that it could affect 55% of the commercial fishing revenue generated in OCS-A 0487.
- Bay State Wind occupies the only northeastern portion of OCS-A 0500 and could affect 41% of the commercial fishing revenue generated in the lease area (NMFS 2021).
- Park City Wind is built in two phases: Phase 1 could affect 65% of the revenues generated in the southwestern portion of OCS-A 0501 that was not used by Vineyard Wind; Phase 2 is assumed to comprise the remaining 35%. The southwestern portion of OCS-A 0501 comprises 49% of the commercial fisheries revenue generated in the entire lease area (NMFS 2021).
- Beacon Wind is built in the northeastern portion of OCS-A 0520 and is assumed by analysts to potentially affect 55% of the commercial fishing revenue generated from the entire lease area.
- Mayflower Wind comprises only the northwestern portion of OCS-A 0521 and could affect 56% of the commercial fishing revenue generated in the lease area (NMFS 2021).
- Liberty Wind 1 occupies the northeastern portion of OCS-A 0522 and could affect 41% of the commercial fishing revenue generated in the lease area (NMFS 2021).

[3] The U.S. Department of Energy announced a scoping process for Aqua Ventus in February 2017; however, the *Federal Register* does not include any notices that a NEPA environmental assessment has been completed. NEPA environmental assessments for Block Island and Coastal Virginia Offshore Wind have been completed.

- Ocean Wind is built in the eastern portion of OCS-A 0498. This area could affect 45% of the commercial fishing revenue in the lease area (NMFS 2021).
- Empire Wind Phase 1 is built in the northwestern portion of OCS-A 0512. This area could affect 26% of the commercial fishing revenue in the lease area (NMFS 2021).
- Empire Wind Phase 2 is built in the southeastern portion of OCS-A 0512. This area could affect 75% of the commercial fishing revenue in the lease area (NMFS 2021).
- Atlantic Shores Wind Farm in the first year of offshore construction is assumed to potentially affect 5% of the commercial fishing revenue of OCS-A 0499, based on the number of foundations listed in Table E-4. In the second year of offshore construction, the project could affect the full extent of the lease area.
- US Wind is built in the southeastern portion of OCS-A 0490. This area could affect 54% of the commercial fishing revenue in the lease area (NMFS 2021).
- Skipjack is assumed to be built in the southern portion of OCS-A 0519. This area could affect 26% of the commercial fishing revenue in the lease area (NMFS 2021).
- Dominion CVOW Commercial in OCS-A 0483 is assumed to develop 138 foundations in 2024 and the final 70 in 2025. Based on the number foundations, the analysts assume construction could affect 66% of the commercial fishing revenue in the first year, increasing in the second year to potentially affect all of the revenue in the lease area.
- Kitty Hawk in OCS-A 0508 is assumed by the analysts to potentially affect 40% of the commercial fishing revenues in the lease area.

BOEM assumes proposed offshore wind projects will include the same or similar components as the proposed Project: wind turbines, offshore and onshore cable systems, offshore substations, onshore O&M facilities, and onshore interconnection facilities. BOEM further assumes that other potential offshore wind projects will employ the same or similar construction, O&M, and conceptual decommissioning activities as the proposed Project. However, future offshore wind projects would be subject to evolving economic, environmental, and regulatory conditions. Lease areas may be split into multiple projects, expanded, or removed, and development within a particular lease area may occur in phases over long periods of time. Research currently being conducted in combination with data gathered regarding physical, biological, socioeconomic, and cultural resources during development of initial offshore wind projects in the United States could affect the design and implementation of future projects, as could advancements in technology. For the cumulative impact analysis, all proposed projects included in Table E-3 are analyzed in Chapter 3 of this EIS.

For consideration of cumulative environmental impacts from future offshore wind projects and for a list of best management practices (BMPs) that were considered in the impact analysis in Chapter 3 of this EIS, please see the Project EIS's Appendix G (Environmental Protection Measures, Mitigation, and Monitoring).

Table E-4. Future Offshore Wind Project Construction Schedule (dates shown as of June 1, 2021)

Project/Region	Number of FDN before 2021	Number of FDN 2021	Number of FDN 2022	Number of FDN 2023	Number of FDN 2024	Number of FDN 2025	Number of FDN 2026	Number of FDN 2027	Number of FDN 2028	Number of FDN 2029	Number of FDN 2030 and Beyond
Block Island Wind Farm (state waters)	5										
Massachusetts/Rhode Island Region											
Vineyard Wind 1				63							
South Fork				16							
Revolution				102							
Sunrise					124						
Mayflower					152						
Park City Wind Phase 1					81	(81 cont.)					
Park City Wind Phase 2							44	(44 cont.)			
Future development (Beacon Wind)						106	(106 cont.)				
Future development (Liberty Wind)							139	(139 cont.)			
Future development (Bay State Wind)							93	(93 cont.)			
Estimated annual construction subtotal:	*0*	*0*	*0*	*181*	*357*	*106*	*276*	*0*	*0*	*0*	*0*
Estimated O&M subtotal:	*0*	*0*	*0*	*0*	*181*	*538*	*644*	*920*	*920*	*920*	*920*
New York/New Jersey Region											
Ocean Wind				100	(100 cont.)						
Empire Wind Phase 1					120	(120 cont.)					
Empire Wind Phase 2						120	(120 cont.)				
Atlantic Shores Wind Farm						10	200	(200 cont.)			
Estimated annual construction subtotal:	*0*	*0*	*0*	*100*	*120*	*130*	*200*	*0*	*0*	*0*	*0*

Project/Region	Number of FDN before 2021	Number of FDN 2021	Number of FDN 2022	Number of FDN 2023	Number of FDN 2024	Number of FDN 2025	Number of FDN 2026	Number of FDN 2027	Number of FDN 2028	Number of FDN 2029	Number of FDN 2030 and Beyond
Estimated O&M subtotal:	*0*	*0*	*0*	*0*	*100*	*220*	*350*	*550*	*550*	*550*	*550*
Delaware/Maryland Region											
Skipjack (revised COP expected)				17							
US Wind					129						
Estimated annual construction subtotal	*0*	***0***	*0*	*17*	*129*	*0*	*0*	*0*	*0*	*0*	*0*
Estimated O&M subtotal:	*0*	*0*	*0*	*0*	*17*	*146*	*146*	*146*	*146*	*146*	*146*
Virginia/North Carolina Region											
CVOW	2										
Dominion CVOW Commercial					138	70					
Kitty Hawk						61	(61 cont.)				
Estimated annual construction subtotal:	*2*	*0*	*0*	*0*	*138*	*131*	*0*	*0*	*0*	*0*	*0*
Estimated O&M subtotal:	*0*	*2*	*2*	*2*	*2*	*140*	*271*	*271*	*271*	*271*	*271*
ESTIMATED ANNUAL TOTAL CONSTRUCTION:	**2**	**0**	**0**	**298**	**744**	**367**	**476**	**0**	**0**	**0**	**0**
ESTIMATED O&M TOTAL	**0**	**2**	**2**	2	300	1,044	1,411	1,887	1,887	1,887	1,887

Notes: For projects with 2-year construction schedules, and for purposes of this table, all foundations (FDN) are assumed to be installed in the first year of construction. However, a note is made in the second year cell ("cont.") to indicate any FDN installation not completed in the first year would be continued in the second year.

Incorporation by Reference of Cumulative Impacts Study and the Analyses Therein

BOEM has completed a study of impact-producing factors (IPFs) on the North Atlantic OCS to consider in an offshore wind development cumulative impacts scenario (BOEM 2019). That study is incorporated in this documented by reference. The study identifies cause-and-effect relationships between renewable energy projects and resources potentially affected by such projects. It further classifies those relationships into a manageable number of IPFs through which renewable energy projects could affect resources. It also identifies the types of actions and activities to be considered in a cumulative impacts scenario. The study identifies actions and activities that may affect the same physical, biological, economic, or cultural resources as renewable energy projects and states that such actions and activities may have the same IPFs as offshore wind projects.

The BOEM (2019a) study identifies the relationships between IPFs associated with specific past, present, and reasonably foreseeable actions and activities in the North Atlantic OCS to consider in a NEPA cumulative impacts scenario. These IPFs and their relationships were used in the EIS analysis of cumulative impacts and the application of which IPF applied to which resource was decided by BOEM. If an IPF was not associated with the SFWF Project, it was not included in the cumulative impacts analysis.

As discussed in the BOEM (2019a) study, reasonably foreseeable activities other than offshore wind projects may also affect the same resources as the proposed Project or other offshore wind projects, possibly via the same IPFs or via IPFs through which offshore wind projects do not contribute. This Appendix E lists reasonably foreseeable non-offshore wind activities that may contribute to the cumulative impacts of the proposed Project.

Undersea Transmission Lines, Gas Pipelines, and Other Submarine Cables

The following existing undersea transmission lines, gas pipelines, and other submarine cables are located near the Project:

- New Shoreham (Block Island), Rhode Island, is served by a submarine power cable from the Block Island Wind Farm to New Shoreham (Block Island).
- A submarine power cable connects Block Island to the mainland electrical grid at Narragansett, Rhode Island.
- Service to Martha’s Vineyard is provided by four electric cables from Falmouth, located in three corridors through Vineyard Sound. Two cables are located in the same corridor between Elm Road in Falmouth and West Chop; one is located between Shore Street in Falmouth and Eastville (East Chop), and one connects between Mill Road in Falmouth and West Chop.
- Two cables service Nantucket through Nantucket Sound, from Dennis Port and Hyannis Port to landfall at Jetties Beach.
- Additional submarine cables, including fiber-optic cables and trans-Atlantic cables that originate near Charlestown, Rhode Island; New York City; Long Island, near Trenton, New Jersey; and Wall, New Jersey, are located offshore New England and mid-Atlantic states, but outside the proposed Project area.
- Two natural gas pipelines are located offshore Boston, Massachusetts, in Massachusetts Bay and lead to liquid natural gas (LNG) export facilities: the Neptune pipeline and the Northeast Gateway LNG pipeline.

The offshore wind projects listed in Table E-2 that have a COP under review are presumed to include at least one identified cable route. Cable routes have not yet been announced for the remainder of the projects.

Tidal Energy Projects

The following tidal energy projects have been proposed or studied on the U.S East Coast and are in operation or considered reasonably foreseeable:

- The Bourne Tidal Test Site, located in the Cape Cod Canal near Bourne, Massachusetts, is a testing platform for tidal turbines that was installed in late 2017 by the Marine Renewable Energy Collaborative. The Bourne Tidal Test Site offers a test platform for tidal turbines (MRECo 2017, 2018).
- Cobscook Bay Tidal Project, located in Maine, is a Federal Energy Regulatory Commission-(FERC) licensed tidal project that began operations in 2012. The project owner, Ocean Power Energy Company, has informed FERC that it will not apply for relicensing, and removal and site restoration activities are anticipated to be conducted prior to its current license expiration date in January 2022 (FERC 2012a).
- Western Passage Tidal Energy Project, a proposed tidal energy site in the Western Passage, received a preliminary permit from FERC in 2016. The preliminary permit allows developers to study a project but does not authorize construction.
- The Roosevelt Island Tidal Energy (RITE) Project located in the East Channel of the East River, a tidal strait connecting the Long Island Sound with the Atlantic Ocean in the New York Harbor. In 2005, Verdant Power petitioned FERC for permission to the first U.S. commercial license for tidal power. In 2012, FERC issued a 10-year license to install up to 1 MW of power (30 turbines/10 TriFrames) at the RITE project (FERC 2012b; Verdant Power 2018).

Dredging and Port Improvement Projects

The following dredging projects have been proposed or studied between New York, New York, and Boston, Massachusetts, and are either in operation or are considered reasonably foreseeable:

- The U.S. Army Corps of Engineers (USACE) New England District partnership with Rhode Island Coastal Resources Management Council proposes a project that would dredge approximately 23,700 cubic yards of sandy material from the Point Judith Harbor Federal Navigation Project to widen the existing 15-foot-deep mean lower low water (MLLW) West Bulkhead channel by 50 feet and extend the same channel approximately 1,200 feet into the North Basin area (USACE 2018a).
- The Plymouth Harbor Federal Navigation Project in Plymouth, Massachusetts, includes maintenance dredging of approximately 385,000 cubic yards of sand and silt from approximately 75 acres of the authorized project area in order to restore the project to authorized and maintained dimensions (USACE 2018b).
- The Port of New Bedford was awarded a $15.4 million U.S. Department of Transportation Better Utilizing Investments to Leverage Development grant to improve the port's infrastructure and to help with the removal of contaminated materials. The funding will be used to extend the port's bulkhead, creating room for 60 additional commercial vessels, and additional sites for offshore wind staging (Phillips 2018).
- Proposed New Haven Harbor Improvements would include deepening the main ship channel, maneuvering area, and turning basin to -40 feet MLLW and widening the main channel and turning basin to allow larger vessels to efficiently access the Port of New Haven’s terminals. The proposed improvements would remove approximately 4.28 million cubic yards of predominately glacially deposited silts from the federal channel (USACE 2018c).

- The Nature Conservancy seeks a permit to place an artificial reef array in Narraganset Bay at 130 Shore Road in Narragansett Bay in East Providence, Rhode Island. The proposed work involves the construction of a 0.14-acre artificial reef using 91 pre-fabricated reef modules. The artificial reef array would consist of 58 Pallet Balls (4.0 × 2.9 feet) and 33 Bay Balls (3 × 2 feet). The reef modules would be transported to the project site by barge and lowered to the seafloor by crane (USACE 2019).
- The Rhode Island Coastal Resources Management Council has awarded funding for nine habitat restoration projects comprising four salt marsh restoration and enhancement projects, two projects involving restoration of fish passage, one coastal buffer project, and two projects for technical and support services related to habitat restoration (Rhode Island Coastal Resources Management Council 2018a).
- The Town of Dennis seeks a permit for the selective dredging of multiple navigation and mooring basins within multiple waterways in the towns of Dennis and Yarmouth. Suitable dredged material will be used as nourishment on multiple town-owned beaches in Dennis whereas material that is not deemed suitable for beach nourishment will be disposed of at the Cape Cod Bay Disposal Site and at the South Dennis Landfill. The town is requesting to dredge approximately 434,310 cubic yards from portions of these waterways over 10 years encompassing an area of approximately 96.03 acres (USACE 2018d).

The following port improvement projects have been proposed in Connecticut, Rhode Island, Massachusetts, and/or New Jersey, and are either in operation or are considered reasonably foreseeable:

- The Connecticut Port Authority announced a $93 million public-private partnership to upgrade the Connecticut State Pier in New London to support the offshore wind industry (Sheridan 2019). According to the Connecticut Maritime Strategy 2018 (Connecticut Port Authority 2018b), New London is the only major port between New York and Maine that does not have vertical obstruction and offshore barriers, two factors that are critical for offshore wind turbine assembly. The document includes strategic objectives to manage and redevelop the Connecticut State Pier partially to support the offshore wind industry, which could create a dramatic increase in demand for the Connecticut State Pier and regional job growth. The development partnership, announced in May 2019, includes a 3-year plan to upgrade infrastructure to meet heavy-lift requirements of Ørsted and Eversource offshore wind components (Cooper 2019). Redevelopment of the Connecticut State Pier is considered a reasonably foreseeable activity.
- In Rhode Island, South Fork Wind, LLC has committed to investing approximately $40 million in improvements at the Port of Providence, the Port of Davisville at Quonset Point, and possibly other Rhode Island ports for the Revolution Wind Project (Kuffner 2018). This investment will position Rhode Island ports to participate in construction and operation of future offshore wind projects in the region (Rhode Island Governor’s Office 2018). The Port of Davisville has added a 150-megaton mobile harbor crane, which will enable the port to handle wind turbines and heavy equipment, and enables the Port of Davisville to participate in regional offshore wind projects (Port of Davisville 2017). Further improvements at Rhode Island ports to support the offshore wind industry are considered reasonably foreseeable.
- The Massachusetts Clean Energy Center (MassCEC) has identified 18 waterfront sites in Massachusetts that may be available and suitable for use by the offshore wind industry. Potential activities at these sites include manufacturing of offshore wind transmission cables, manufacture and assembly of turbine components, substation manufacturing and assembly, O&M bases, and storage of turbine components (MassCEC 2020).

- The MassCEC manages the New Bedford Marine Commerce Terminal in New Bedford, Massachusetts. The 29-acre facility was completed in 2015 and is the first in North America designed specifically to support the construction, assembly, and deployment of offshore wind projects (MassCEC 2018). The New Bedford Port Authority Strategic Plan 2018–2023 contains goals related to expanding the New Bedford Marine Commerce Terminal to improve and expand services to the offshore wind industry, including development of North Terminal with the capacity to handle two separate offshore wind installation projects in the future (Port of New Bedford 2018). Vineyard Wind signed an 18-month lease with the Marine Commerce Terminal in October 2018 (Port of New Bedford 2020) and has supported the New Bedford Port Authority with grants to develop publicly owned facilities to support shore-based operations for offshore wind facilities (Vineyard Wind 2019).

Marine Minerals Use and Ocean Dredged Material Disposal

The closest active lease in BOEM's Marine Minerals Program for sand borrow areas for beach replenishment is located offshore New Jersey near Harvey Cedars, Surf City, Long Beach Township, Ship Bottom, and Beach Haven (Lease Number OCS-A-0505). The Lessee, Long Beach Island, Barnegat Inlet to Little Egg Harbor Inlet (Amendment) has been approved through June 29, 2018, for 12,000,000 cubic yards volume requested (BOEM 2018a).

In addition, reconnaissance and/or design-level OCS studies along the East Coast from Rhode Island to Florida have identified potential future sand resources. Sand resources identified nearest the Project include locations offshore Rhode Island (between Block Island and Charlestown), Long Island (Rockaway Beach, Long Beach, and Fire Island, New York), and Sandy Hook, New Jersey. The closest potential sand borrow location to the Project is the Manasquan Project off the coast of New Jersey, approximately 162 miles from the Project.

The EPA Region 1 is responsible for designating and managing ocean disposal sites for materials offshore in the region of the Project. The USACE issues permits for ocean disposal sites; all ocean sites are for the disposal of dredged material permitted or authorized under the Marine Protection, Research, and Sanctuaries Act (16 USC 1431 et seq. and 33 USC 1401 et seq.). There are nine active projects along the Massachusetts, Rhode Island, Connecticut and New York coasts, with the closest dredge disposal project, the Rhode Island Sound Disposal Site (RISDS) located northeast of Block Island (USACE 2018e).

Military Use

Military activities can include various vessel training exercises, submarine and antisubmarine training, and U.S. Air Force exercises. The U.S. Navy, the U.S. Coast Guard (USCG), and other military entities have numerous facilities in the region. Major onshore regional facilities include Joint Base Cape Cod, Naval Station Newport, Newport Naval Undersea Warfare Center, Naval Submarine Base New London, and USCG Academy (BOEM 2013; Epsilon Associates, Inc 2018; Rhode Island Coastal Resources Management Council 2010). The U.S. Atlantic Fleet also conducts training and testing exercises in the Narraganset Bay Operating Area, and the Newport Naval Undersea Warfare Center routinely performs testing in the area (BOEM 2013).

Marine Transportation

Marine transportation in the region is diverse and sourced from many ports and private harbors from New York to Massachusetts. Commercial vessel traffic in the region includes research, tug/barge, liquid tankers (such as those used for liquid petroleum), cargo, military and search-and-rescue vessels, and commercial fishing vessels. Recreational vessel traffic includes cruise ships, sailboats, and charter boats. A number of federal agencies, state agencies, educational institutions, and environmental non-governmental organizations participate in ongoing research offshore including oceanographic, biological, geophysical, and archaeological surveys. The Northeast Regional Planning Body anticipates that major vessel traffic routes will be relatively stable in the region for the foreseeable future, but that coastal developments and market demands that are unknown at this time could affect them (Northeast Regional Planning Body 2016). One new regional maritime highway project received funding from the Maritime Administration. A new barge service (Davisville/Brooklyn/ Newark Container-on-Barge Service) is proposed to run twice each week in state waters between Newark, New Jersey; Brooklyn, New York; and the Port of Davisville in Rhode Island, which is located on Quonset Point, one of the potential O&M locations.

National Marine Fisheries Service Activities

Research and enhancement permits may be issued for marine mammals protected by the Marine Mammal Protection Act (MMPA) and for threatened and endangered species under the ESA. NMFS is anticipated to continue issuing research permits under section 10(a)(1)(A) of the ESA to allow take of certain ESA-listed species for scientific research. Scientific research permits issued by NMFS currently authorize studies on ESA-listed species in the Atlantic Ocean, some of which occur in portions of the Lease Area. Current fisheries management and ecosystem monitoring surveys conducted by or in coordination with the Northeast Fisheries Science Center (NEFSC) could overlap with offshore wind lease areas in the New England region and south into the Mid-Atlantic region. Surveys include 1) the NEFSC Bottom Trawl Survey, a more than 50-year multispecies stock assessment tool using a bottom trawl; 2) the NEFSC Sea Scallop/Integrated Habitat Survey, a sea scallop stock assessment and habitat characterization tool, using a bottom dredge and camera tow; 3) the NEFSC Surfclam/Ocean Quahog Survey, a stock assessment tool for both species using a bottom dredge; and 4) the NEFSC Ecosystem Monitoring Program, a more than 40-year shelf ecosystem monitoring program using plankton tows and conductivity, temperature, and depth units. These surveys are anticipated to continue within the region, regardless of offshore wind development.

The regulatory process administered by the NMFS, which includes stock assessments for all marine mammals and 5-year reviews for all ESA-listed species, assists in informing decisions on take authorizations and the assessment of project-specific and cumulative impacts that consider past, present, and reasonably foreseeable future actions in biological opinions. Stock assessments completed regularly under MMPA include estimates of potential biological removal that stocks of marine mammals can sustainably absorb. MMPA take authorizations require that a proposed action have no more than a negligible impact on species or stocks, and that a proposed action impose the least practicable adverse impact on the species. MMPA authorizations are reinforced by monitoring and reporting requirements so that NMFS is kept informed of deviations from what has been approved. Biological opinions for federal and non-federal actions are similarly grounded in status reviews and conditioned to avoid jeopardy and to allow continued progress toward recovery. These processes help to ensure that, through compliance with these regulatory requirements, a proposed action would not have a measurable impact on the conservation, recovery, and management of the resource.

Directed Take Permits for Scientific Research and Enhancement

NMFS issues permits for research on protected species for scientific purposes. These scientific research permits include the authorization of directed take for activities such as capturing animals and taking measurements and biological samples to study their health, tagging animals to study their distribution and migration, photographing and counting animals to get population estimates, taking animals in poor health to an animal hospital, and filming animals. NMFS also issues permits for enhancement purposes; these permits are issued to enhance the survival or recovery of a species or stock in the wild by taking actions that increase an individual's or population's ability to recover in the wild. In waters near the Lease Area, scientific research and enhancement permits have been issued previously for satellite, acoustic, and multi-sensor tagging studies on large and small cetaceans, research on reproduction, mortality, health, and conservation issues for North Atlantic Right Whales, and research on population dynamics of harbor and gray seals. Reasonably foreseeable future impacts from scientific research and enhancement permits include physical and behavioral stressors (e.g., restraint and capture, marking, implantable and suction tagging, biological sampling).

Fisheries Use and Management

The National Marine Fisheries Service (NMFS) implements regulations to manage commercial and recreational fisheries in federal waters, including those within which the Project would be located; the State of New York, state of Rhode Island, and Commonwealth of Massachusetts regulate commercial fisheries in state waters (within 3 nautical miles of the coastline). There were no active aquaculture leases or activities within federal or state waters within the Lease Area or along the export cable route as of spring 2018 (Jacobs 2021). The project overlaps two of NMFS' eight regional councils to manage federal fisheries: Mid-Atlantic Fisheries Management Council (MAFMC) which includes New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia and North Carolina; and New England Fishery Management Council (NEFMC), which includes Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut (NEFMC 2016). The councils manage species with many fishery management plans that are frequently updated, revised, and amended and coordinate with each other to jointly manage species across jurisdictional boundaries (MAFMC 2019). Many of the fisheries managed by the councils are fished for in state waters or outside of the Mid-Atlantic region, so the council works with the Atlantic States Marine Fisheries Commission (ASMFC). ASMFC is composed of the 15 Atlantic coast states and coordinates the management of marine and anadromous resources found in the states' marine waters. In addition, the lobster and Jonah crab fisheries are cooperatively managed by the states and NMFS under the framework of the ASMFC (2019).

The fishery management plans of the Councils and ASMFC were established, in part, to manage fisheries to avoid overfishing. They accomplish this through an array of management measures, including annual catch quotas, minimum size limits, and closed areas. These various measures can further reduce (or increase) the size of landings of commercial fisheries in the Northeast and the Mid-Atlantic regions.

NOAA Fisheries also manages highly migratory species (HMS), such as tuna and sharks, that can travel long distances and cross domestic boundaries. Table E-5 summarizes other fishery management plans and actions in the region.

Table E-5. Other Fishery Management Plans

Area	Plan and Projects
Atlantic States Marine Fisheries Commission	ASMFC Five-Year Strategic Plan 2014–2018 (ASMFC 2014) Draft 2019 strategic management plan under review Management, Policy and Science Strategies for Adapting Fisheries Management to Changes in Species Abundance and Distribution Resulting from Climate Change (ASMFC 2018)
New York	Ocean Action Plan 2017–2027 – adaptive management plan (New York State Department of Environmental Conservation [NYSDEC] 2017) New York State filed a petition with the NOAA, NMFS, and the MAMFC to demand that commercial fluke allocations be revised to provide fishers with equitable access to summer flounder. New York is also reviewing other species where there is an unfair allocation, including black sea bass and bluefish, and may pursue similar actions (Governor’s Office 2018a).
Long Island Regional Development Council (LIRDC)	East Hampton Shellfish Hatchery project to consolidate the hatchery’s municipal hatchery and nursing facilities. Haskell’s seafood facility in East Quogue is proposed become a fully functioning seafood processing plant. Shinnecock Dock Revitalization to provide better processing and packing facilities for local fishermen (LIRDC 2018).
Suffolk County	Suffolk County Shellfish Aquaculture Lease Program in Peconic Bay and Gardiners Bay (limited to conveyance of shellfish cultivation); a complete review of the Lease Program is required to determine if and/or how the program should be changed and implemented in 2020 and beyond (Suffolk County 2018).

Global Climate Change

Section 7.6.1.4 of the Programmatic EIS for Alternative Energy Development and Production and Alternate Use of Activities on the Outer Continental Shelf (Minerals Management Service 2007) describes global climate change with respect to assessing renewable energy development. Climate change is predicted to affect Northeast fishery species differently (Hare et al. 2016), and the NMFS biological opinion discusses in detail the potential impacts of global climate change on protected species that occur within the proposed action area (NMFS 2013).

The Intergovernmental Panel on Climate Change (IPCC) released a special report in October 2018 that compared risks associated with an increase of global warming of 1.5 degrees Celsius (°C) and an increase of 2°C. The report found that climate-related risks depend on the rate, peak, and duration of global warming, and that an increase of 2°C was associated with greater risks associated with climatic changes such as extreme weather and drought; global sea level rise; impacts to terrestrial ecosystems; impacts to marine biodiversity, fisheries, and ecosystems and their functions and services to humans; and impacts to health, livelihoods, food security, water supply, and economic growth (IPCC 2018).

Table E-6 summarizes regional plans and policies that are in place to address climate change, and Table E-7 summarizes resiliency plans.

Table E-6. Climate Change Plans and Policies

Plans and Policies	Summary/Goal
New York	
Reforming the Energy Vision (New York State 2014)	State's energy policy to build integrated energy network; Clean energy goal to reduce greenhouse gases (GHG) 40% by 2030 and 80% by 2050.
Order Adopting a Clean Energy Standard (State of New York Public Service Commission 2016)	Requirement that 50% of New York's electricity come from renewable energy sources by 2030.
New York State Energy Plan 2015; 2017 Biennial Report to 2015 Plan (New York State Energy Research Development Authority [NYSERDA] 2015, 2017a)	Requires 40% reduction in GHG from 1990 levels; 50% electricity will come from renewable energy resources; and 600 trillion British thermal units (Btu) increase in statewide energy efficiency.
Governor Cuomo State of State Address 2017, 2018, 2021	2017: Set offshore wind energy development goal of 2,400 MW by 2030 (Governor's Office 2017a). 2018: Procurement of at least 800 MW of offshore wind power between two solicitations in 2018 and 2019; new energy efficiency target for investor-owned utilities to more than double utility energy efficiency progress by 2025; energy storage initiative to achieve 1,500 MW of storage by 2025 and up to 3,000 MW by 2030 (Governor Office 2018b, 2018c). 2021: The governor's 2021 agenda—Reimagine | Rebuild | Renew—establishes a goal of building out its renewable energy program. The agenda notes the development of two new offshore wind farms more than 20 miles off the shore of Long Island, the creation of dedicated offshore port facilities, and additional transmission capacity development.
New York State Offshore Wind Master Plan (2017) (NYSERDA 2017b)	Grants NYSERDA ability to award 25-year long-term contracts for projects ranging from approximately 200 MW to approximately 800 MW, with an ability to award larger quantities if sufficiently attractive proposals are received. Each proposer is also required to submit at least one proposal of approximately 400 MW. Bids are due in February 2019, awards are expected in spring 2019; and contracts are expected to be executed thereafter.
2020 Offshore Wind Solicitation	As noted above, NYSERDA has provisionally awarded two offshore wind projects, totaling 2,490 MW. Empire Wind 2 (1,260 MW) and Beacon Wind (1,230 MW) of Equinor Wind US LLC will generate enough clean energy to power 1.3 million homes and will be major economic drivers, supporting the following: • More than 5,200 direct jobs • Combined economic activity of $8.9 billion in labor, supplies, development, and manufacturing statewide • $47 million in workforce development and just access funding
The Climate Leadership and Community Protection Act (CLCPA), enacted on July 18, 2019, signed into law in July 2019 and effective January 1, 2020	CLCPA establishes economy-wide targets to reduce GHG emissions by 40% of 1990 levels by 2030 and 85% of 1990 levels by 2050.

Plans and Policies	Summary/Goal
Massachusetts	
Global Warming Solutions Act (GWSA) of 2008	Framework to reduce GHG emissions by requiring 25% reduction in emissions from all sectors below 1990 baseline emission level in 2020, at least 80% reduction in 2050. Full implementation of these policies is projected to result in total net reduction of 25.0 million metric tons of carbon dioxide equivalent, or 26.4% below 1990 baseline level (Commonwealth of Massachusetts 2018a).
Massachusetts Clean Energy and Climate Plan (CECP) for 2020; 2015 CECP Update	Policies that aim to reduce GHG emissions in the commonwealth across all sectors; full implementation of policies would result in reducing emissions by at least 25% below 1900 level in 2020 (Commonwealth of Massachusetts 2015).
Executive Order 569, Establishing an Integrated Climate Strategy for the Commonwealth and "Act to Promote Energy Diversity" (2016)	Calls for large procurements of offshore wind and hydroelectric resources (Commonwealth of Massachusetts 2016).
Environmental Bond Bill and An Act to Advance Clean Energy (2018)	Sets new targets for offshore wind, solar, and storage technologies; expands Renewable Portfolio Standard requirements for 2020–2029; establishes a Clean Peak Standard; and permits fuel switching in energy efficiency programs (Commonwealth of Massachusetts 2018a).
Massachusetts State Hazard Mitigation and Climate Adaption Plan 2018	Updated 2013 plan to comprehensively integrate climate change impacts and adaptation strategies with hazard mitigation planning while complying with federal requirements for state hazard mitigation plans and maintaining eligibility for federal disaster recovery and hazard mitigation funding under the Stafford Act. The plan will next be submitted to the Federal Emergency Management Agency (FEMA) for approval. In 2020, a new 2030 emissions limit and CECP for 2030 will be published (Commonwealth of Massachusetts 2018a, 2018b).
Rhode Island	
Governor's Climate Priorities (2018) Executive Order 15-17, 17-06	Increasing in-state renewable energy tenfold by 2020 (to 1,000 MWs) through new development and regional procurement (State of Rhode Island 2015a, 2017, 2018a).
Resilient Rhode Island Act (2014)	Established the Executive Climate Change Coordinating Council (EC4) and set specific GHG reduction targets; incorporates consideration of climate change impacts into the powers and duties of all state agencies (State of Rhode Island 2014).
Rhode Island Greenhouse Gas Emissions Reductions Plan (2016)	Targets for GHG reductions: 10% below 1990 levels by 2020; 45% below 1990 levels by 2035; 80% below 1990 levels by 2040 (State of Rhode Island 2016).
Energy 2035 Rhode Island State Energy Plan (2015)	Long-term comprehensive strategy for energy services across all sectors using a secure, cost-effective, and sustainable energy system; plan to increase sector fuel diversity, produce net economic benefits, and reduce GHG emissions by 45% by the year 2035 (State of Rhode Island 2015b).
Resilient Rhody (2018)	Planning document outlining climate resiliency actions; focuses on leveraging emissions reduction targets and adaptation (State of Rhode Island 2018b).

Table E-7. Resiliency Plans and Policies in the Lease Area

Plans and Policies	Summary
New York	
Part 490 of Community Risk and Resiliency Act (CRRA) of 2014	Establishes statewide science-based sea-level rise projections for coastal regions of the state. As of 2019, DEC is in the process of developing a State Flood Risk Management Guidance document for state agencies (NYSDEC n.d. [2019]).
NY Rising Community Reconstruction (NYRCR) (2018)	$20.4 million in projects on Long Island to help flood-prone communities plan and prepare for extreme weather events as they continue projects to recover from Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee. Three projects were announced for Suffolk County and five for Nassau County (Governor’s Office 2018c).
Massachusetts	
Municipal Vulnerability Preparedness grant program (MVP) (2017)	Provides support for cities and towns to plan for resiliency and implement key climate change adaptation actions for resiliency. The City of New Bedford has received MVP designation as of November 1, 2018 (Commonwealth of Massachusetts 2019a).
Coastal Grant and Resilience Program	Provides financial and technical support for local efforts to increase awareness and understanding of climate impacts, identify and map vulnerabilities, conduct adaptation planning, redesign vulnerable public facilities and infrastructure, and implement non-structural approaches that enhance natural resources and provide storm damage protection (Commonwealth of Massachusetts 2019b).
Rhode Island	
Nantucket’s Coastal Resilience Plan	The plan is currently under development, and while no actions have been identified to date, potential shoreline management activities could include sediment management, construction of seawalls and similar structures, and other activities (Town and County of Nantucket 2018a, 2018b).
Shoreline Change Special Area Management Plan (Beach SAMP)	Rhode Island Coastal Resources Management Council is developing the Shoreline Change Special Area Management Plan (Beach SAMP) to improve the state’s resilience and manage the shoreline (Town and County of Nantucket 2018b) (Rhode Island Coastal Resources Management Council 2018b).

Oil and Gas Activities

The proposed Project area is located in the North Atlantic Planning Area of the OCS Oil and Gas Leasing Program (National OCS Program). On September 8, 2020, the White House issued a presidential memorandum for the Secretary of the Interior on the withdrawal of certain areas of the United States OCS from leasing disposition for 10 years, including the areas currently designated by BOEM as the South Atlantic and Straits of Florida Planning Areas (The White House 2020). The South Atlantic Planning Area includes the OCS off South Carolina, Georgia, and northern Florida. On September 25, the White House issued a similar memorandum for the Mid-Atlantic Planning Area that lies south of the northern administrative boundary of North Carolina (The White House 2020b). This withdrawal prevents consideration of these areas for any leasing for purposes of exploration, development, or production during the 10-year period beginning July 1, 2022, and ending June 30, 2032. However, at this time, there has been no decision by the Secretary of the Interior regarding future oil and gas leasing in the North Atlantic or remainder of the Mid-Atlantic Planning Areas. Existing leases in the withdrawn areas are not affected.

BOEM issues geological and geophysical (G&G) permits to obtain data for hydrocarbon exploration and production; locate and monitor marine mineral resources; aid in locating sites for alternative energy structures and pipelines; identify possible manmade, seafloor, or geological hazards; and locate potential archeological and benthic resources. G&G surveys are typically classified into categories by equipment type and survey technique.

There are currently no such permits under review for areas offshore Massachusetts and Rhode Island; areas under consideration for G&G surveys are located in federal waters offshore Delaware to Georgia (BOEM 2021b).

Several liquefied natural gas ports are located on the East Coast of the United States. Table E-8 lists existing, approved, and proposed LNG ports on the East Coast of the United States that provide (or may in the future provide) services such as natural gas export, natural gas supply to the interstate pipeline system or local distribution companies, or storage of LNG for periods of peak demand, or production of LNG for fuel and industrial use (FERC 2018).

Table E-8. Liquid Natural Gas Terminals Located in the Northeastern United States

Terminal Name	Type	Company	Jurisdiction	Distance from Project (approximate)	Status
Everett, MA	Import terminal	GDF SUEZ—DOMAC	FERC	90 miles north	Existing
Offshore Boston, MA	Import terminal	Neptune LNG	U.S. Department of Transportation Maritime Administration (MARAD)/USCG	100 miles north	Existing
Offshore Boston, MA	Import terminal, authorized to re-export delivered LNG	Excelerate Energy—Northeast Gateway	MARAD/USCG	95 miles north (Buoy B)	Existing
Cove Point, MD (Chesapeake Bay)	Import terminal	Dominion—Cove Point LNG	FERC	340 miles southwest	Existing
Elba Island, GA (Savannah River)	Import terminal	El Paso—Southern LNG	FERC	835 miles southwest	Existing
Elba Island, GA (Savannah River)	Export terminal	Southern LNG Company	FERC	835 miles southwest	Approved
Jacksonville, FL	Export terminal	Eagle LNG Partners	FERC	960 miles southwest	Proposed

Source: FERC (2018).

Onshore Development Activities

Onshore development activities that may contribute to cumulative impacts include visible infrastructure such as onshore wind turbines and cell towers, port development, and other energy projects such as transmission and pipeline projects. Coastal development projects permitted through regional planning commissions and towns may also contribute to cumulative impacts. These may include residential, commercial, and industrial developments spurred by population growth in the region (Table E-9).

Table E-9. Existing, Approved, and Proposed Onshore Development Activities

Type	Description
Local planning documents	• Suffolk County Master Plan (Suffolk County 2015) • A City Master Plan: New Bedford 2020 (City of New Bedford 2010) • Town of North Kingstown Comprehensive Plan Update 2008 (Town of North Kingston 2008)
Onshore wind projects	• According to the U.S. Geological Survey, there are nine onshore wind projects located within the 41-mile viewshed of the project (U.S. Geological Survey 2018).
Communications towers	• There are numerous communications towers located in Suffolk County, on offshore islands, and within the viewshed of the proposed Project components. Within the recreation/tourism geographic analysis area, there are 864 communications towers, 10 of which exceed the Federal Aviation Administration height limit for marking/lighting requirements (Federal Aviation Administration 2016). • The East Hampton Town Board is replacing its aging 800-megahertz frequency emergency communication system tower to a 700-megahertz system with updated equipment. This will require the replacement of a 150-foot communication tower with a 300-foot lattice tower and the raising of a 55-foot monopole to 85 feet. This upgrade also requires replacing antennas at towers near the East Hampton Airport in Wainscott, at the Amagansett firehouse, and at the East Hampton Town Hall complex (Chinese 2018).
Development projects	• As a part of New York State’s $100 billion infrastructure project, $5.6 billion will go to transform the Long Island Railroad (LIRR) to improve system connectivity. Within Suffolk County, the following stations will receive funds for upgrades: Brentwood, Deer Park, East Hampton, Northport, Ronkonkoma, Stony Brook, Port Jefferson, and Wyandanch. The East Hampton historic LIRR station will undergo upgrades and modernizations (Metropolitan Transit Authority 2017; Governor’s Office 2017b). Additional plans for transit-oriented design (TOD) and highway improvements are planned in Suffolk County in state and county planning documents. • Fire Island Inlet to Montauk Point (FIMP) Project is a $1.2 billion project by the USACE, NYDEC, and Long Island, NY municipalities to engage in inlet management; beach, dune and berm construction; breach response plans; raising and retrofitting 4,400 homes; road-raising; groin modifications; and coastal process features. Within Suffolk County, portions of the Towns of Babylon, Islip, Brookhaven, Southampton, and East Hampton; 12 incorporated villages along Long Island’s south shore (mainland); Fire Island National Seashore; and the Poospatuck and Shinnecock Indian Reservations will be involved in this project (USACE 2018f). • The USACE is working to remediate and cleanup a former defense site (former NIKE Battery PR-58 and Disaster Village Training Area) at Quonset Development Corporation in North Kingstown, RI. A feasibility study was performed from 2014 to 2016, and the final remedial investigation/feasibility study was published in 2016. Pre-design investigations, followed by remedial designs and engineering plans, and remedial action is proposed for 2021 (USACE 2018g). • The Massachusetts Department of Environmental Protection Bureau of Air and Waste approved National Grid’s application for the construction and operation of a diesel generator and a battery electric storage system at an existing electric generating facility located at 32 Bunker Road in Nantucket, approximately 1 mile north of the coastline. The facilities are anticipated to be operational in 2019 (MassDEP 2017; Utility Dive 2018).

Type	Description

Port studies/upgrades	The USACE completed the Lake Montauk Harbor Feasibility Study in 2020. The study determined that Lake Montauk Harbor has insufficient channel and depth to support commercial fishing fleet activities. The study evaluated a range of alternative navigation improvement plans; the recommended plan consisted of deepening the existing navigation channel to -17 feet MLLW depth, creating a deposition basin immediately east of the channel at a width of 100 feet, and placing dredged material on the shoreline west of the inlet for a distance of 3,000 feet and a width of approximately 44 feet.
	Ports in New York, Connecticut, Rhode Island, and Massachusetts may require upgrades to support the offshore wind industry developing in the northeastern United States. Upgrades may include onshore developments or underwater improvements (such as dredging).
	• In December 2017, NYSERDA issued an offshore wind master plan that assessed 54 distinct waterfront sites along the New York Harbor and Hudson River and 11 distinct areas with multiple small sites along the Long Island coast. Twelve waterfront areas and five distinct areas were singled out for “potential to be used or developed into facilities capable of supporting OSW projects” (Table 26; NYSERDA 2017b). Nearly all identified sites would require some level of infrastructure upgrade (from minimal to significant) depending on OSW activities intended for the site. Particular sites of interest include Red Hook-Brooklyn, South Brooklyn Marine Terminal, and the Port of Coeymans (NYSERDA 2017b). For additional information regarding specific proposed improvements to these ports, see DockNYC 2018, Capital Region Economic Development Council 2018, American Association of Port Authorities 2016, Rulison 2018, and NYCEDC 2018.
	• The Connecticut Port Authority is currently evaluating proposals from parties to develop, finance, and manage the Connecticut State Pier in New London under a long-term operating agreement (Connecticut Port Authority 2018a). According to the Connecticut Maritime Strategy 2018 (Connecticut Port Authority 2018b), New London is the only major port between New York and Maine that does not have vertical obstruction and offshore barriers, two factors that are critical for offshore wind turbine assembly. The document includes strategic objectives to manage and redevelop the Connecticut State Pier partially to support the offshore wind industry, which could create a dramatic increase in demand for the Connecticut State Pier and regional job growth. Redevelopment of the State Pier is considered a reasonably foreseeable activity, though specific redevelopment plans are not yet available.
	• In Rhode Island, DWW has committed to investing approximately $40 million in improvements at the Port of Providence, the Port of Davisville at Quonset Point, and possibly other Rhode Island ports for the Revolution Wind Project (Kuffner 2018). The Port of Davisville has added a 150-megaton mobile harbor crane, which will enable the port to handle wind turbines and heavy equipment, and enables the Port of Davisville to participate in regional offshore wind projects (Port of Davisville 2017). Further improvements at Rhode Island ports to support the offshore wind industry are considered reasonably foreseeable.
	• The Massachusetts Clean Energy Center (MassCEC) has identified 18 waterfront sites in Massachusetts that may be available and suitable for use by the offshore wind industry. Potential activities at these sites include manufacturing of offshore wind transmission cables, manufacture and assembly of turbine components, substation manufacturing and assembly, O&M bases, and storage of turbine components (MassCEC 2017a, 2017b). The Draft New Bedford Port Authority Strategic Plan 2018 – 2023 contains goals related to expanding the New Bedford Marine Commerce Terminal to improve and expand services to the offshore wind industry (Port of New Bedford 2018; MassCEC 2018), but no new improvements were identified.
	• New York State proposed port improvements include the governor's 2021 agenda—Reimagine | Rebuild | Renew—which includes upgrades to create five dedicated port facilities for offshore wind, including the following:
	  ○ The nation's first offshore wind tower manufacturing facility, to be built at the Port of Albany
	  ○ An offshore wind turbine staging facility and O&M hub to be established at the South Brooklyn Marine Terminal
	  ○ Increasing the use of the Port of Coeymans for cutting-edge turbine foundation manufacturing
	  ○ Buttressing ongoing O&M out of Port Jefferson and Port of Montauk Harbor in Long Island

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ATTACHMENT 1

Geographic Analysis Area Maps

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Figures

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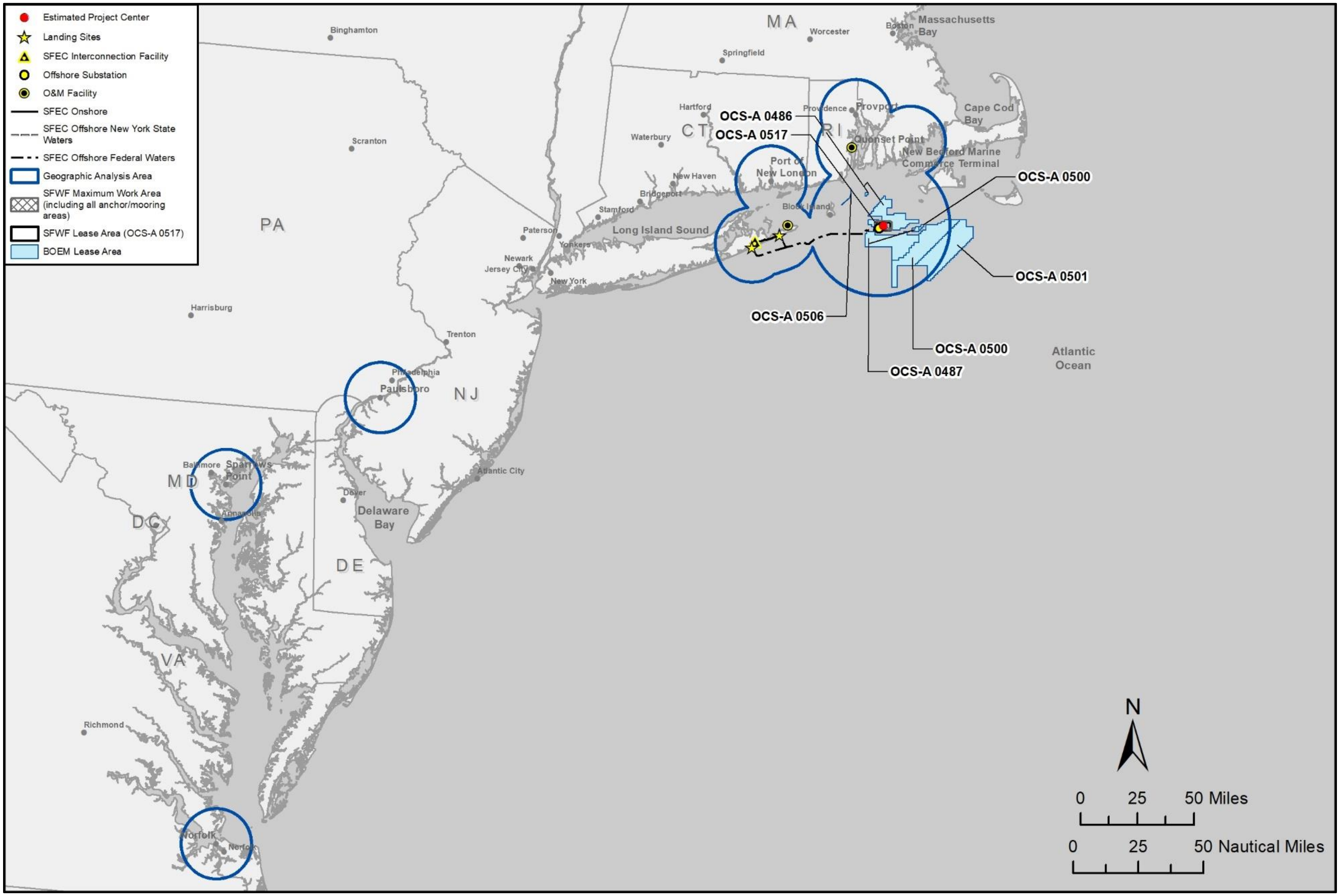

Figure E-1. Air quality geographic analysis area.

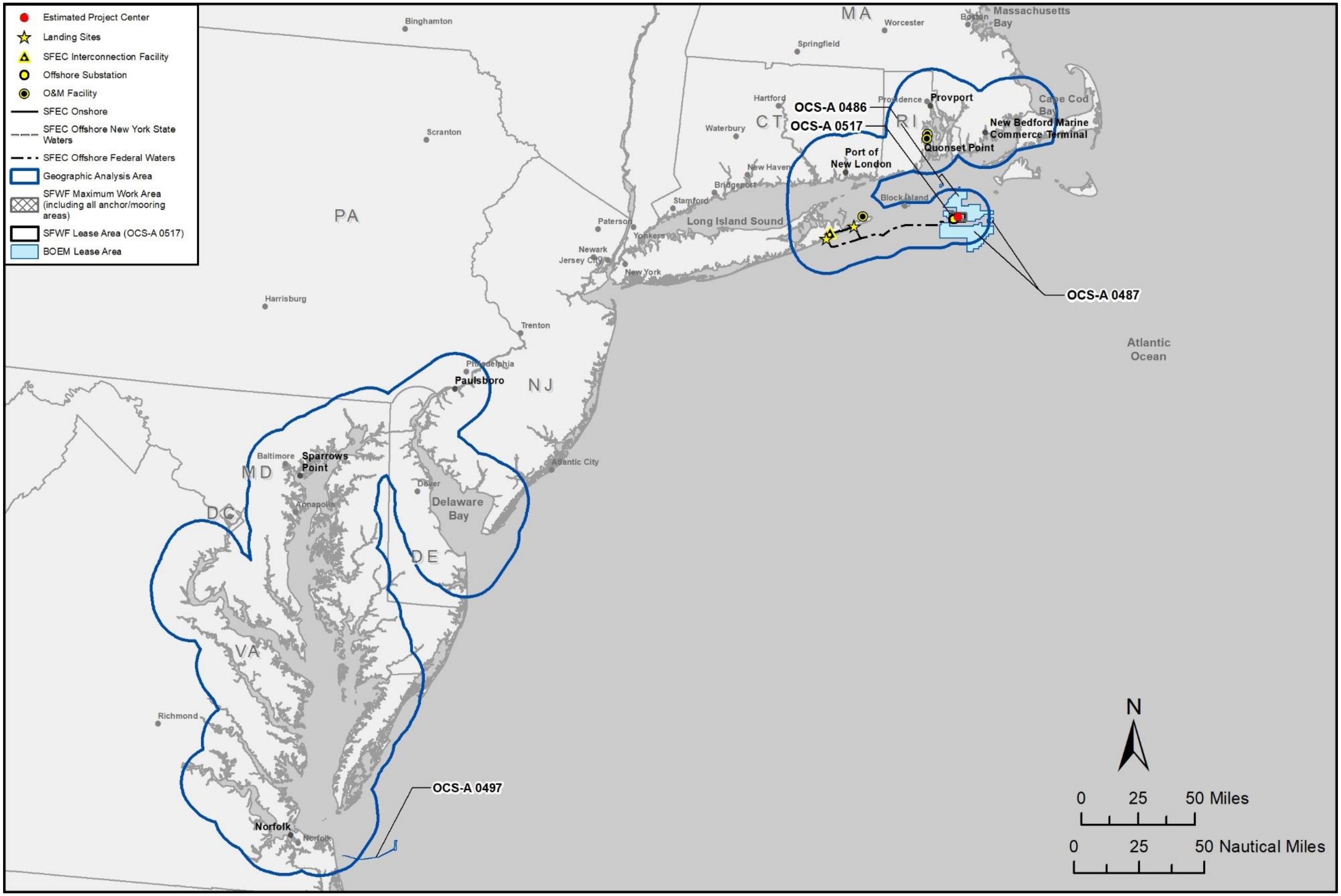

Figure E-2. Water quality geographic analysis area.

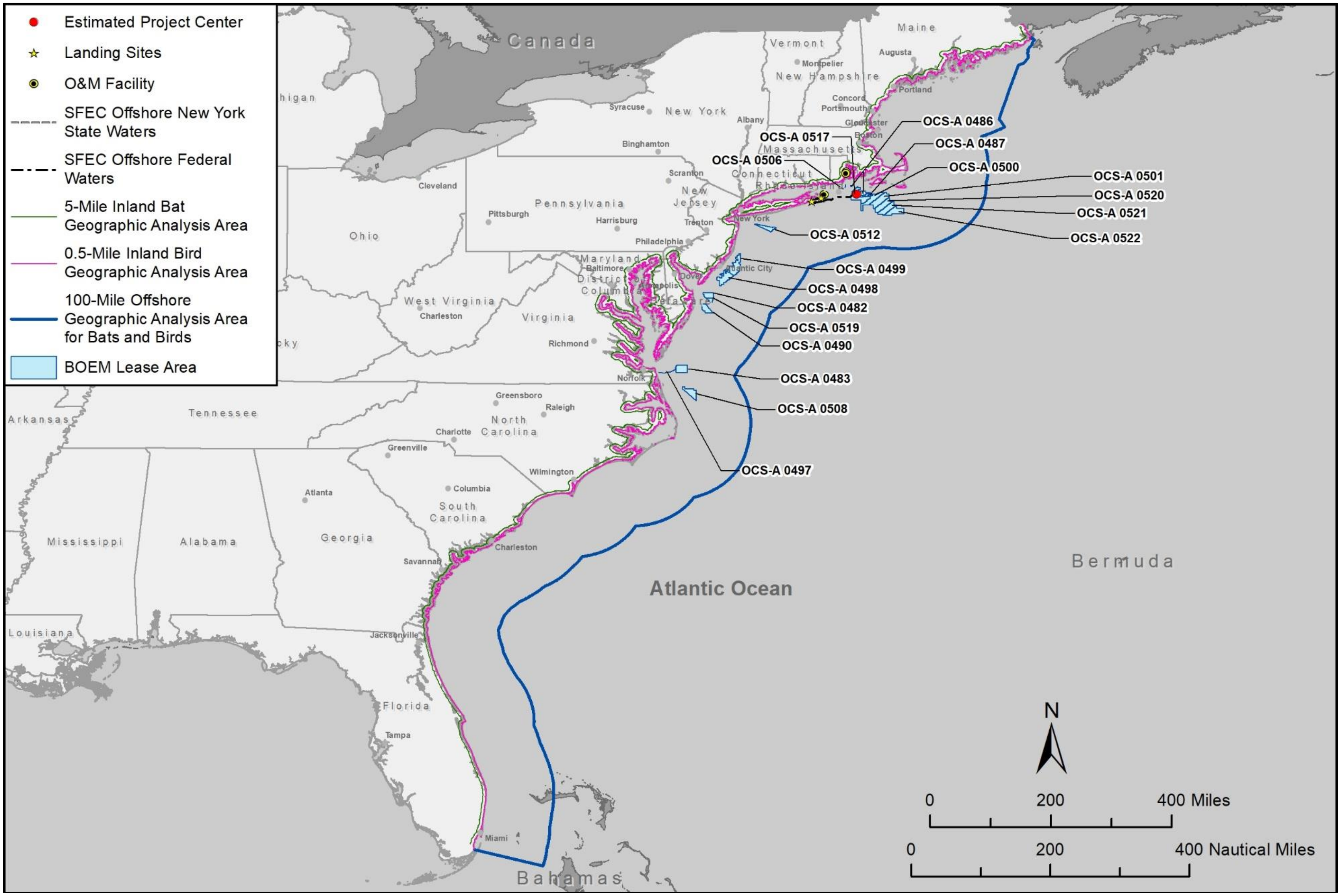

Figure E-3. Birds and bats geographic analysis area.

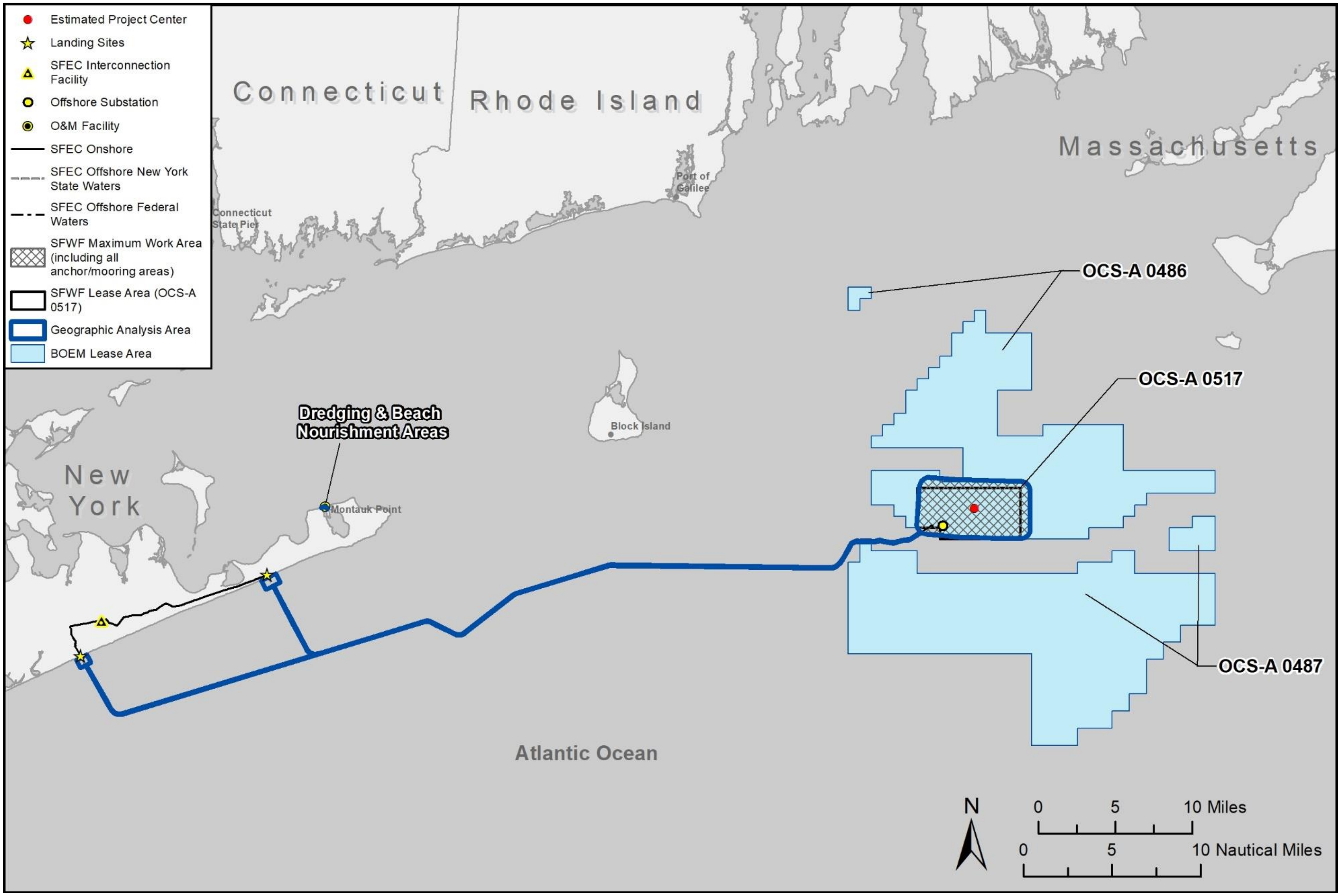

Figure E-4a. Benthic resources geographic analysis area.

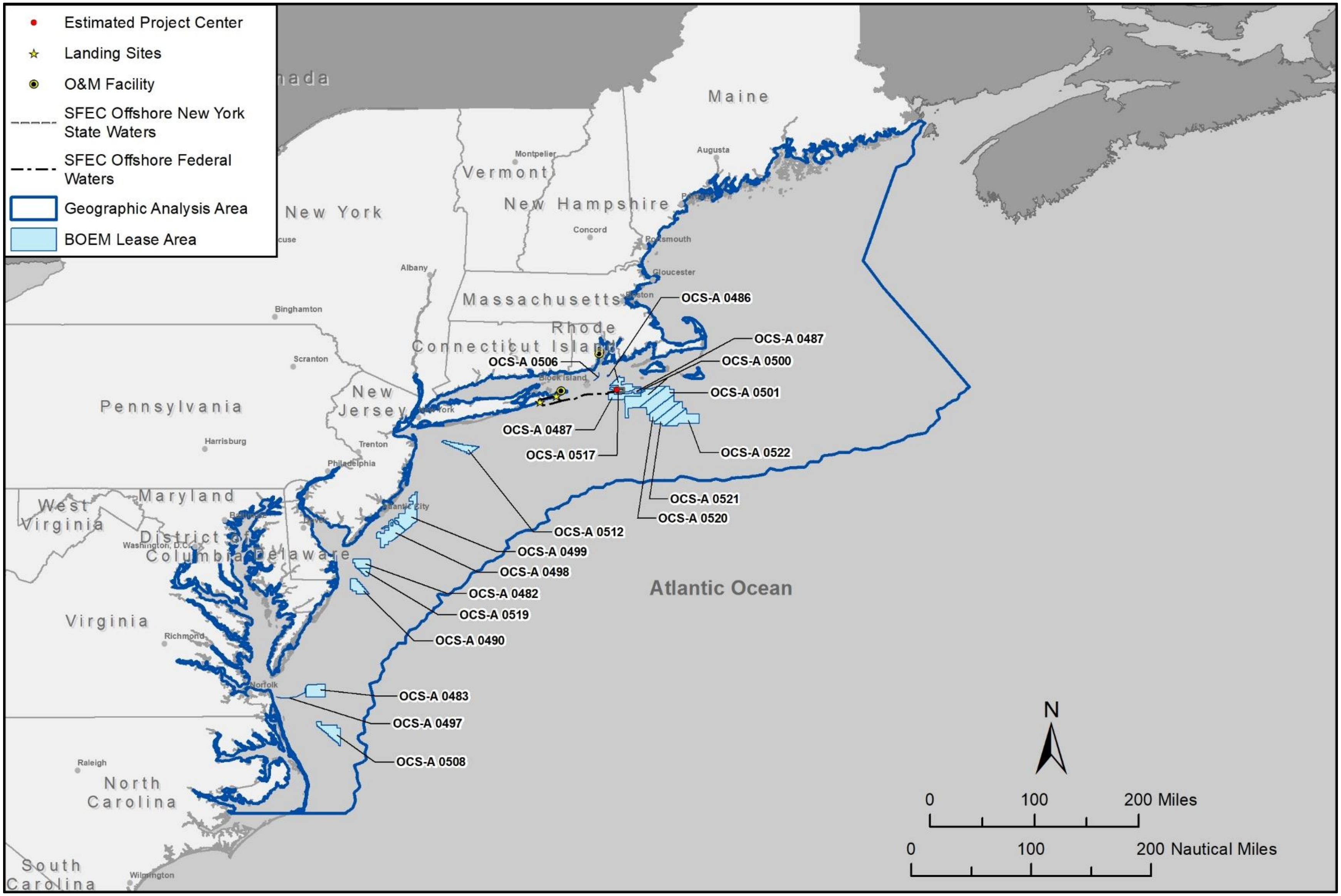

Figure E-4b. Essential fish habitat, invertebrates, and finfish geographic analysis area.

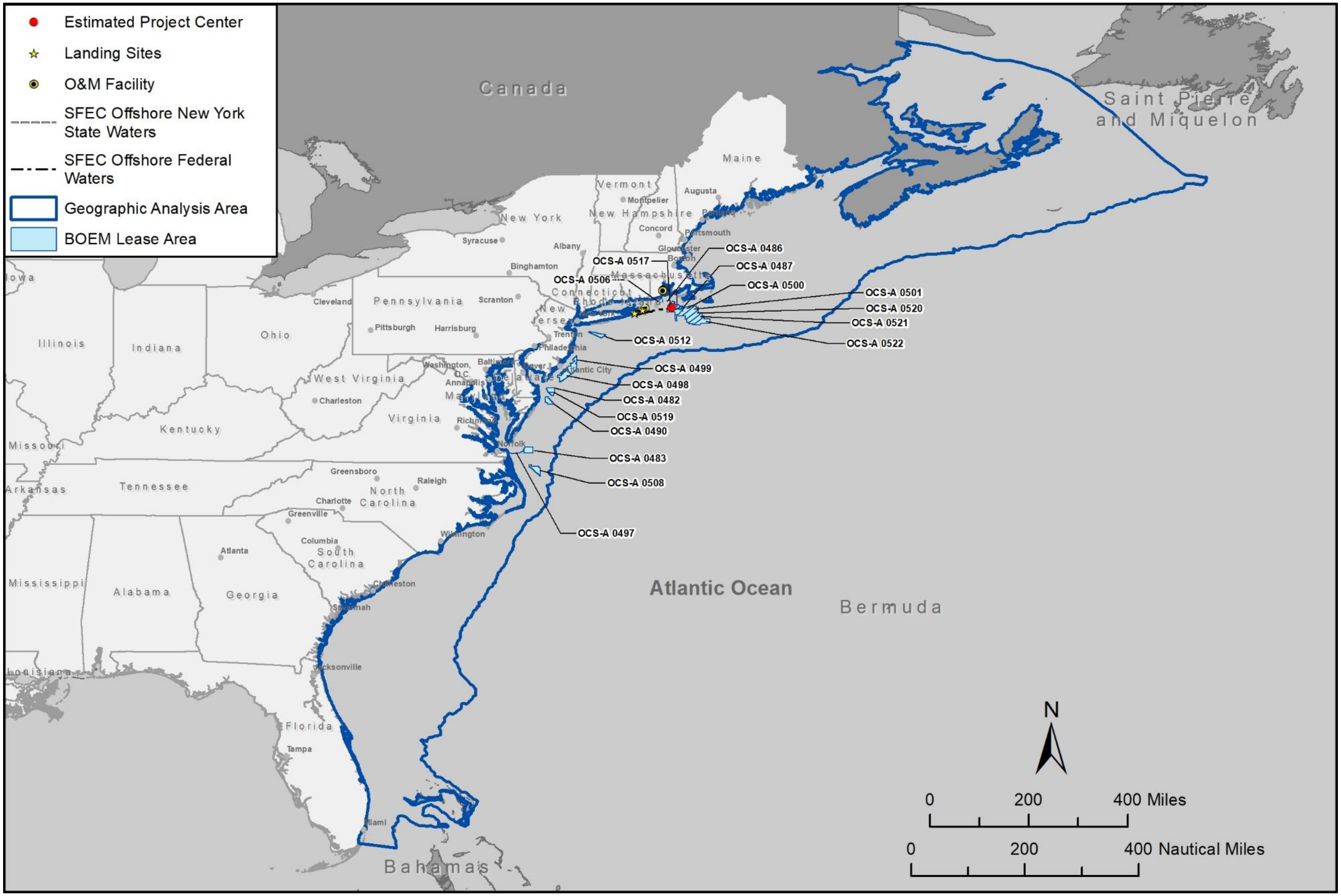

Figure E-5. Marine mammals geographic analysis area.

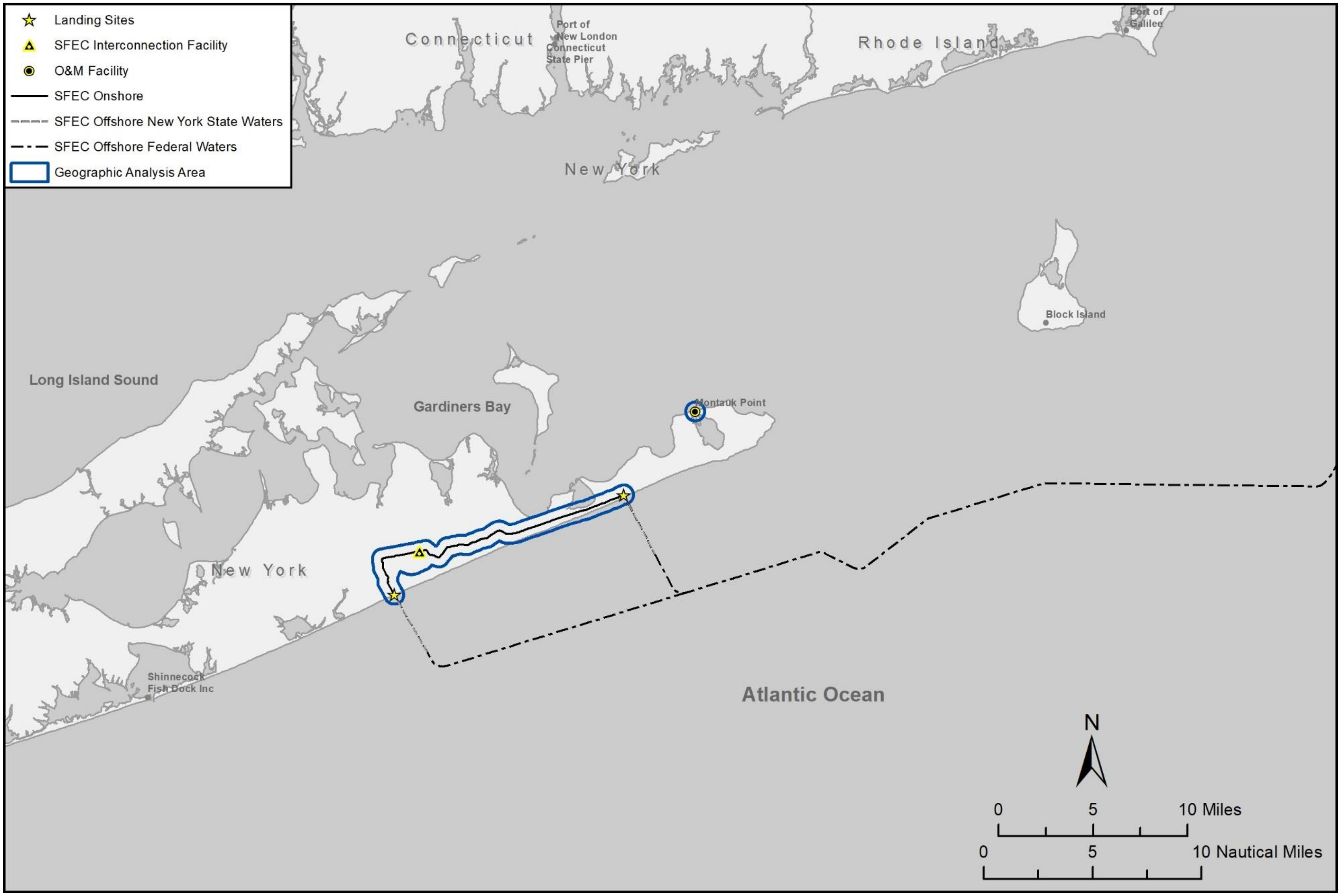

Figure E-6. Terrestrial and coastal habitats and faunas geographic analysis area.

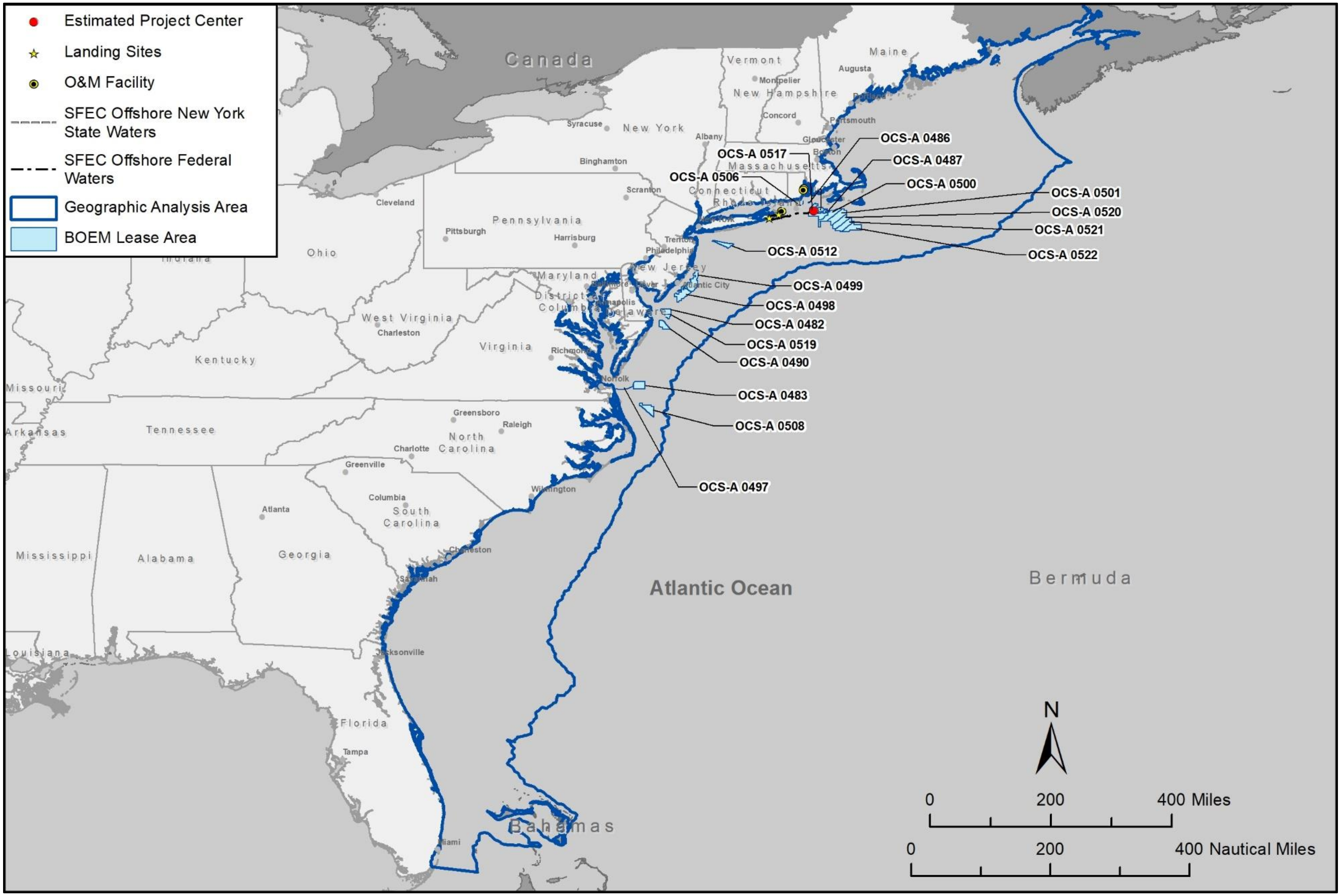

Figure E-7. Sea turtles geographic analysis area.

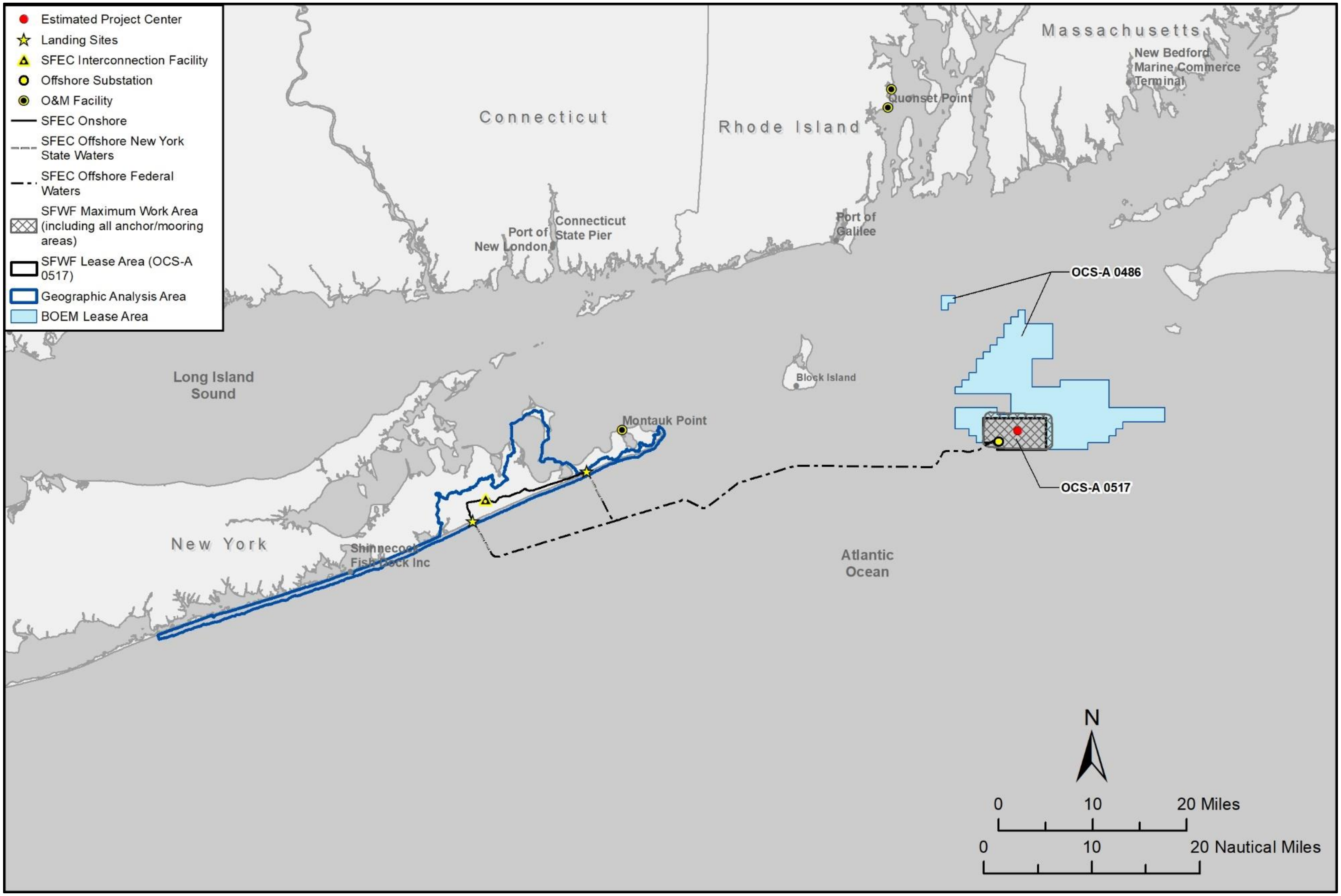

Figure E-8. Wetlands and other waters of the United States geographic analysis area.

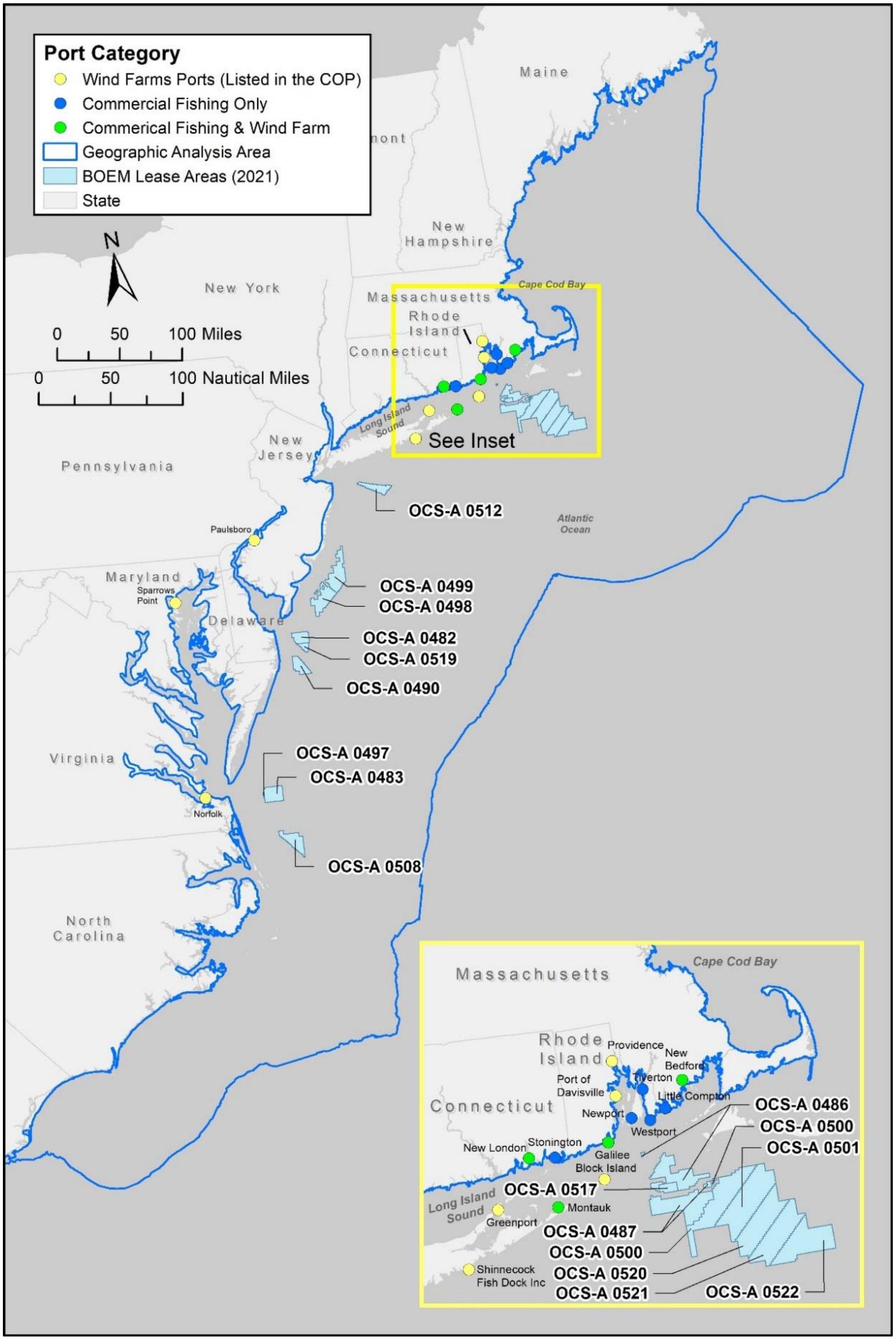

Figure E-9. Commercial fisheries and for-hire recreational fishing geographic analysis area.

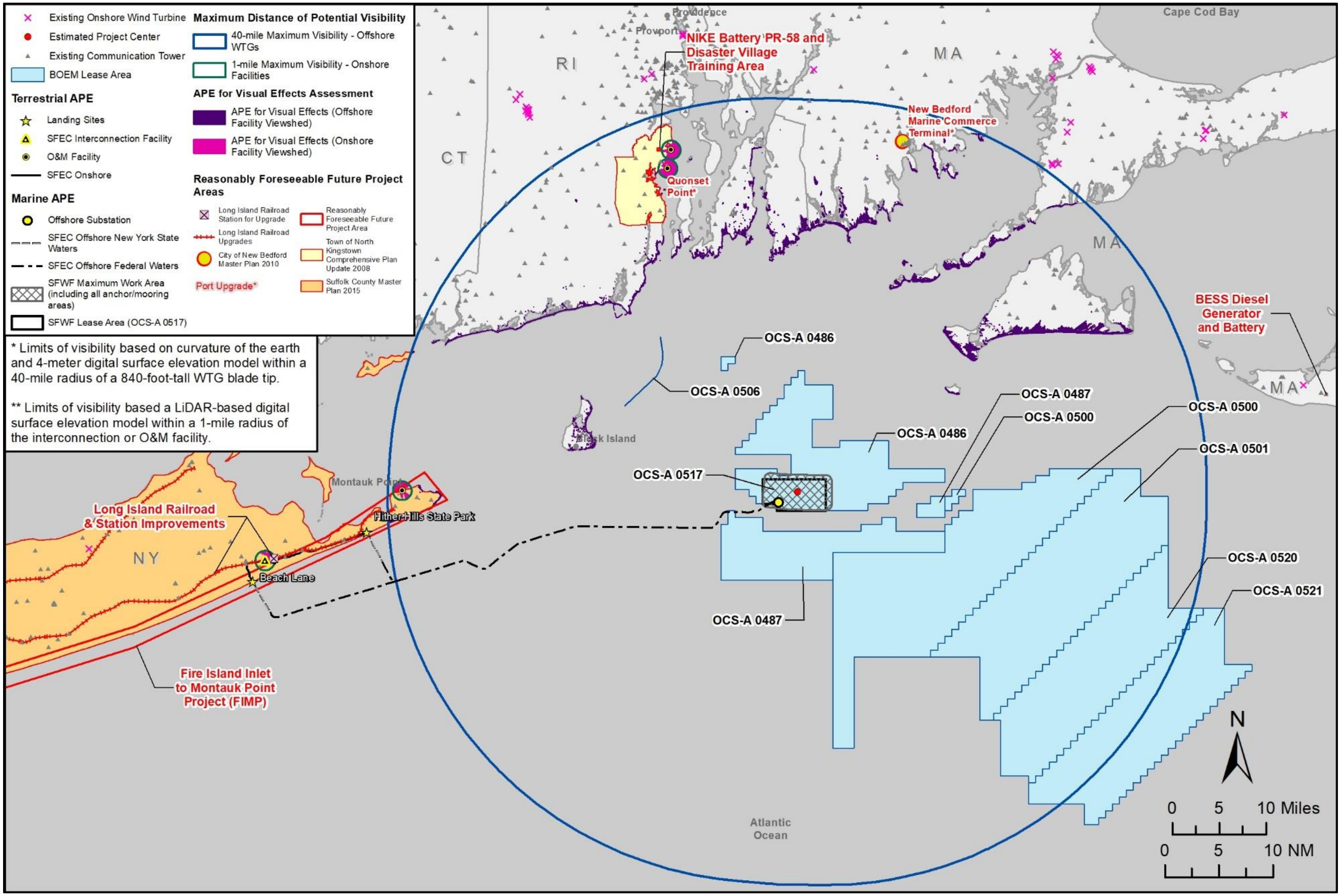

Figure E-10. Viewshed and visual effects assessment geographic analysis area.

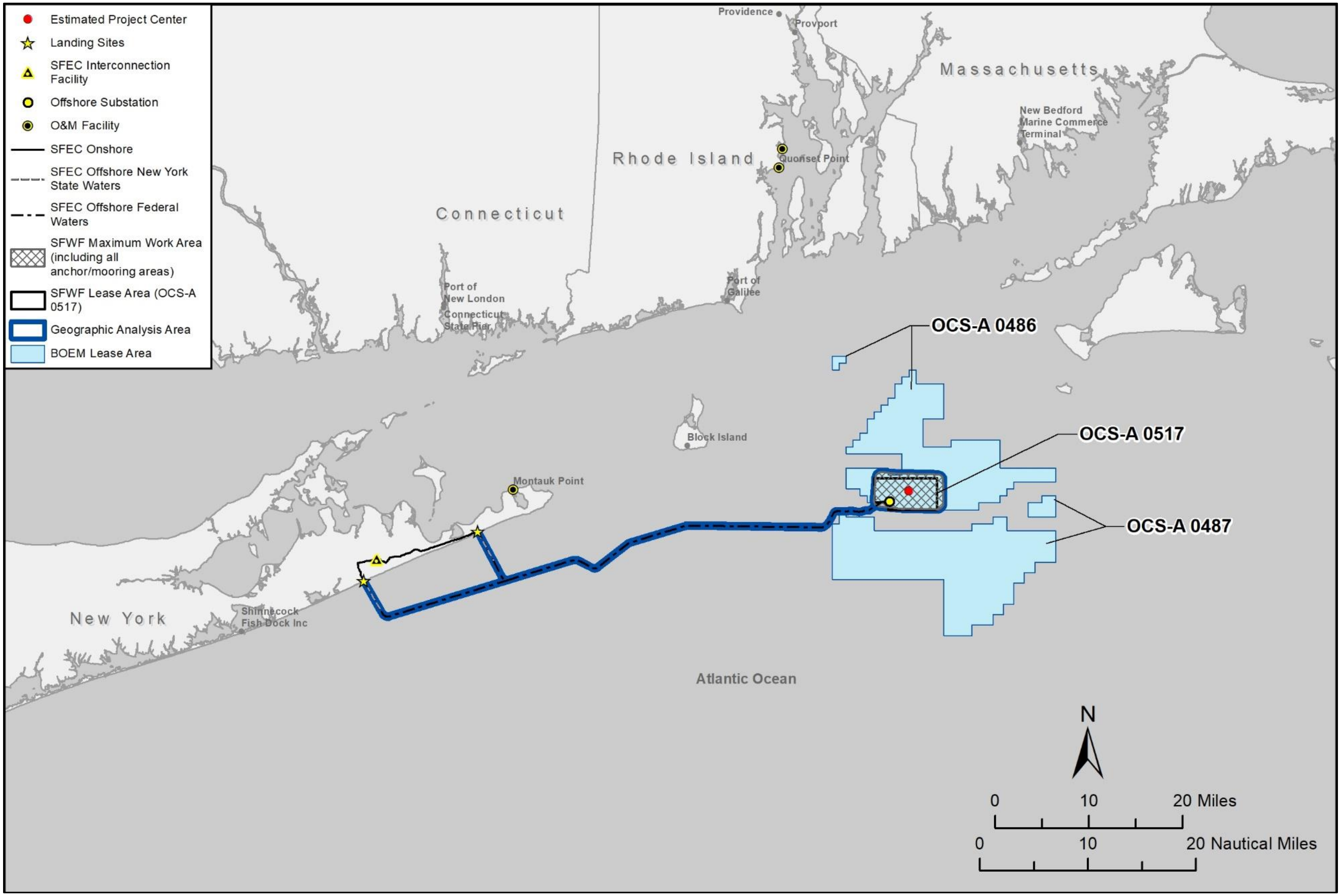

Figure E-11. Marine cultural resources geographic analysis area.

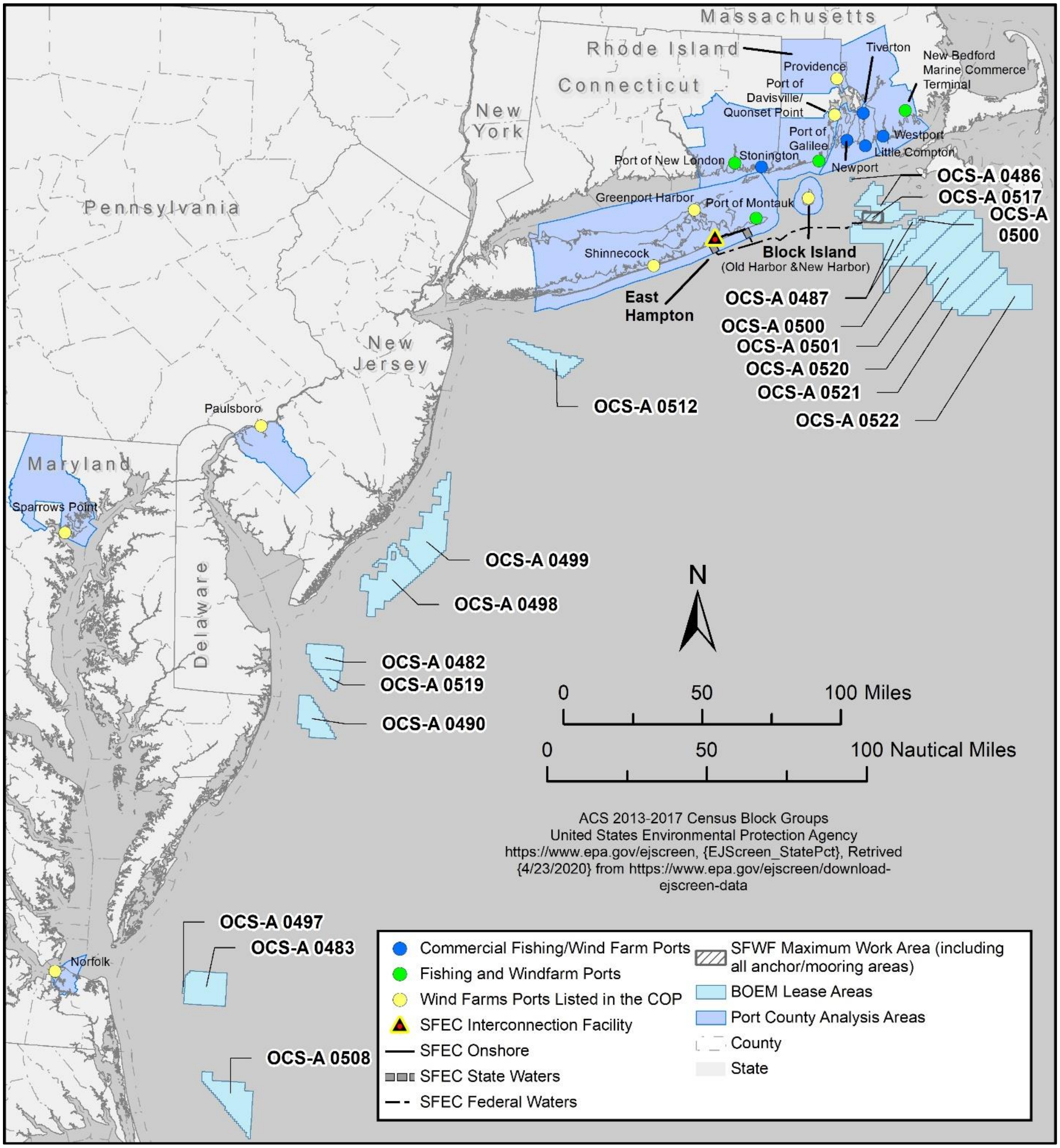

Figure E-12. Socioeconomics (demographics, employment, and economics) and environmental justice geographic analysis area.

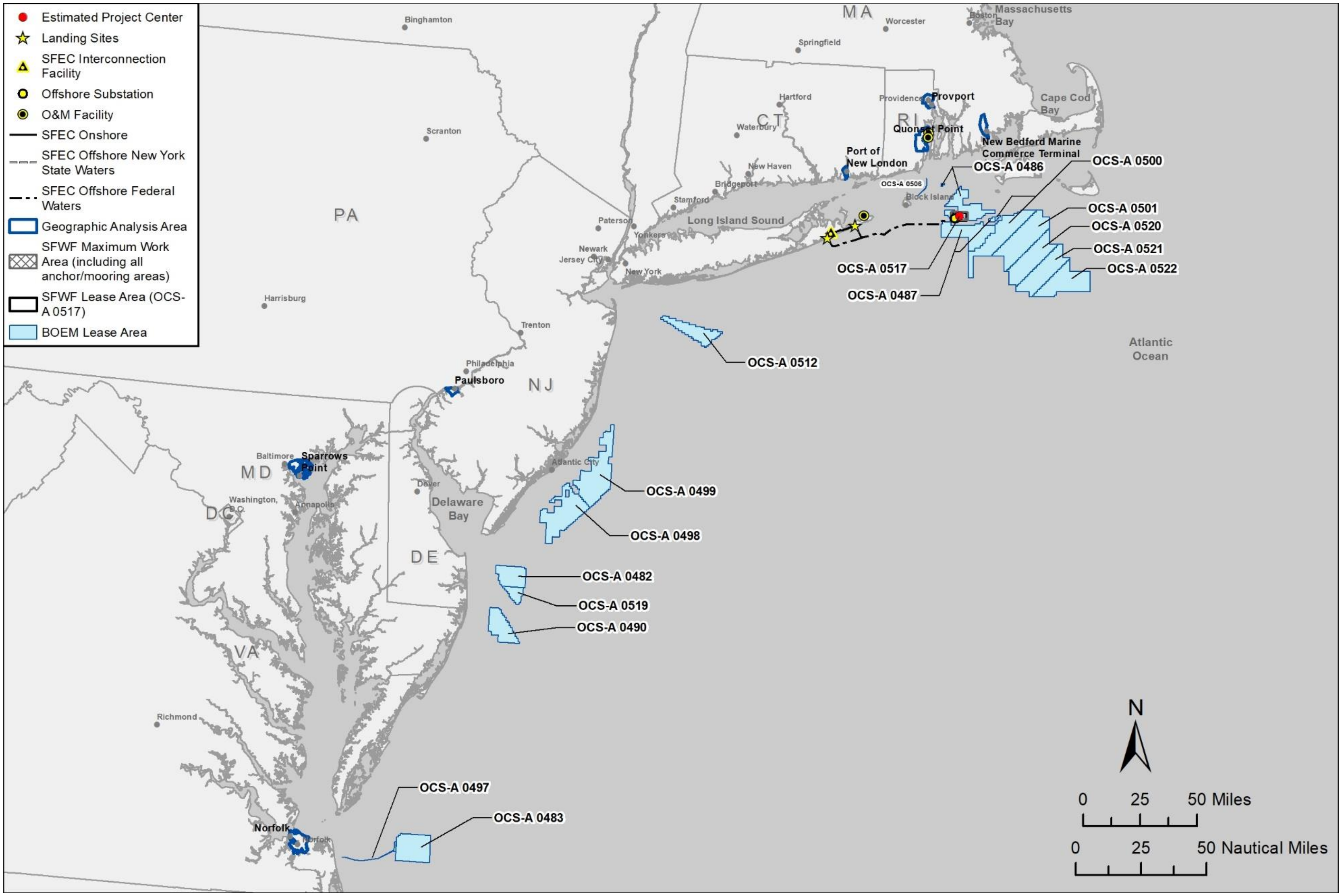

Figure E-13. Land use and coastal infrastructure geographic analysis area.

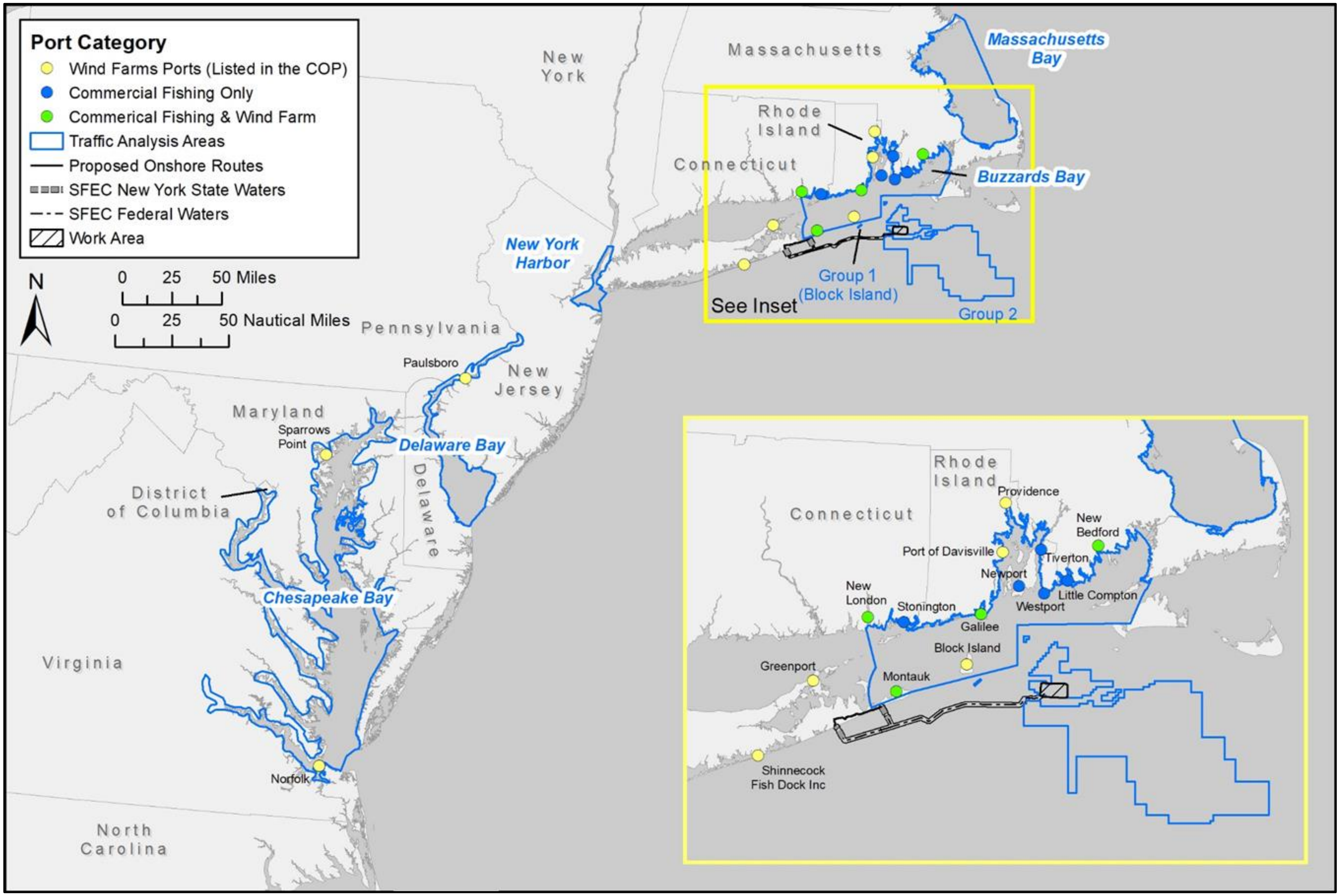

Figure E-14. Navigation and vessel traffic geographic analysis area.

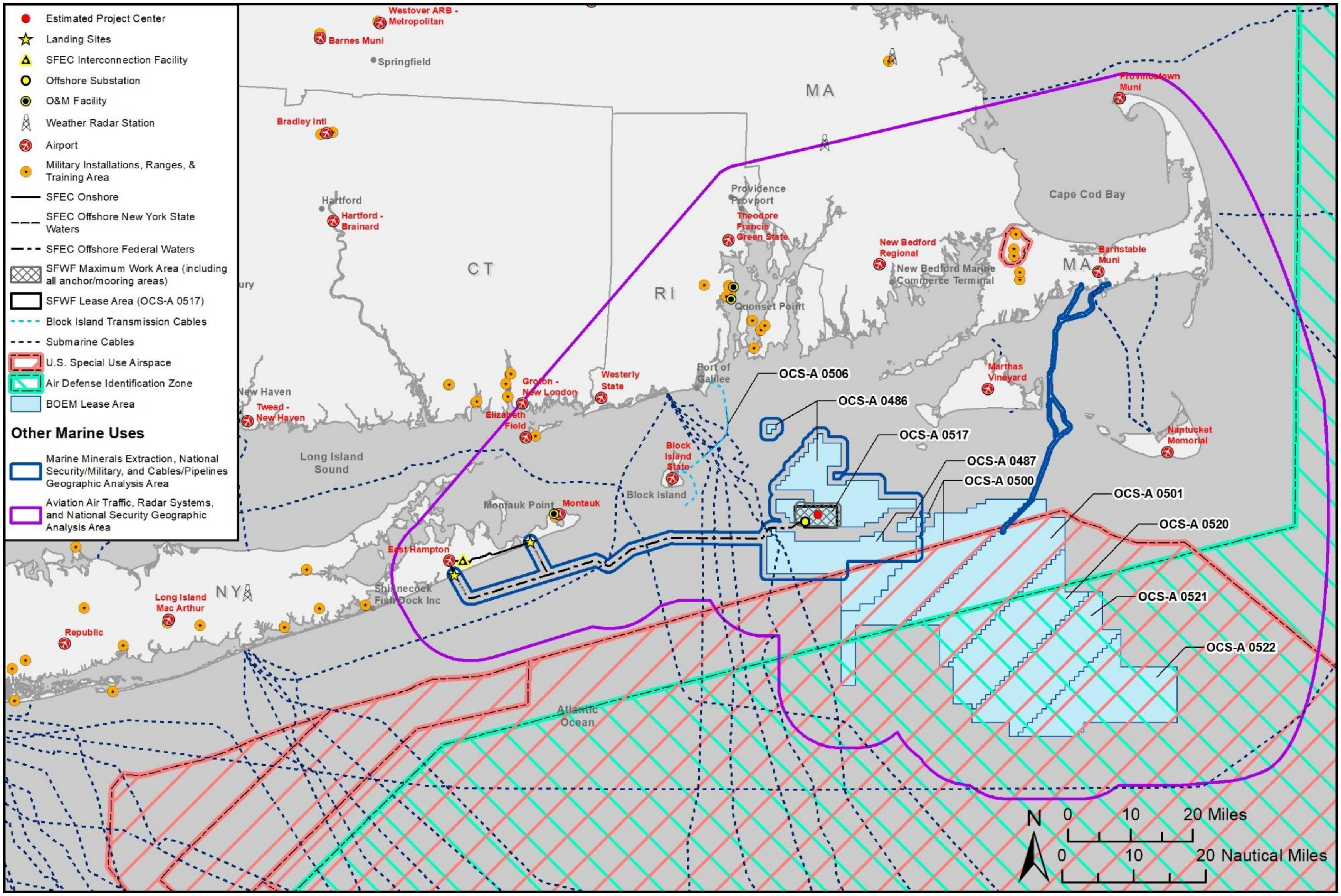

Figure E-15. Other Uses (marine, military use, aviation, offshore energy) geographic analysis area. Scientific surveys and research geographic analysis area would be the same as Figure E-4b.

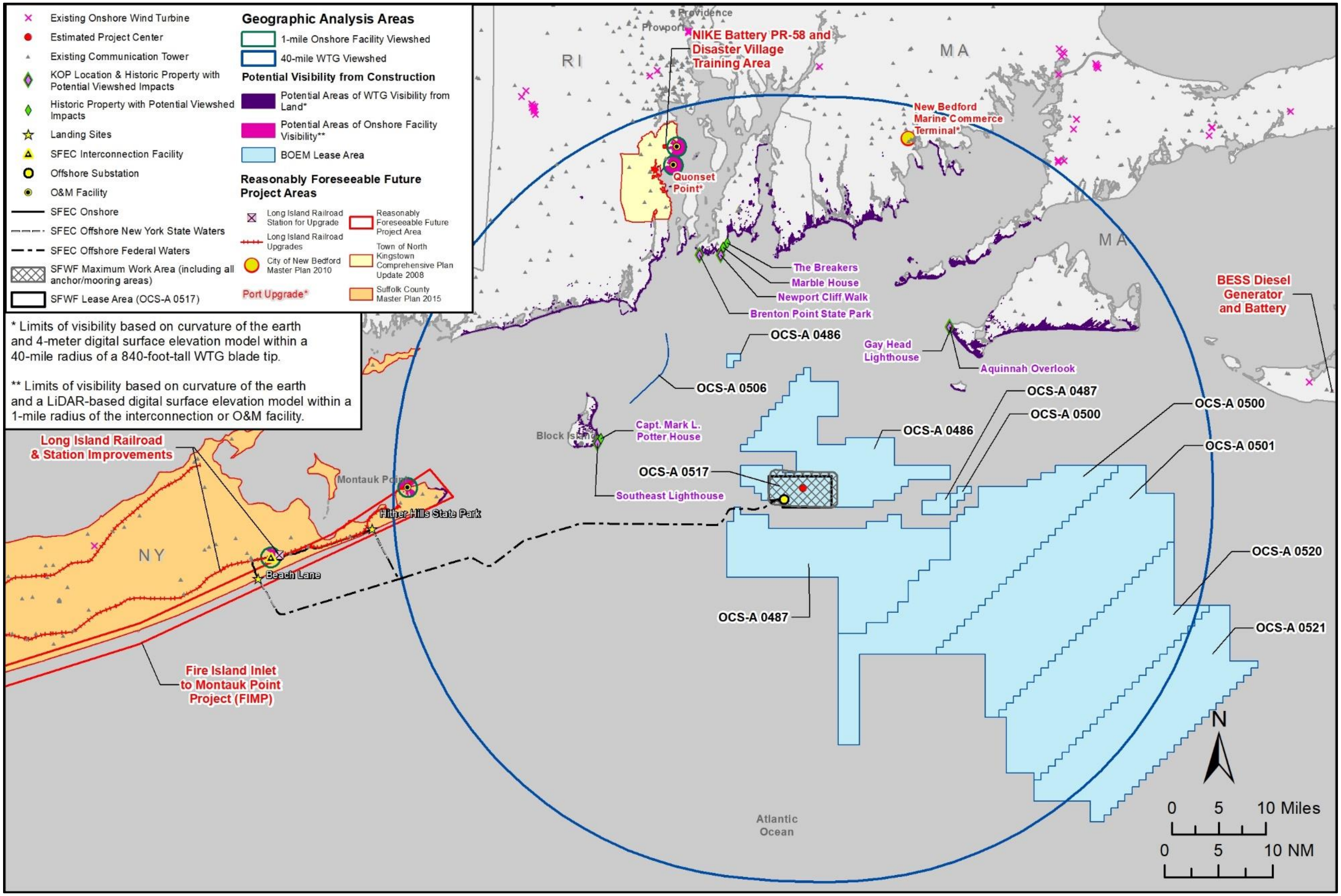

Figure E-16. Recreation and tourism geographic analysis area.

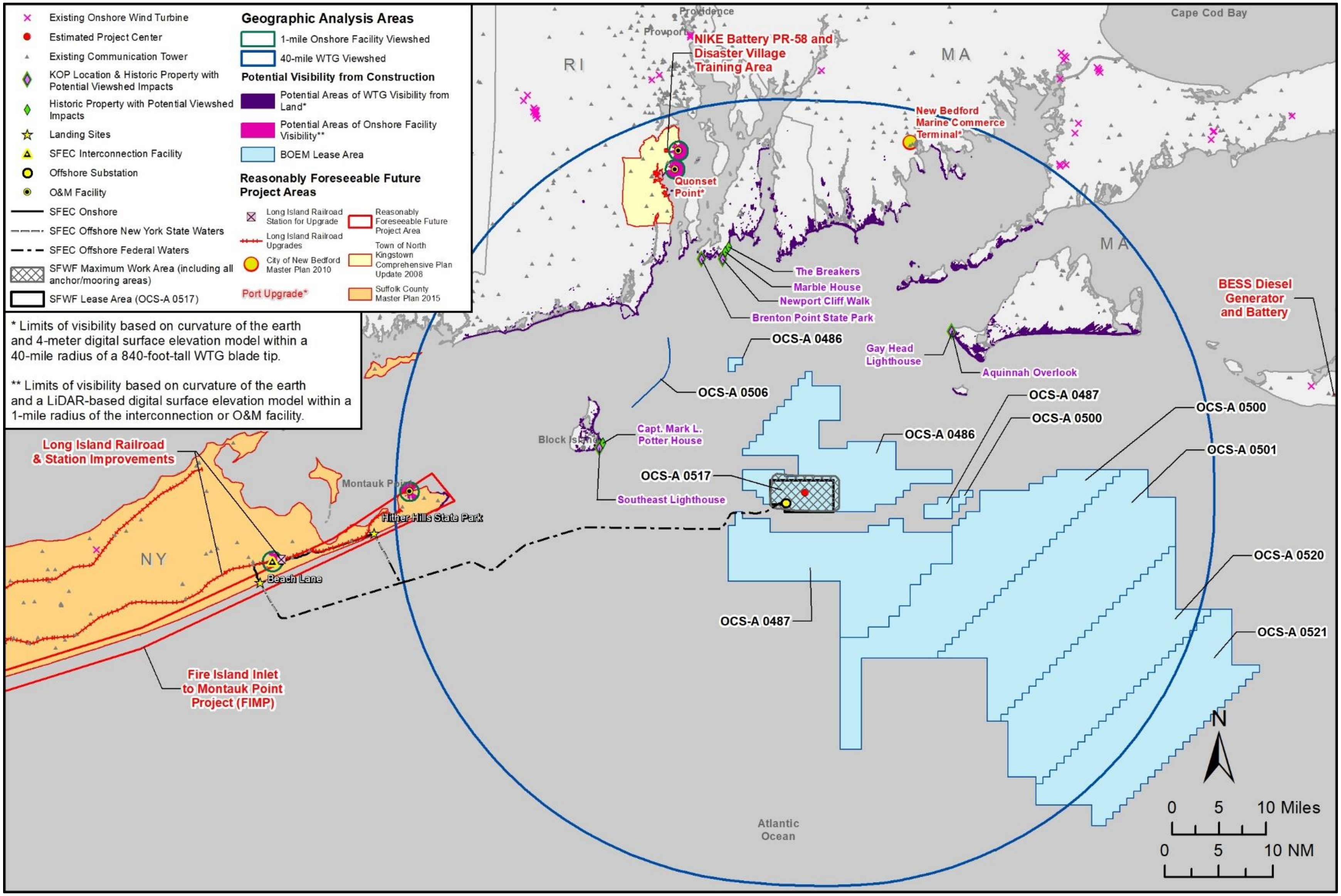

Figure E-17. Visual geographic analysis area.

ATTACHMENT 2

Ongoing and Future Non-Offshore Wind Activity Analysis (Part 1)

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BOEM developed the following tables based on their 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019), which evaluates potential impacts associated with ongoing and future non-offshore wind activities. The content of these tables has been vetted and approved by cooperating agencies to the SFWF EIS and therefore has been included in whole for their use in impact and cumulative analyses, and for ease in reference by the reader.

Table E2-1. Summary of Activities and the Associated Impact-Producing Factors for Air Quality

Associated IPFs: Sub-IPFs	**Ongoing Activities**	**Future Non-Offshore Wind Activities Intensity/Extent**
Accidental releases: Fuel/fluids/ hazmat	Accidental releases of air toxics HAPS are due to potential chemical spills. Ongoing releases occur in low frequencies. These may lead to short-term periods of toxic pollutant emissions through surface evaporation. According to the U.S. Department of Energy, 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Approximately 40.5 million barrels of oil were lost as a result of tanker incidents from 1970 to 2009, according to International Tanker Owners Pollution Federation Limited, which collects data on oil spills from tankers and other sources. From 1990 to1999, the average annual input to the coastal Northeast was 220,000 barrels of petroleum and offshore it was up to less than 70,000 barrels.	Accidental releases of air toxics or HAPS will be due to potential chemical spills. See Table E2-2 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 30 years would increase the risk of accidental releases. These may lead to short-term periods of toxic pollutant emissions through evaporation. Air quality impacts will be short-term and limited to the local area at and around the accidental release location.
Air emissions: Construction and decommissioning	Air emissions originate from combustion engines and electric power generated by burning fuel. These activities are regulated under the CAA to meet set standards. Air quality has generally improved over the last 30 years; however, some areas in the Northeast have experienced a decline in air quality over the last 2 years. Some areas of the Atlantic coast remain in nonattainment for ozone, with the source of this pollution from power generation. Many of these states have made commitments toward cleaner energy goals to improve this, and offshore wind is part of these goals. Primary processes and activities that can affect the air quality impacts are expansions and modifications to existing fossil fuel power plants, onshore and offshore activities involving renewable energy facilities, and various construction activities.	The largest air quality impacts over the next 30 years will occur during the construction phase of any one project; however, projects will be required to comply with the CAA. During the limited construction and decommissioning phases, emissions may occur that are above *de minimis* thresholds and will require offsets and mitigation. Primary emission sources will be increased commercial vehicular traffic, air traffic, public vehicular traffic, and combustion emissions from construction equipment and fugitive emissions from construction-generated dust. As projects come online, power generation emissions overall will decline and the industry as a whole will have a net benefit on air quality.
Air emissions: O&M		Activities associated with operation and maintenance of onshore wind projects will have a proportionally very small contribution to emissions compared to the construction and decommissioning activities over the next 30 years. Emissions will largely be due to commercial vehicular traffic and operation of emergency diesel generators. Such activity will result in short-term, intermittent, and widely dispersed emissions and small air quality impacts.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Air emissions: Power generation emissions reductions		Many Atlantic states have committed to clean energy goals, with offshore wind being a large part of that. Other reductions include transitioning to onshore wind and solar. The No Action Alternative without implementation of other future offshore wind projects would likely result in increased air quality impacts regionally due to the need to construct and operate new energy generation facilities to meet future power demands. These facilities may consist of new natural-gas-fired power plants, coal-fired, oil-fired, or clean-coal-fired plants. These types of facilities would likely have larger and continuous emissions and result in greater regional scale impacts on air quality.
Climate change	The construction, operation, and decommissioning of offshore wind projects would produce GHG emissions (nearly all CO_2) that can contribute to climate change; however, these contributions would be minuscule compared to aggregate global emissions. CO_2 is relatively stable in the atmosphere and generally mixed uniformly throughout the troposphere and stratosphere. Hence the impact of GHG emissions does not depend upon the source location. Increasing energy production from offshore wind projects will likely decrease GHGs emissions by replacing energy from fossil fuels.	Development of future onshore wind projects will produce a small overall increase in GHG emissions over the next 30 years. However, these contributions would be very small compared to the aggregate global emissions. The impact on climate change from these activities would be very small. As more projects come online, some reduction in GHG emissions from modifications of existing fossil fuel facilities to reduce power generation. Overall, it is anticipated that there would be no cumulative impact on global warming as a result of onshore wind project activities.

Notes: % = percent; BOEM = Bureau of Ocean Energy Management; CAA = Clean Air Act; CO = carbon monoxide; draft EIS = draft environmental impact statement; EIS = environmental impact statement; GHG = greenhouse gas; HAP = hazardous air pollutant; IPF = impact producing factor; NAAQS = National Ambient Air Quality Standards; NO2 = nitrogen dioxide ; NOx = nitrogen oxides; O&M = operations and maintenance; PM2.5 = particulate matter with diameters 2.5 microns or smaller; PM10 = particulate matter with diameters 10 microns or smaller; ppb = parts per billion; SO2 = sulfur dioxide; USC = United States Code; USEPA = U.S. Environmental Protection Agency; VOC = volatile organic compounds.

Table E2-2. Summary of Activities and the Associated Impact-Producing Factors for Water Quality

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/ hazmat	Accidental releases of fuels and fluids occur during vessel usage for dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable lines, and pipeline laying activities. According to the DOE, 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Approximately 40.5 million barrels of oil were lost as a result of tanker incidents from 1970 to 2009, according to International Tanker Owners Pollution Federation Limited, which collects data on oil spills from tankers and other sources. From 1990 to 1999, the average annual input to the coastal Northeast was 220,000 barrels of petroleum and into the offshore was < 70,000 barrels. Impacts on water quality would be expected to brief and localized from accidental releases.	Future accidental releases from offshore vessel usage, spills, and consumption will likely continue on a similar trend. Impacts are unlikely to affect water quality.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Trash and debris	Trash and debris may be accidentally discharged through fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities, and cables, lines, and pipeline laying. Accidental releases of trash and debris are expected to be low probability events. BOEM assumes operator compliance with federal and international requirements for management of shipboard trash; such events also have a relatively limited spatial impact.	As population and vessel traffic increase gradually over the next 30 years, accidental release of trash and debris may increase. However, there does not appear to be evidence that the volumes and extents anticipated would have any effect on water quality.
Anchoring	Impacts from anchoring occur due to ongoing military use and survey, commercial, and recreational activities.	Impacts from anchoring may occur semi-regularly over the next 30 years due to offshore military operations or survey activities. These impacts would include increased seabed disturbance resulting in increased turbidity levels. All impacts would be localized, short-term, and temporary.
New cable emplacement/ maintenance	Elevated suspended sediment concentrations can occur under natural tidal conditions and increase during storms, trawling, and vessel propulsion. Survey activities, and new cable and pipeline laying activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances would be short-term and either be limited to the emplacement corridor or localized.	Suspension of sediments may continue to occur infrequently over the next 30 years due to survey activities, and submarine cable, lines, and pipeline-laying activities. Future new cables would occasionally disturb the seafloor and cause short-term increases in turbidity and minor alterations in localized currents resulting in local short-term impacts. The FCC has two pending submarine tele-communication cable applications in the North Atlantic. If the cable routes enter the water quality geographic analysis area, short-term disturbance in the form of increased suspended sediment and turbidity would be expected.
Port utilization: Expansion	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from Virginia to Maine is that port activity will increase modestly. The ability of ports to receive the increase in larger ships will require port modifications, which, along with additional vessel traffic, could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long-term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future.	The general trend along the coastal region from Virginia to Maine is that port activity will increase modestly over the next 30 years. Port modifications and channel deepening activities are being undertaken to accommodate the increase in vessel traffic and deeper draft vessels that transit the Panama Canal Locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future.
Presence of structures	The installation of onshore and offshore structures leads to alteration of local water currents. These disturbances would be local but, depending on the hydrologic conditions, have the potential to impact water quality through the formation of sediment plumes.	Impacts associated with the presence of structures includes temporary sediment disturbance during maintenance. This sediment suspension would lead to interim and localized impacts.
Discharges	Discharges impact water quality by introducing nutrients, chemicals, and sediments to the water. There are regulatory requirements related to prevention and control of discharges, the prevention and control of accidental spills, and the prevention and control of nonindigenous species.	Increased coastal development is causing increased nutrient pollution in communities. In addition, ocean disposal activity in the North and Mid-Atlantic is expected to gradually decrease or remain stable. Impacts of ocean disposal on water quality are minimized because USEPA has established dredge spoil criteria and regulate the disposal permits issued by USACE. The impact on water quality from sediment suspension during these future activities would be short-term and localized.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Land disturbance: erosion and sedimentation	Ground disturbance activities may lead to un-vegetated or otherwise unstable soils. Precipitation events could mobilize the soils into nearby surface waters, leading to potential erosion and sedimentation effects and subsequent increased turbidity.	Ground disturbance associated with construction and installation of onshore components could lead to un-vegetated or unstable soils. Precipitation events could mobilize these soils leading to erosion and sedimentation effects and turbidity. The impacts for future offshore wind through this IPF would be staggered in time and localized. The impacts would be short term and localized with an increased likelihood of impacts limited to onshore construction periods.
Land disturbance: Onshore construction	Onshore construction activities may lead to un-vegetated or otherwise unstable soils as well as soil contamination due to leaks or spills from construction equipment. Precipitation events could mobilize the soils into nearby surface waters, leading to increased turbidity and alteration of water quality.	The general trend along coastal regions is that port activity will increase modestly in the future. This increase in activity includes expansion needed to meet commercial, industrial, and recreational demand. Modifications to cargo handling equipment and conversion of some undeveloped land to meet port demand would be required to receive the increase in larger ships.

Notes: BOEM = Bureau of Ocean Energy Management; DO = dissolved oxygen; DOE = U.S. Department of Energy; EIS = Environmental Impact Statement; ESP = electrical service platform; FCC = Federal Communications Commission; gal = gallon; IPF = impact-producing factors; NASA = National Aeronautics and Space Administration; OCS = Outer Continental Shelf; OECC = Offshore Export Cable Corridor; USACE = U.S. Army Corps of Engineers; USCG = U.S. Coast Guard; USEPA = Environmental Protection Agency; WDA = Wind Development Area; WTG = wind turbine generator.

Table E2-3. Summary of Activities and the Associated Impact-Producing Factors for Birds

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/ hazmat	See Table E2-2 for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Ingestion of hydrocarbons can lead to morbidity and mortality due to decreased hematological function, dehydration, drowning, hypothermia, starvation, and weight loss (Briggs et al. 1997, Haney et al. 2017, Paruk et al. 2016). Additionally, even small exposures that result in feather oiling can lead to sublethal effects that include changes in flight efficiencies and result in increased energy expenditure during daily and seasonal activities including chick provisioning, commuting, courtship, foraging, long-distance migration, predator evasion, and territory defense (Maggini et al. 2017). These impacts rarely result in population-level impacts.	See Table E2-2 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 30 years would increase the potential risk of accidental releases and associated impacts, including mortality, decreased fitness, and health effects on individuals. Impacts are unlikely to affect populations.
Accidental releases: Trash and debris	Trash and debris are accidentally discharged through onshore sources; fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation, navigation, and traffic; survey activities; and cables, lines, and pipeline laying on an ongoing basis. In a study from 2010, students at sea collected more than 520,000 bits of plastic debris per square mile. In addition, many fragments come from consumer products blown out of landfills or tossed out as litter. (Law et al. 2010). Birds may accidentally ingest trash mistaken for prey. Mortality is typically a result of blockages caused by both hard and soft plastic debris (Roman et al. 2019).	As population and vessel traffic increase gradually over the next 30 years, accidental release of trash and debris may increase. This may result in increased injury or mortality of individuals. However, there does not appear to be evidence that the volumes and extents would have any impact on bird populations.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Light: Vessels	Ocean vessels have an array of lights including navigational lights, deck lights, and interior lights. Such lights can attract some birds. The impact is localized and temporary. This attraction would not be expected to result in an increased risk of collision with vessels. Population-level impacts would not be expected.	Gradually increasing vessel traffic over the next 30 years would increase the potential for bird and vessel interactions. While birds may be attracted to vessel lights, this attraction would not be expected to result in increased risk of collision with vessels. No population-level impacts would be expected.
Light: Structures	Buoys, towers, and onshore structures with lights can attract birds. Onshore structures like houses and ports emit a great deal more light than offshore buoys and towers. This attraction has the potential to result in an increased risk of collision with lighted structures (Huppop et al. 2006). Light from structures is widespread and permanent near the coast, but minimal offshore.	Light from onshore structures is expected to gradually increase in proportion with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.
New cable emplacement/ maintenance	Cable emplacement and maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances will be temporary and generally limited to the emplacement corridor. Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances will be temporary and limited to the emplacement corridor. Suspended sediment could impair the vision of diving birds that are foraging in the water column (Cook and Burton 2010). However, given the localized nature of the potential impacts, individuals would be expected to successfully forage in nearby areas not affected by increased sedimentation and no biologically significant impacts on individuals or populations would be expected.	Future new cables, would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in localized, short-term impacts. The FCC has two pending submarine telecommunications cable applications in the North Atlantic. Impacts would be temporary and localized, with no biologically significant impacts on individuals or populations.
Noise: Aircraft	Aircraft routinely travel in the geographic analysis area for birds. With the possible exception of rescue operations and survey aircraft, no ongoing aircraft flights would occur at altitudes that would elicit a response from birds. If flights are at a sufficiently low altitude, birds may flush, resulting in non-biologically significant increased energy expenditure. Disturbance, if any, would be localized and temporary and impacts would be expected to dissipate once the aircraft has left the area.	Aircraft noise is likely to continue to increase as commercial air traffic increases; however, very few flights would be expected to be at a sufficiently low altitude to elicit a response from birds. If flights are at a sufficiently low altitude, birds may flush, resulting in non-biologically significant increased energy expenditure. Disturbance, if any, would be localized and temporary and impacts would be expected to dissipate once the aircraft has left the area.
Noise: G&G	Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities could result in diving birds leaving the local area. Non-diving birds would be unaffected. Any displacement would only be temporary during non-migratory periods, but impacts could be greater if displacement were to occur in preferred feeding areas during seasonal migration periods.	Same as ongoing activities, with the addition of possible future oil and gas surveys.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water could result in intermittent, temporary, localized impacts on diving birds due to displacement from foraging areas if birds are present in the vicinity of pile-driving activity. The extent of these impacts depends on pile size, hammer energy, and local acoustic conditions. No biologically significant impacts on individuals or populations would be expected.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Noise: Onshore construction	Onshore construction is routinely used in generic infrastructure projects. Equipment could cause displacement. Any displacement would only be temporary and no individual fitness or population-level impacts would be expected.	Onshore construction will continue at current trends. Some behavior responses could range from escape behavior to mild annoyance, but no individual injury or mortality would be expected.
Noise: Vessels	Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Sub-surface noise from vessels could disturb diving birds foraging for prey below the surface. The consequence to birds would be similar to noise from G&G but likely less because noise levels are lower.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Presence of structures: Entanglement, gear loss, gear damage	Each year, 2,551 seabirds die annually from interactions with U.S. commercial fisheries on the Atlantic (Sigourney et al. 2019). Even more die due to abandoned commercial fishing gear (nets). In addition, recreational fishing gear (hooks and lines) is periodically lost on existing buoys, pilings, hard protection, and other structures and has the potential to entangle birds.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various hard protections atop cables create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these objects. These impacts are local and can be short-term to permanent. These fish aggregations can provide localized, short-term to permanent, beneficial impacts to some bird species because it could increase prey species availability.	New cables, installed incrementally in the geographic analysis area for birds over the next 20 to 30 years, would likely require hard protection atop portions of the cables (see New cable emplacement/maintenance row). Any new towers, buoys, or piers would also create uncommon relief in a mostly flat seascape. Structure-oriented fishes could be attracted to these locations. Abundance of certain fishes may increase. These impacts are expected to be local and may be short-term to permanent. These fish aggregations can provide localized, short-term to permanent beneficial impacts on some bird species due to increased prey species availability.
Presence of structures: Migration disturbances	A few structures may be scattered about the offshore geographic analysis area for birds, such as navigation and weather buoys and light towers (NOAA 2020). Migrating birds can easily fly around or over these sparsely distributed structures.	The infrequent installation of future new structures in the marine or onshore environment over the next 30 years would not be expected to result in migration disturbances.
Presence of structures: Turbine strikes, displacement, and attraction	A few structures may be in the offshore geographic analysis area for birds, such as navigation and weather buoys, turbines, and light towers (NOAA 2020). Given the limited number of structures currently in the geographic analysis area, individual- and population-level impacts due to displacement from current foraging habitat would not be expected. Stationary structures in the offshore environment would not be expected to pose a collision risk to birds. Some birds like cormorants and gulls may be attracted to these structures and opportunistically roost on these structures.	The installation of future new structures in the marine or onshore environment over the next 30 years would not be expected to result in an increase in collision risk or to result in displacement. Some potential for attraction and opportunistic roosting exists, but would be expected to be limited given the anticipated number of structures.
Traffic: Aircraft	General aviation accounts for approximately two bird strikes per 100,000 flights (Dolbeer et al. 2019). Additionally, aircraft are used for scientific and academic surveys in marine environments.	Bird fatalities associated with general aviation would be expected to increase with the current trend in commercial air travel. Aircraft will continue to be used to conduct scientific research studies as well as wildlife monitoring and pre-construction surveys. These flights would be well below the 100,000 flights and no bird strikes would be expected to occur.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Land disturbance: Onshore construction	Onshore construction activity will continue at current trends. There is some potential for indirect impacts associated with habitat loss and fragmentation.	Future non-offshore wind development would continue to occur at the current rate. This development has the potential to result in habitat loss, but would not be expected to result in injury or mortality of individuals.
Climate change: Warming and sea level rise, storm severity/frequency	Increased storm frequency and severity during the breeding season can reduce productivity of bird nesting colonies and kill adults, eggs, and chicks.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Climate change: Ocean acidification	Increasing ocean acidification may affect prey species upon which some birds feed and could lead to shifts in prey distribution and abundance. Intensity of impacts on birds is speculative.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Climate change: Warming and sea level rise, altered habitat/ecology	Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters over the next 30 years, influencing the distribution of bird prey resources.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Climate change: Warming and sea level rise, altered migration patterns	Birds rely on cues from the weather to start migration. Wind direction and speed influence the amount of energy used during migration. For nocturnal migrants, wind assistance is projected to increase across eastern portions of the continent (0.32 m/s; 9.6%) during spring migration by 2091, and wind assistance is projected to decrease within eastern portions of the continent (0.17 m/s; 6.6%) during autumn migration (La Sorte et al. 2018).	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Climate change: Warming and sea level rise, property/ infrastructure damage	This sub-IPF would have no impacts on birds.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Climate change: Warming and sea level rise, protective measures (barriers, seawalls)	The proliferation of coastline protections have the potential to result in long-term, high-consequence, impacts on bird nesting habitat.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Climate change: Warming and sea level rise, increased disease frequency	Climate change, influenced in part by GHG emissions, is expected to continue to contribute to a gradual warming of ocean waters over the next 30 years, influencing the frequencies and distributions of various diseases of birds.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.

Notes: ADLS = Aircraft Detection Light System; BMP = best management practice; BOEM = Bureau of Ocean Energy Management; EIS = environmental impact statement; ESP = electrical service platform; FAA = Federal Aviation Administration; FCC = Federal Communications Commission; G&G = Geological and Geophysical; GHG = greenhouse gas; IPF = impact-producing factors; m/s = meter per second; NOAA = National Oceanic and Atmospheric Administration; OCS = outer continental shelf; ROW = right-of-way; USCG = U.S. Coast Guard; WDA = wind development area; WTG = wind turbine generator.

Table E2-4. Summary of Activities and the Associated Impact-Producing Factors for Bats

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded and would result in high-intensity, low-exposure level, long-term, but localized intermittent risk to bats in nearshore waters. Direct impacts are not expected to occur as recent research has shown that bats may be less sensitive to temporary threshold shifts than other terrestrial mammals (Simmons et al. 2016). Indirect impacts (i.e., displacement from potentially suitable habitats) could occur as a result of construction activities, which could generate noise sufficient to cause avoidance behavior (Schaub et al. 2008). Construction activity would be temporary and highly localized.	Similar to ongoing activities, noise associated with pile driving activities would be limited to nearshore waters, and these high-intensity, but low-exposure risks would not be expected to result in direct impacts. Some indirect impacts (i.e., displacement from potentially suitable foraging habitats) could occur as a result of construction activities, which could generate noise sufficient to cause avoidance behavior (Schaub et al. 2008). Construction activity would be temporary and highly localized and no population-level effects would be expected.
Noise: Construction	Onshore construction occurs regularly for generic infrastructure projects in the bats geographic analysis area. There is a potential for displacement caused by equipment if construction occurs at night (Schaub et al. 2008). Any displacement would only be temporary. No individual or population level impacts would be expected. Some bats roosting in the vicinity of construction activities may be disturbed during construction, but would be expected to move to a different roost farther from construction noise. This would not be expected to result in any impacts as frequent roost switching is a common component of a bat's life history (Hann et al. 2017; Whitaker 1998).	Onshore construction is expected to continue at current trends. Some behavioral responses and avoidance of construction areas may occur (Schaub et al. 2008). However, no injury or mortality would be expected.
Presence of structures: Migration disturbances	There may be few structures scattered throughout the offshore bats geographic analysis area, such as navigation and weather buoys and light towers (NOAA 2020). Migrating bats can easily fly around or over these sparsely distributed structures, and no migration disturbance would be expected. Bat use of offshore areas is very limited and generally restricted to spring and fall migration. Very few bats would be expected to encounter structures on the OCS and no population-level effects would be expected.	The infrequent installation of future new structures in the marine environment of the next 30 years is expected to continue. As described under Ongoing Activities, These structures would not be expected to cause disturbance to migrating tree bats in the marine environment.
Presence of structures: Turbine strikes	There may be few structures in the offshore bats geographic analysis area, such as navigation and weather buoys, turbines, and light towers (NOAA 2020). Migrating tree bats can easily fly around or over these sparsely distributed structures, and no strikes would be expected.	The infrequent installation of future new structures in the marine environment of the next 30 years is expected to continue. As described under Ongoing Activities, these structures would not be expected to result in increased collision risk to migrating tree bats in the marine environment.
Land disturbance: onshore construction	Onshore construction activities are expected to continue at current trends. Potential direct effects on individuals may occur if construction activities include tree removal when bats are potentially present. Injury or mortality may occur if trees being removed are occupied by bats at the time of removal. While there is some potential for indirect impacts associated with habitat loss, no individual or population-level effects would be expected.	Future non-offshore wind development would continue to occur at the current rate. This development has the potential to result in habitat loss and could result in injury or mortality of individuals.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Climate change: Warming and sea level rise, storm severity/frequency	Storms during breeding and roosting season can reduce productivity and increase mortality. Intensity of this impact is speculative.	No future activities were identified within the bats geographic analysis area other than ongoing activities.
Climate change: Ocean acidification; Warming and sea level rise, altered habitat/ecology; Warming and sea level rise, altered migration patterns; Warming and sea level rise, property/ infrastructure damage; Warming and sea level rise, protective measures (barriers, sea walls); Warming and sea level rise, storm severity/frequency, sediment erosion, deposition	These sub-IPFs would have no impacts on bats.	No future activities were identified within the bats geographic analysis area other than ongoing activities.
Climate change: Warming and sea level rise, increased disease frequency	Disease can weaken, lower reproductive output, and/or kill individuals. Some tropical diseases will move northward. Extent and intensity of this impact is highly speculative.	No future activities were identified within the bats geographic analysis area other than ongoing activities.

Notes: EIS = Environmental Impact Statement; ESP = electrical service platform; IPF = impact-producing factors; NOAA = National Oceanic and Atmospheric Administration; OCS = outer continental shelf; ROW = right-of-way; WTG = wind turbine generator.

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ATTACHMENT 3

Ongoing and Future Non-Offshore Wind Activity Analysis (Part 2)

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BOEM developed the following tables based on their 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019), which evaluates potential impacts associated with ongoing and future non-offshore wind activities. The content of these tables has been vetted by cooperating agencies to the SFWF EIS and therefore has been included in whole for their use in impact and cumulative analyses, and for ease in reference by the reader.

Table E3-1. Summary of Activities and the Associated Impact-Producing Factors for Terrestrial and Coastal Fauna

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Land disturbance: Erosion and sedimentation	Periodic ground-disturbing activities contribute to elevated levels of erosion and sedimentation, but usually not to a degree that affects terrestrial and coastal fauna, assuming that industry standard BMPs are implemented.	No future activities were identified within the geographic analysis area other than ongoing activities.
Land disturbance: Onshore construction	Periodic clearing of shrubs and tree saplings along existing utility ROWs causes disturbance and temporary displacement of mobile species and may cause direct injury or mortality of less-mobile species, resulting in short-term impacts that are less than noticeable. Continual development of residential, commercial, industrial, solar, transmission, gas pipeline, onshore wind turbine, and cell tower projects also causes disturbance, displacement, and potential injury and/or mortality of fauna, resulting in small temporary impacts.	No future activities were identified within the geographic analysis area other than ongoing activities.
Land disturbance: Onshore, land use changes	Periodically, undeveloped parcels are cleared and developed for human uses, permanently changing the condition of those parcels as habitat for terrestrial fauna. Continual development of residential, commercial, industrial, solar, transmission, gas pipeline, onshore wind turbine, transportation infrastructure, sewer infrastructure, and cell tower projects could permanently convert various areas.	No future activities were identified within the geographic analysis area other than ongoing activities.
Climate change: Warming and sea level rise, altered habitat/ecology	Climate change, influenced in part by greenhouse gas emissions, is altering the seasonal timing and patterns of species distributions and ecological relationships, likely causing permanent changes of unknown intensity gradually over the next 30 years.	No future activities were identified within the geographic analysis area other than ongoing activities.

Notes: BMPs = best management practices; BOEM = Bureau of Ocean Energy Management; IPF = impact-producing factors; ROW = right-of-way; WMA = wildlife management area.

Table E3-2. Summary of Activities and the Associated Impact-Producing Factors for Coastal Habitats

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/ hazmat	See Table E2-2 for a discussion of ongoing accidental releases. Accidental releases of fuel/fluids/hazmat have the potential to cause habitat contamination and harm to the species that build biogenic coastal habitats (e.g., eelgrass, oysters, mussels, slipper limpets, salt marsh cordgrass) from releases and/or cleanup activities. Only a portion of the ongoing releases contact coastal habitats in the geographic analysis area. Impacts are small, localized, and temporary.	See Attachment 2 for a discussion of accidental releases.
Accidental releases: Trash and debris	Ongoing releases of trash and debris occur from onshore sources, fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities and cables, lines and pipeline laying. As population and vessel traffic increase, accidental releases of trash and debris may increase. Such materials may be obvious when they come to rest on shorelines; however, there does not appear to be evidence that the volumes and extents would have any detectable impact on coastal habitats.	No future activities were identified within the geographic analysis area for coastal habitats other than ongoing activities.
Anchoring	Vessel anchoring related to ongoing military, survey, commercial, and recreational activities will continue to cause temporary to permanent impacts in the immediate area where anchors and chains meet the seafloor. These impacts include increased turbidity levels and potential for direct contact to cause physical damage to coastal habitats. All impacts are localized; turbidity is short-term and temporary; physical damage can be permanent if it occurs in eelgrass beds or hard bottom.	No future activities were identified within the geographic analysis area for coastal habitats other than ongoing activities.
EMF	EMFs continuously emanate from existing telecommunication and electrical power transmission cables. New cables generating EMFs are infrequently installed in the analysis area. The extent of impacts is likely less than 50 feet from the cable, and the intensity of impacts on coastal habitats is likely undetectable.	No future activities were identified within the geographic analysis area for coastal habitats other than ongoing activities.
Light: Vessels	Navigation lights and deck lights on vessels would be a source of ongoing light. The extent of impacts is limited to the immediate vicinity of the lights, and the intensity of impacts on coastal habitats is likely undetectable.	Light is expected to continue to increase gradually with increasing vessel traffic over the next 30 years. The extent of impacts would likely be limited to the immediate vicinity of the lights, and the intensity of impacts on coastal habitats would likely be undetectable.
Light: Structures	Ongoing lights from navigational aids and other structures onshore and nearshore. The extent of impacts is likely limited to the immediate vicinity of the lights, and the intensity of impacts on coastal habitats is likely undetectable.	No future activities were identified within the geographic analysis area for coastal habitats other than ongoing activities.
New cable emplacement/ maintenance	Ongoing cable maintenance activities infrequently disturb bottom sediments; these disturbances are local and limited to the emplacement corridor (see the Sediment deposition and burial IPF).	No future activities were identified within the geographic analysis area other than ongoing activities.
Noise: Onshore/offshore construction	Ongoing noise from construction occurs frequently near shores of populated areas in New England and the mid-Atlantic, but infrequently offshore. Noise from construction near shore is expected to gradually increase over the next 30 years in line with human population growth along the coast of the geographic analysis area. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary.	No future activities were identified within the analysis area other than ongoing activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Noise: G&G	Site characterization surveys and scientific surveys are ongoing. The intensity and extent of the resulting impacts are difficult to generalize, but are local and temporary.	Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 30 years. Site characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize, but are likely local and temporary.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can reach coastal habitats. The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified within the analysis area other than ongoing activities.
Noise: Cable laying/trenching	Rare but ongoing trenching for pipeline and cable laying activities emits noise; cable burial via jet embedment also causes similar noise impacts. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise on coastal habitats are discountable compared to the impacts of the physical disturbance and sediment suspension.	New or expanded submarine cables and pipelines may occur in the geographic analysis area infrequently over the next 30 years. These disturbances would be temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise on coastal habitats are discountable compared to the impacts of the physical disturbance and sediment suspension.
Presence of structures: Habitat conversion	Various structures, including pilings, piers, towers, riprap, buoys, and various means of hard protection, are periodically added to the seascape, creating uncommon relief in a mostly flat seascape and converting previously existing habitat (whether hard-bottom or soft-bottom) to a type of hard habitat, although it differs from the typical hard-bottom habitat in the analysis area, namely, coarse substrates in a sand matrix. The new habitat may or may not function similarly to hard-bottom habitat typical in the region (Kerckhof et al. 2019; HDR 2019). Soft bottom is the dominant habitat type on the OCS, and structures do not meaningfully reduce the amount of soft-bottom habitat available (Guida et al. 2017; Greene et al. 2010). Structures can also create an artificial reef effect, attracting a different community of organisms.	Any new cable or pipeline installed in the geographic analysis area would likely require hard protection atop portions of the route (see cells to the left). Such protection is anticipated to increase incrementally over the next 30 years. Where cables would be buried deeply enough that protection would not be used, presence of the cable would have no impact on coastal habitats.
Presence of structures: Transmission cable infrastructure	Various means of hard protection atop existing cables can create uncommon hard-bottom habitat. Where cables are buried deeply enough that protection is not used, presence of the cable has no impact on coastal habitats.	See above.
Land disturbance: Erosion and sedimentation	Ongoing development of onshore properties, especially shoreline parcels, periodically causes short-term erosion and sedimentation of coastal habitats.	No future activities were identified within the geographic analysis area other than ongoing activities.
Land disturbance: Onshore construction	Ongoing development of onshore properties, especially shoreline parcels, periodically causes short-term to permanent degradation of onshore coastal habitats.	No future activities were identified within the geographic analysis area other than ongoing activities.

Associated IPFs: Sub-IPFs	**Ongoing Activities**	**Future Non-Offshore Wind Activities Intensity/Extent**
Land disturbance: Onshore, land use changes	Ongoing development of onshore properties, especially shoreline parcels, periodically causes the conversion of onshore coastal habitats to developed space.	No future activities were identified within the geographic analysis area other than ongoing activities.
Seabed profile alterations	Ongoing sediment dredging for navigation purposes results in localized, short-term impacts on coastal habitats through this IPF. Dredging typically occurs only in sandy or silty habitats, which are abundant in the analysis area and are quick to recover from disturbance. Therefore, such impacts, while locally intense, have little effect on the general character of coastal habitats.	No future activities were identified within the geographic analysis area other than ongoing activities.
Sediment deposition and burial	Ongoing sediment dredging for navigation purposes results in fine sediment deposition within coastal habitats. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local, limited to the emplacement corridor. No dredged material disposal sites were identified within the geographic analysis area.	No future activities were identified within the geographic analysis area other than ongoing activities.
Climate change: Ocean acidification	Ongoing CO_2 emissions causing ocean acidification may contribute to reduced growth or the decline of reefs and other habitats formed by shells.	No future activities were identified within the geographic analysis area other than ongoing activities.
Climate change: Warming and sea level rise, altered habitat/ecology	Climate change, influenced in part by ongoing greenhouse gas emissions, is expected to continue to contribute to a widespread loss of shoreline habitat from rising seas and erosion. In submerged habitats, warming is altering ecological relationships and the distributions of ecosystem engineer species, likely causing permanent changes of unknown intensity gradually over the next 3 years.	See above.

Notes: BOEM = Bureau of Ocean Energy Management; COP = Construction and Operations Plan; EIS = Environmental Impact Statement; EMF = electromagnetic field; G&G = Geological and Geophysical; IPF = impact-producing factors; OCS = Outer Continental Shelf; OECC = offshore export cable corridor; SSU = special, sensitive, and unique.

Table E3-3. Summary of Activities and the Associated Impact-Producing Factors for Benthic Resources

Associated IPFs: Sub-IFPs	**Ongoing Activities**	**Future Non-Offshore Wind Activities Intensity/Extent**
Accidental releases: Fuel/fluids/ hazmat	See Attachment 2/Table E2-2 for a discussion of ongoing accidental releases. Accidental releases of hazmat occur periodically, mostly consisting of fuels, lubricating oils, and other petroleum compounds. Because most of these materials tend to float in seawater, they rarely contact benthic resources. The chemicals with potential to sink or dissolve rapidly often dilute to non-toxic levels before they affect benthic resources. The corresponding impacts on benthic resources are rarely noticeable.	Gradually increasing vessel traffic over the next 30 years would increase the risk of accidental releases. See previous cell and Attachment 2/Table E2-2 on water quality for details.
Accidental releases: Invasive species	Invasive species are periodically released accidentally during ongoing activities, including the discharge of ballast water and bilge water from marine vessels. The impacts on benthic resources (e.g., competitive disadvantage, smothering) depend on many factors, but can be noticeable, widespread, and permanent.	No future activities were identified within the geographic analysis area other than ongoing activities.
Accidental releases: Trash and debris	Ongoing releases of trash and debris occurs from onshore sources, fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities and cables, lines and pipeline laying. However, there does not appear to be evidence that ongoing releases have detectable impacts on benthic resources.	No future activities were identified within the geographic analysis area other than ongoing activities.

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Anchoring	Regular vessel anchoring related to ongoing military, survey, commercial, and recreational activities continues to cause temporary to permanent impacts in the immediate area where anchors and chains meet the seafloor. These impacts include increased turbidity levels and the potential for direct contact to cause injury and mortality of benthic resources, as well as physical damage to their habitats. All impacts are localized; turbidity is temporary; injury and mortality are recovered in the short term; and physical damage can be permanent if it occurs in eelgrass beds or hard bottom.	No future activities were identified within the geographic analysis area other than ongoing activities.
EMFs	EMFs continuously emanate from existing telecommunication and electrical power transmission cables. New cables generating EMFs are infrequently installed in the geographic analysis area. Some benthic species can detect EMFs, although EMFs do not appear to present a barrier to movement. The extent of impacts (behavioral changes) is likely less than 50 feet (15.2 meters) from the cable and the intensity of impacts on benthic resources is likely undetectable.	No future activities were identified within the geographic analysis area other than ongoing activities.
New cable emplacement/ maintenance	Cable maintenance activities infrequently disturb benthic resources and cause temporary increases in suspended sediment; these disturbances would be local and limited to the emplacement corridor. New cables are infrequently added near shore. Cable emplacement/maintenance activities injure and kill benthic resources, and result in temporary to long-term habitat alterations. The intensity of impacts depends on the time (season) and place (habitat type) where the activities occur. (See also the IPFs of Seabed profile alterations and Sediment deposition and burial.)	No future activities were identified within the geographic analysis area other than ongoing activities.
Noise: Onshore/offshore construction	See Table E3-4 on finfish, invertebrates, and EFH. Detectable impacts of construction noise on benthic resources rarely, if ever, overlap from multiple sources.	See Table E3-4 on finfish, invertebrates, and EFH. Detectable impacts of construction noise on benthic resources would rarely, if ever, overlap from multiple sources.
Noise: G&G	See Table E3-4 on finfish, invertebrates, and EFH. Detectable impacts of G&G noise on benthic resources rarely, if ever, overlap from multiple sources.	See Table E3-4 on finfish, invertebrates, and EFH. Detectable impacts of G&G noise on benthic resources would rarely, if ever, overlap from multiple sources.
Noise: O&M	See Table E3-4 on finfish, invertebrates, and EFH.	See Table E3-4 on finfish, invertebrates, and EFH.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can cause injury and/or mortality to benthic resources in a small area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area. The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified within the geographic analysis area other than ongoing activities.
Noise: Cable laying/trenching	Infrequent trenching activities for pipeline and cable laying, as well as other cable burial methods, emit noise. These disturbances are local, temporary, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	New or expanded submarine cables and pipelines are likely to occur in the geographic analysis area. These disturbances would be infrequent over the next 30 years, local, temporary, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Port utilization: Expansion	See Table E3-4 on finfish, invertebrates, and EFH.	See Table E3-4 on finfish, invertebrates, and EFH.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear are periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb, injure, or kill benthic resources, creating small, short-term, localized impacts.	Future new cables would present additional risk of gear loss, resulting in small, short-term, localized impacts (disturbance, injury).
Presence of structures: Hydrodynamic disturbance	See Table E3-4 on finfish, invertebrates, and EFH.	See E3-4 on finfish, invertebrates, and EFH.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables continuously create uncommon relief in a mostly sandy seascape. Structure-oriented fishes are attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes can adversely affect populations and communities of benthic resources. These impacts are local and permanent.	New cables installed in the geographic analysis area over the next 30 years would likely require hard protection atop portions of the route (see the "new cable emplacement/maintenance" row in this table). Any new towers, buoy, or piers would also create uncommon relief in a mostly flat, sandy seascape. Structure-oriented fishes could be attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes could adversely affect populations and communities of benthic resources. These impacts are expected to be local and to be permanent as long as the structures remain.
Presence of structures: Habitat conversion	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables continuously provide uncommon hard-bottom habitat. A large portion is homogeneous sandy seascape but there is some other hard and/or complex habitat. Benthic species dependent on hard-bottom habitat can benefit on a constant basis, although the new habitat can also be colonized by invasive species (e.g., certain tunicate species). Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat to the new hard-structure habitat.	See above for quantification and timing. Any new towers, buoy, piers, or cable protection structures would create uncommon relief in a mostly sandy seascape. Benthic species dependent on hard-bottom habitat could benefit, although the new habitat could also be colonized by invasive species (e.g., certain tunicate species). Soft bottom is the dominant habitat type in the region, and species that rely on this habitat would not likely experience population-level impacts (Guida et al. 2017; Greene et al. 2010).
Presence of structures: Transmission cable infrastructure	The presence of transmission cable infrastructure, especially hard protection atop cables, causes impacts through entanglement/gear loss/damage, fish aggregation, and habitat conversion. Therefore, see those sub-IPFs within Presence of structures.	See other sub-IPFs within Presence of structures.

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Discharges	The gradually increasing amount of vessel traffic is increasing the cumulative permitted discharges from vessels. Many discharges are required to comply with permitting standards established to ensure potential impacts on the environment are minimized or mitigated. However, there does not appear to be evidence that the volumes and extents have any impact on benthic resources.	There is the potential for new ocean dumping/dredge disposal sites in the Northeast. Impacts (disturbance, reduction in fitness) of infrequent ocean disposal to benthic resources are short-term because spoils are typically recolonized naturally. In addition, the USEPA has established dredge spoil criteria and it regulates the disposal permits issued by the USACE; these discharges are required to comply with permitting standards established to ensure potential impacts on the environment are minimized or mitigated.
Regulated fishing effort	Ongoing commercial and recreational regulations for finfish and shellfish implemented and enforced by states, towns, and/or NOAA, depending on jurisdiction, affect benthic resources by modifying the nature, distribution and intensity of fishing-related impacts, including those that disturb the seafloor (trawling, dredge fishing).	No future activities were identified within the geographic analysis area other than ongoing activities.
Seabed profile alterations	Ongoing sediment dredging for navigation purposes results in localized short-term impacts (habitat alteration, injury, and mortality) on benthic resources through this IPF. Dredging typically occurs only in sandy or silty habitats, which are abundant in the geographic analysis area and are quick to recover from disturbance. Therefore, such impacts, while locally intense, have little impact on benthic resources in the geographic analysis area.	No future activities were identified within the geographic analysis area other than ongoing activities.
Sediment deposition and burial	Ongoing sediment dredging for navigation purposes results in fine sediment deposition. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local, limited to the emplacement corridor. Sediment deposition could have adverse impacts on some benthic resources, especially eggs and larvae, including smothering and loss of fitness. Impacts may vary based on season/time of year. Where dredged materials are disposed, benthic resources are smothered. However, such areas are typically recolonized naturally in the short term. Most sediment dredging projects have time-of-year restrictions to minimize impacts on benthic resources. Most benthic resources in the geographic analysis area are adapted to the turbidity and periodic sediment deposition that occur naturally in the geographic analysis area.	The USACE and/or private ports may undertake dredging projects periodically. Where dredged materials are disposed, benthic resources are buried. However, such areas are typically recolonized naturally in the short term. Most benthic resources in the geographic analysis area are adapted to the turbidity and periodic sediment deposition that occur naturally in the geographic analysis area.
Climate change: Ocean acidification	Ongoing CO_2 emissions causing ocean acidification may contribute to reduced growth or the decline of benthic invertebrates that have calcareous shells, as well as reefs and other habitats formed by shells.	No future activities were identified within the geographic analysis area other than ongoing activities.
Climate change: Warming and sea level rise, altered habitat/ecology	Climate change, influenced in part by ongoing greenhouse gas emissions, is expected to continue to contribute to a gradual warming of ocean waters, influencing the distributions of benthic species and altering ecological relationships, likely causing permanent changes of unknown intensity gradually over the next 30 years.	See above.

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Climate change: Warming and sea level rise, altered migration patterns	See above.	See above.
Climate change: Warming and sea level rise, disease frequency	Climate change, influenced in part by ongoing greenhouse gas emissions, is expected to continue to contribute to a gradual warming of ocean waters, influencing the frequencies of various diseases of benthic species, and likely causing permanent changes of unknown intensity over the next 30 years.	See above.

Notes: BMP = best management practice; BOEM = Bureau of Ocean Energy Management; CO_2 = carbon dioxide; COP = Construction and Operations Plan; EFH = Essential Fish Habitat; EIS = Environmental Impact Statement; EMF = electromagnetic field; ESP = electrical service platform; G&G = Geological and Geophysical; hazmat = hazardous materials; IPF = impact-producing factors; met = meteorological; NA = not applicable; NOAA = National Oceanic and Atmospheric Administration; OCS = Outer Continental Shelf; OECC = Offshore Export Cable Corridor(s); USACE = U.S. Army Corps of Engineers; USEPA = U.S. Environmental Protection Agency; WTG = wind turbine generator.

Table E3-4. Summary of Activities and the Associated Impact-Producing Factors for Finfish, Invertebrates, and Essential Fish Habitat

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/ hazmat	See Attachment 2/Table E2-2 for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Impacts, including mortality, decreased fitness, and contamination of habitat, are localized and temporary, and rarely affect populations.	See Attachment 2/Table E2-2 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 30 years would increase the risk of accidental releases. Impacts are unlikely to affect populations.
Accidental releases: Invasive species	Invasive species are periodically released accidentally during ongoing activities, including the discharge of ballast water and bilge water from marine vessels. The impacts on finfish, invertebrates, and EFH depend on many factors, but can be widespread and permanent.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Anchoring	Vessel anchoring related to ongoing military use, and survey, commercial, and recreational activities continues to cause temporary to permanent impacts in the immediate area where anchors and chains meet the seafloor. Impacts on finfish, invertebrates, and EFH are greatest for sensitive EFH (e.g., eelgrass, hard bottom) and sessile or slow-moving species (e.g., corals, sponges, and sedentary shellfish).	Impacts from anchoring may occur on a semi-regular basis over the next 30 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. These impacts would include increased turbidity levels and potential for direct contact causing mortality of benthic species and, possibly, degradation of sensitive habitats. All impacts would be localized; turbidity would be temporary; impacts from direct contact would be recovered in the short term. Degradation of sensitive habitats such as certain types of hard bottom (e.g., boulder piles), if it occurs, could be long-term.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
EMF	EMF emanates continuously from installed telecommunication and electrical power transmission cables. Biologically significant impacts on finfish, invertebrates, and EFH have not been documented for AC cables (CSA Ocean Sciences, Inc. and Exponent 2019 and see Thomsen et al. 2015), but behavioral impacts have been documented for benthic species (skates and lobster) near operating DC cables (Hutchison et al. 2018). The impacts are localized and affect the animals only while they are within the EMF. There is no evidence to indicate that EMF from undersea AC power cables negatively affects commercially and recreationally important fish species within the southern New England area (CSA Ocean Sciences, Inc. and Exponent 2019).	During operation, future new cables would produce EMF. (See cell to the left.) Submarine power cables in the geographic analysis area for this resource are assumed to be installed with appropriate shielding and burial depth to reduce potential EMF to low levels. EMF of any two sources would not overlap (even for multiple cables within a single OECC). Although the EMF would exist as long as a cable was in operation, impacts, on finfish, invertebrates, and EFH would likely be difficult to detect.
Light: Vessels	Marine vessels have an array of lights including navigational lights and deck lights. There is little downward-focused lighting, and therefore only a small fraction of the emitted light enters the water. Light can attract finfish and invertebrates, potentially affecting distributions in a highly localized area. Light may also disrupt natural cycles, e.g., spawning, possibly leading to short-term impacts.	See cell to the left.
Light: Structures	Offshore buoys and towers emit light, and onshore structures, including buildings and ports, emit a great deal more on an ongoing basis. Light can attract finfish and invertebrates, potentially affecting distributions in a highly localized area. Light may also disrupt natural cycles, e.g., spawning, possibly leading to short-term impacts. Light from structures is widespread and permanent near the coast, but minimal offshore.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.
New cable emplacement/ maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances are local, limited to the cable corridor. New cables are infrequently added near shore. Cable emplacement/ maintenance activities disturb, displace, and injure finfish and invertebrates and result in temporary to long-term habitat alterations. The intensity of impacts depends on the time (season) and place (habitat type) where the activities occur. (See also the IPF of Sediment deposition and burial.)	Future new cables would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in local short-term impacts. The FCC has two pending submarine telecommunication cable applications in the North Atlantic. If the cable routes enter the geographic analysis area for this resource, short-term disturbance would be expected. The intensity of impacts would depend on the time (season) and place (habitat type) where the activities would occur.
Noise: Aircraft	Noise from aircraft reaches the sea surface on a regular basis. However, there is not likely to be any impact of aircraft noise on finfish, invertebrates, and EFH, as very little of the aircraft noise propagates through the water.	Aircraft noise is likely to continue to increase as commercial air traffic increases. However, there is not likely to be any impact of aircraft noise on finfish, invertebrates, and EFH.
Noise: Onshore/offshore construction	Noise from construction occurs frequently in near shores of populated areas in New England and the mid-Atlantic but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. See also sub-IPF for Noise: Pile driving.	Noise from construction near shores is expected to gradually increase in line with human population growth along the coast of the geographic analysis area for this resource.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Noise: G&G	Ongoing site characterization surveys and scientific surveys produce noise around sites of investigation. These activities can disturb finfish and invertebrates in the immediate vicinity of the investigation and can cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions.	Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 30 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise to penetrate deep into the seabed, potentially resulting in injury or mortality to finfish and invertebrates in a small area around each sound source and short-term stress and behavioral changes to individuals over a greater area. Site characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves more similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize, but are likely local and temporary.
Noise: O&M	Some finfish and invertebrates may be able to hear the continuous underwater noise of operational WTGs. As measured at the Block Island Wind Farm, this low frequency noise barley exceeds ambient levels at 164 feet (50 meters) from the WTG base. Based on the results of Thomsen et al. (2015), sound pressure levels would be expected to be at or below ambient levels at relatively short distances (approximately 164 feet [50 meters]) from WTG foundations. These low levels of elevated noise likely have little to no impact. Noise is also created by operations and maintenance of marine minerals extraction and commercial fisheries, each of which has small local impacts.	New or expanded marine minerals extraction and commercial fisheries may intermittently increase noise during their operations and maintenance over the next 30 years. Impacts would likely be small and local.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can cause injury and/or mortality to finfish and invertebrates in a small area around each pile, and can cause short-term stress and behavioral changes to individuals over a greater area. Eggs, embryos, and larvae of finfish and invertebrates could also experience developmental abnormalities or mortality resulting from this noise, although thresholds of exposure are not known (Weilgart 2018, Hawkins and Popper 2017). Potentially injurious noise could also be considered as rendering EFH temporarily unavailable or unsuitable for the duration of the noise. The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Noise: Cable laying/ trenching	Infrequent trenching activities for pipeline and cable laying, as well as other cable burial methods, emit noise. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	New or expanded submarine cables and pipelines are likely to occur in the geographic analysis area for this resource. These disturbances would be infrequent over the next 30 years, temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.
Noise: Vessels	While ongoing vessel noise may have some effect on behavior, it is likely limited to brief startle and temporary stress responses. Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels.	See cell to the left.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 30 years.	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. Certain types of vessel traffic have increased recently (e.g. ferry use and cruise industry) and may continue to increase in the foreseeable future. In addition, the general trend along the coast from Virginia to Maine is that port activity will increase modestly. The ability of ports to receive the increase may require port modifications, leading to local impacts. Future channel deepening activities will likely be undertaken. Existing ports have already affected finfish, invertebrates, and EFH, and future port projects would implement BMPs to minimize impacts. Although the degree of impacts on EFH would likely be undetectable outside the immediate vicinity of the ports, adverse impacts on EFH for certain species and/or life stages may lead to impacts on finfish and invertebrates beyond the vicinity of the port.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb habitats and potentially harm individuals, creating small, localized, short-term impacts.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Presence of structures: Hydrodynamic disturbance	Manmade structures, especially tall vertical structures such as foundations for towers of various purposes, continuously alter local water flow at a fine scale. Water flow typically returns to background levels within a relatively short distance from the structure. Therefore, impacts on finfish, invertebrates, and EFH are typically undetectable. Indirect impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood. New structures are periodically added.	Tall vertical structures can increase seabed scour and sediment suspension. Impacts would likely be highly localized and difficult to detect. Indirect impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly sandy seascape. Structure-oriented fishes are attracted to these locations. These impacts are local and often permanent. Fish aggregation may be considered adverse, beneficial, or neutral.	New cables, installed incrementally in the geographic analysis area for this resource over the next 20 to 30 years, would likely require hard protection atop portions of the route (see the New cable emplacement/ maintenance IPF). Any new towers, buoys, or piers would also create uncommon relief in a mostly sandy seascape. Structure-oriented fishes could be attracted to these locations. Abundance of certain fishes may increase. These impacts are local and may be permanent.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Habitat conversion	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly sandy seascape. A large portion is homogeneous sandy seascape but there is some other hard and/or complex habitat. Structure-oriented species thus benefit on a constant basis; however, the diversity may decline over time as early colonizers are replaced by successional communities dominated by blue mussels and anemones (Degraer et al. 2019 [Chapter 7]). Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat to the new hard-structure habitat.	New cable, installed incrementally in the analysis area over the next 20 to 30 years, would likely require hard protection atop portions of the route (see New cable emplacement/ maintenance). Any new towers, buoys, or piers would also create uncommon relief in a mostly sandy seascape. Structure-oriented species would benefit (Claisse et al. 2014, Smith et al. 2016); however, the diversity may decline over time as early colonizers are replaced by successional communities dominated by blue mussels and anemones (Degraer et al. 2019 [Chapter 7]). Soft bottom is the dominant habitat type from Cape Hatteras to the Gulf of Maine (over 60 million acres), and species that rely on this habitat would not likely experience population-level impacts (Guida et al. 2017; Greene et al. 2010).
Presence of structures: Migration disturbances	Human structures in the marine environment, e.g., shipwrecks, artificial reefs, and oil platforms, can attract finfish and invertebrates that approach the structures during their migrations. This could slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement than structure is (Moser and Shepherd 2009; Fabrizio et al. 2014; Secor et al. 2018). There is no evidence to suggest that structures pose a barrier to migratory animals.	The infrequent installation of future new structures in the marine environment over the next 30 years may attract finfish and invertebrates that approach the structures during their migrations. This could tend to slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement (Moser and Shepherd 2009; Fabrizio et al. 2014; Secor et al. 2018). Migratory animals would likely be able to proceed from structures unimpeded.
Presence of structures: Transmission cable infrastructure	See other sub-IPFs within the Presence of structures IPF. See Table E3-2 on Coastal Habitats.	See other sub-IPFs within the Presence of structures IPF. See Table E3-2 on Coastal Habitats.
Regulated fishing effort	Regulated fishing effort results in the removal of a substantial amount of the annually produced biomass of commercially regulated finfish and invertebrates and can also influence bycatch of non-regulated species. Ongoing commercial and recreational regulations for finfish and shellfish implemented and enforced by states, municipalities, and/or NOAA, depending on jurisdiction, affect finfish, invertebrates, and EFH by modifying the nature, distribution and intensity of fishing-related impacts, including those that disturb the seafloor (trawling, dredge fishing).	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Seabed profile alterations	Ongoing sediment dredging for navigation purposes results in localized short-term impacts (habitat alteration, change in complexity) on finfish, invertebrates, and EFH through this IPF. Dredging is most likely in sand wave areas where typical jet plowing is insufficient to meet target cable burial depth. Sand waves that are dredged would likely be redeposited in like-sediment areas. Any particular sand wave may not recover to the same height and width as pre-disturbance; however, the habitat function would largely recover post-disturbance. Therefore, seabed profile alterations, while locally intense, have little impact on finfish, invertebrates, and EFH on a regional (Cape Hatteras to Gulf of Maine) scale.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Sediment deposition and burial	Ongoing sediment dredging for navigation purposes results in fine sediment deposition. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local, limited to the emplacement corridor. Sediment deposition could have negative impacts on eggs and larvae, particularly demersal eggs such as longfin squid, which are known to have high rates of egg mortality if egg masses are exposed to abrasion or burial. Impacts may vary based on season/time of year.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Climate change: Ocean acidification	Continuous carbon dioxide emissions causing ocean acidification may contribute to reduced growth or the decline of invertebrates that have calcareous shells over the course of the next 30 years.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Climate change: Warming and sea level rise, altered habitat/ ecology	Climate change, influenced in part by greenhouse gas emissions, is expected to continue to contribute to a gradual warming of ocean waters over the next 30 years, influencing the distributions of finfish, invertebrates, and EFH. This sub-IPF has been shown to affect the distribution of fish in the northeast United States, with several species shifting their centers of biomass either northward or to deeper waters (Hare et al. 2016).	See above.
Climate change: Warming and sea level rise, altered migration patterns	See above.	See above.
Climate change: Warming and sea level rise, disease frequency	Climate change, influenced in part by greenhouse gas emissions, is expected to continue to contribute to a gradual warming of ocean waters over the next 30 years, influencing the frequencies of various diseases of finfish and invertebrates.	See above.

Notes: °C = degrees Celsius; AC = alternating current; BMP = best management practice; BOEM = Bureau of Ocean Energy Management; COP = Construction and Operations Plan; DC = direct current; EFH = essential fish habitat; EMF = electromagnetic field; EIS = Environmental Impact Statement; ESP = electrical service platform; FCC = Federal Communications Commission; G&G = Geological and Geophysical; GW = gigawatts; IPF = impact-producing factors; met = meteorological; NA = not applicable; NOAA = National Oceanic and Atmospheric Administration; O&M = operations and maintenance; OCS = Outer Continental Shelf; OECC = Offshore Export Cable Corridor(s); USACE = United States Army Corps of Engineers; WDA = Wind Development Area; WTG = wind turbine generator.

Table E3-5. Summary of Activities and the Associated Impact-Producing Factors for Marine Mammals

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See Attachment 2/Table E2-2 for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Marine mammal exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality or sublethal effects on the individual fitness, including adrenal effects, hematological effects, liver effects lung disease, poor body condition, skin lesions, and several other health affects attributed to oil exposure (Kellar et al. 2017; Mazet et al. 2001; Mohr et al. 2008, Smith et al. 2017; Sullivan et al. 2019; Takeshida et al. 2017). Additionally, accidental releases may result in impacts on marine mammals due to effects to prey species (Table E3-4).	See Attachment 2/Table E2-2 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 30 years would increase the risk of accidental releases. Marine mammal exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality or sublethal effects on the individual fitness, including adrenal effects, hematological effects, liver effects lung disease, poor body condition, skin lesions, and several other health affects attributed to oil exposure (Kellar et al. 2017; Mazet et al. 2001; Mohr et al. 2008, Smith et al. 2017; Sullivan et al. 2019; Takeshida et al. 2017). Additionally, accidental releases may result in impacts on marine mammals due to effects to prey species (Table E3-4).
Accidental releases: Trash and debris	Trash and debris may be accidentally discharged through fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities and cables, lines and pipeline laying, and debris carried in river outflows or windblown from onshore. Accidental releases of trash and debris are expected to be low quantity, local, and low-impact events. Worldwide 62 of 123 (50.4%) marine mammal species have been documented ingesting marine litter (Werner et al. 2016). Stranding data indicate potential debris induced mortality rates of 0 to 22%. Mortality has been documented in cases of debris interactions, as well as blockage of the digestive track, disease, injury, and malnutrition (Baulch and Perry 2014). However, it is difficult to link physiological effects to individuals to population level impacts (Browne et al. 2015).	As population and vessel traffic increase gradually over the next 30 years, accidental release of trash and debris may increase. Trash and debris may continue to be accidentally released through fisheries use and other offshore and onshore activities. There may also be a long-term risk from exposure to plastics and other debris in the ocean. Worldwide 62 of 123 (50.4%) of marine mammal species have been documented ingesting marine litter (Werner et al. 2016). Mortality has been documented in cases of debris interacts, as well as blockage of the digestive track, disease, injury, and malnutrition (Baulch and Perry 2014).
EMF	EMFs emanate constantly from installed telecommunication and electrical power transmission cables. Marine mammals appear to have a detection threshold for magnetic intensity gradients (i.e., changes in magnetic field levels with distance) of 0.1% of the earth's magnetic field or about 0.05 μT (Kirschvink 1990) and are thus likely to be very sensitive to **minor** changes in magnetic fields (Walker et al. 2003). There is a potential for animals to react to local variations of the geomagnetic field caused by power cable EMFs. Depending on the magnitude and persistence of the confounding magnetic field, such an effect could cause a trivial temporary change in swim direction or a longer detour during the animal's migration (Gill et al. 2005). Such an effect on marine mammals is more likely to occur with direct current cables than with AC cables (Normandeau et al. 2011). However, there are numerous transmission cables installed across the seafloor and no impacts on marine mammals have been demonstrated from this source of EMF.	During operation, future new cables would produce EMF. Submarine power cables in the marine mammal geographic analysis area are assumed to be installed with appropriate shielding and burial depth to reduce potential EMF to low levels. EMF of any two sources would not overlap. Although the EMF would exist as long as a cable was in operation, impacts, if any, would likely be difficult to detect, if they occur at all. Marine mammals have the potential to react to submarine cable EMF, however, no effects from the numerous submarine cables have been observed. Further, this IPF would be limited to extremely small portions of the areas used by migrating marine mammals. As such, exposure to this IPF would be low, and as a result impacts on marine mammals would not be expected.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
New cable emplacement/ maintenance	Cable maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances will be local and generally limited to the emplacement corridor. Data are not available regarding marine mammal avoidance of localized turbidity plumes; however, Todd et al. (2015) suggest that since some marine mammals often live in turbid waters and some species of mysticetes and sirenians employ feeding methods that create sediment plumes, some species of marine mammals have a tolerance for increased turbidity. Similarly, McConnell et al. (1999) documented movements and foraging of grey seals in the North Sea. One tracked individual was blind in both eyes, but otherwise healthy. Despite being blind, observed movements were typical of the other study individuals, indicating that visual cues are not essential for grey seal foraging and movement (McConnell et al. 1999). If elevated turbidity caused any behavioral responses such as avoiding the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any impacts would be temporary and short-term. Turbidity associated with increased sedimentation may result in temporary, short-term impacts on marine mammal prey species (Table E3-4).	The FCC has two pending submarine telecommunication cable application in the North Atlantic. The impact on water quality from accidental sediment suspension during cable emplacement is temporary and short-term. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any negative impacts would be temporary and short-term. Turbidity associated with increased sedimentation may result in temporary, short-term impacts on some marine mammal prey species (Table E3-4).
Noise: Aircraft	Aircraft routinely travel in the marine mammal geographic analysis area. With the possible exception of rescue operations, no ongoing aircraft flights would occur at altitudes that would elicit a response from marine mammals. If flights are at a sufficiently low altitude, marine mammals may respond with behavioral changes, including short surface durations, abrupt dives, and percussive behaviors (i.e. breaching and tail slapping) (Patenaude et al. 2002). These brief responses would be expected to dissipate once the aircraft has left the area. Similarly, aircraft have the potential to disturb hauled out seals if aircraft overflights occur within 2,000 feet (610 meters) of a haul out area (Efroymson et al. 2000). However, this disturbance would be temporary, short-term, and result in minimal energy expenditure. These brief responses would be expected to dissipate once the aircraft has left the area.	Future low altitude aircraft activities such as survey activities and navy training operations could result short-term responses of marine mammals to aircraft noise. If flights are at a sufficiently low altitude, marine mammals may respond with a behavior changes, including short surface durations, abrupt dives, and percussive behaviors (i.e. breaching and tail slapping) (Patenaude et al. 2002). These brief responses would be expected to dissipate once the aircraft has left the area.
Noise: G&G	Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities have the potential to result in high intensity, high consequence impacts, including auditory injuries, stress, disturbance, and behavioral responses, if present within the ensonified area (NOAA 2018). Survey protocols and underwater noise mitigation procedures are typically implemented to decrease the potential for any marine mammal to be within the area where sound levels are above relevant harassment thresholds associated with an operating sound source to reduce the potential for behavioral responses and injury (PTS/TTS) close to the sound source. The magnitude of effects, if any, is intrinsically related to many factors, including: acoustic signal characteristics, behavioral state (e.g., migrating), biological condition, distance from the source, duration and level of the sound exposure, as well as environmental and physical conditions that affect acoustic propagation (NOAA 2018).	Same as ongoing activities, with the addition of possible future oil and gas exploration surveys.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Noise: Turbines	Marine mammals would be able to hear the continuous underwater noise of operational WTGs. As measured at the Block Island Wind Facility, this low frequency noise barely exceeds ambient levels at 164 feet (50 meters) from the WTG base. Based on the results of Thomsen et al. (2015) and Kraus et al. (2016), sound pressure levels would be expected to be at or below ambient levels at relatively short distances from the WTG foundations.	This sub-IPF does not apply to future non-offshore wind development.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can result in high-intensity, low-exposure level, long-term, but localized intermittent risk to marine mammals. Impacts would be localized in nearshore waters. Pile driving activities may negatively affect marine mammals during foraging, orientation, migration, predator detection, social interactions, or other activities (Southall et al. 2007). Noise exposure associated with pile-driving activities can interfere with these functions, and have the potential to cause a range of responses, including insignificant behavioral changes, avoidance of the ensonified area, PTS, harassment, and ear injury, depending on the intensity and duration of the exposure. BOEM assumes that all ongoing and potential future activities will be conducted in accordance with a project-specific IHA to minimize impacts on marine mammals.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.
Noise: Cable laying/trenching	N/A	Cable laying impacts resulting from future non-offshore wind activities would be identical to those described for future offshore wind projects.
Noise: Vessels	Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, scientific and academic research vessels, as well as other construction vessels. The frequency range for vessel noise falls within marine mammals' known range of hearing and would be audible. Noise from vessels presents a long-term and widespread impact on marine mammals across in most oceanic regions. While vessel noise may have some effect on marine mammal behavior, it would be expected to be limited to brief startle and temporary stress response. Results from studies on acoustic impacts from vessel noise on odontocetes indicate that small vessels at a speed of 5 knots in shallow coastal water can reduce the communication range for bottlenose dolphins within 164 feet (50 meters) of the vessel by 26% (Jensen et al. 2009). Pilot whales in a quieter, deep-water habitat could experience a 50% reduction in communication range from a similar size boat and speed (Jensen et al. 2009). Since lower frequencies propagate farther away from the sound source compared to higher frequencies, low frequency cetaceans are at a greater risk of experiencing Level B Harassment produced by vessel traffic.	Any offshore projects that require the use of ocean vessels could result in long term but infrequent impacts on marine mammals, including temporary startle responses, masking of biologically relevant sounds, physiological stress, and behavioral changes. However, BOEM expects that these brief responses of individuals to passing vessels would be unlikely given the patchy distribution of marine mammals and no stock or population level effects would be expected.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. Port expansion activities are localized to nearshore habitats, and are expected to result in temporary, short-term impacts, if any, on marine mammals. Vessel noise may affect marine mammals, but response would be expect to be temporary and short-term (see Vessels: Noise sub-IPF above). The impacts on water quality from sediment suspension during port expansion activities is temporary, short-term, and would be similar to those described under the New cable emplacement/maintenance IPF above.	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from Virginia to Maine is that port activity will increase modestly. The ability of ports to receive the increase in larger ships will require port modifications. Future channel deepening activities are being undertaken to accommodate deeper draft vessels for the Panama Canal Locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long-term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g. ferry use and cruise industry) and may continue to increase in the foreseeable future. Additional impacts associated with the increased risk of vessel strike could also occur (see the Traffic: Vessel collisions sub-IPF below).
Presence of structures: Entanglement or ingestion of lost fishing gear	There are more than 130 artificial reefs in the Mid-Atlantic region. This sub-IPF may result in long-term, high intensity impacts, but with low exposure due to localized and geographic spacing of artificial reefs, long-term. Currently bridge foundations and the Block Island Wind Facility may be considered artificial reefs and may have higher levels of recreational fishing, which increases the chances of marine mammals encountering lost fishing gear, resulting in possible ingestions, entanglement, injury, or death of individuals (Moore and van der Hoop 2012), if present nearshore where these structures are located. There are very few, if any, areas within the OCS geographic analysis area for marine mammals that would serve to concentrate recreational fishing and increase the likelihood that marine mammals would encounter lost fishing gear.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.
Presence of structures: Habitat conversion and prey aggregation	There are more than 130 artificial reefs in the Mid-Atlantic region. Hard-bottom (scour control and rock mattresses) and vertical structures (bridge foundations and Block Inland Wind Facility WTGs) in a soft-bottom habitat can create artificial reefs, thus inducing the ‘reef’ effect (Taormina et al. 2018; NMFS 2015). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans (Taormina et al. 2018), providing a potential increase in available forage items and shelter for seals and small odontocetes compared to the surrounding soft-bottoms.	The presence of structures associated with non-offshore wind development in near shore coastal waters have the potential to provide habitat for seals and small odontocetes as well as preferred prey species. This "reef effect" has the potential to result in long term, low-intensity benefits. Bridge foundations will continue to provide foraging opportunities for seals and small odontocetes with measurable benefits to some individuals. Hard-bottom (scour control and rock mattresses used to bury the offshore export cables) and vertical structures (i.e., WTG and ESP foundations) in a soft-bottom habitat can create artificial reefs, thus inducing the “reef effect” (Taormina et al. 2018; Causon and Gill 2018). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans (Taormina et al. 2018), providing a potential increase in available forage items and shelter for marine mammals compared to the surrounding soft-bottoms.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Avoidance/ displacement	No ongoing activities in the marine mammal geographic analysis area beyond offshore wind facilities are measurably contributing to this sub-IPF. There may be some impacts resulting from the existing Block Island Wind Facility, but given that there are only 5 WTGs, no measurable impacts are occurring.	Not contemplated for non-offshore wind facility sources.
Presence of structures: Behavioral disruption - breeding and migration	No ongoing activities in the marine mammal geographic analysis area beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non-offshore wind facility sources.
Presence of structures: Displacement into higher risk areas (Vessels and Fishing)	No ongoing activities in the marine mammal geographic analysis area beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non-offshore wind facility sources.
Traffic: Vessel collisions	Current activities that are contributing to this sub-IPF include port traffic levels, fairways, traffic separation schemes, commercial vessel traffic, recreational and fishing activity, and scientific and academic vessel traffic. Vessel strike is relatively common with cetaceans (Kraus et al. 2005) and one of the primary causes of death to NARWs with as many as 75% of known anthropogenic mortalities of NARWs likely resulting from collisions with large ships along the US and Canadian eastern seaboard (Kite-Powell et al. 2007). Marine mammals are more vulnerable to vessel strike when they are within the draft of the vessel and when they are beneath the surface and not detectable by visual observers. Some conditions that make marine mammals less detectable include weather conditions with poor visibility (e.g., fog, rain, and wave height) or nighttime operations. Vessels operating at speeds exceeding 10 knots have been associated with the highest risk for vessel strikes of NARWs (Vanderlaan and Taggart 2007). Reported vessel collisions with whales show that serious injury rarely occurs at speeds below 10 knots (Laist et al. 2001). Data show that the probability of a vessel strike increases with the velocity of a vessel (Pace and Silber 2005; Vanderlaan and Taggart 2007).	Vessel traffic associated with non-offshore wind development has the potential to result in an increased collision risk. While these impacts would be high consequence, the patchy distribution of marine mammals makes stock or population-level effects unlikely (Navy 2018).
Climate change: Warming and sea level rise, storm severity/ frequency	Increased storm frequency could result in increased energetic costs for marine mammals and reduced fitness, particularly for juveniles, calves and pups.	No future activities were identified within the geographic analysis area for marine mammals other than ongoing activities.
Climate change: Ocean acidification	This sub-IPF has the potential to lead to long-term, high-consequence impacts on marine ecosystems by contributing to reduced growth or the decline of invertebrates that have calcareous shells.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.
Climate change: Warming and sea level rise, altered habitat/ecology	This sub-IPF has the potential to lead to long-term, high-consequence impacts on marine mammals as a result of changes in distribution, reduced breeding, and/or foraging habitat availability, and disruptions in migration.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Climate change: Warming and sea level rise, altered migration patterns	This sub-IPF has the potential to lead to long-term, high-consequence impacts on marine mammal habitat use and migratory patterns. For example, the NARW appears to be migrating differently and feeding in different areas in response to changes in prey densities related to climate change (Record et al. 2019; MacLeod 2009; Nunny and Simmonds 2019.)	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.
Climate change: Warming and sea level rise, increased disease frequency	Climate change, influenced in part by greenhouse gas emissions, is expected to continue to contribute to a gradual warming of ocean waters, influencing the frequencies of various diseases of marine mammals, such as Phocine distemper. Climate change is clearly influencing infectious disease dynamics in the marine environment; however, no studies have shown a definitive causal relationship between any components of climate change and increases in infectious disease among marine mammals. This is due in large part to a lack of sufficient data and to the likely indirect nature of climate change's impact on these diseases. Climate change could affect the incidence or prevalence of infection, the frequency or magnitude of epizootics, and/or the severity or presence of clinical disease in infected individuals. There are a number of potential proposed mechanisms by which this might occur (see summary in Burge et al. 2014 Climate Change Influences on Marine Infectious Diseases: Implications for Management and Society).	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.
Climate change: Warming and sea level rise, storm severity/frequency, sediment erosion, deposition	Increased storm frequency could result in increased energetic costs for marine mammals, reduced fitness, particularly for juveniles, calves and pups. Erosion could impact seal haul outs reducing their habitat availability, especially as things like sea walls are added, blocking seals access to shore.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.

Notes: μPa = micropascal; μT = microtesla; AC = alternating current; BA = Biological Assessment; BOEM = Bureau of Ocean Energy Management; BMP = best management practice; BSW = Bay State Wind; CFR = Code of Federal Regulations; COP = Construction and Operations Plan; dB = decibel; dB RMS = decibel root mean square; DP = dynamic positioning; EIS = Environmental Impact Statement; EMF = electromagnetic field; FCC = Federal Communications Commission; G&G = Geological and Geophysical; hazmat = hazardous material; HRG = High Resolution Geophysical; Hz = hertz; IHA = Incidental Harassment Authorization; IPF = impact-producing factors; met = meteorological; MW = megawatt; NARW = North Atlantic right whale; OCS = Outer Continental Shelf; OECC = Offshore Export Cable Corridor; PAM = passive acoustic monitoring; PSO = protected species observer; PTS = permanent threshold shift; SOV = service operations vessel; TTS = temporary threshold shift; USCG = U.S. Coast Guard; WDA = Wind Development Area; WTG = wind turbine generator.

Table E3-6. Summary of Activities and the Associated Impact-Producing Factors for Sea Turtles

Associated IPF: Sub-IPFs	**Ongoing Activities**	**Future Non-Offshore Wind Activities Intensity/Extent**
Accidental releases: Fuel/fluids/hazmat	See Attachment 2/Table E2-2 for a quantitative analysis of these risks. Ongoing releases are frequent and chronic. Sea turtle exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality (Shigenaka et al. 2010) or sublethal effects on individual fitness, including adrenal effects, dehydration, hematological effects, increased disease incidence, liver effects, poor body condition, skin effects, skeletomuscular effects, and several other health effects that can be attributed to oil exposure (Camacho et al. 2013; Bembenek-Bailey et al. 2019; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Additionally, accidental releases may result in impacts on sea turtles due to effects on prey species (Table E3-4).	See Attachment 2/Table E2-2 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 30 years would increase the risk of accidental releases. Sea turtle exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality (Shigenaka 2010; Wallace et al. 2010) or sublethal effects on individual fitness, including adrenal effects, dehydration, hematological effects, increased disease incidence, liver effects, poor body condition, skin effects, skeletomuscular effects, and several other health effects that can be attributed to oil exposure (Camacho et al. 2013; Bembenek-Bailey et al. 2019; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Additionally, accidental releases may result in impacts on sea turtles due to effects on prey species (Table E3-4).
Accidental releases: Trash and debris	Trash and debris may be accidentally discharged through fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities, cables, lines, and pipeline laying, as well as debris carried in river outflows or windblown from onshore. Accidental releases of trash and debris are expected to be low quantity, local, and low-impact events. Direct ingestion of plastic fragments is well documented and has been observed in all species of sea turtles (Bugoni et al. 2001; Hoarau et al. 2014; Nelms et al. 2016; Schuylar et al. 2014). In addition to plastic debris, ingestion of tar, paper, Styrofoam™, wood, reed, feathers, hooks, lines, and net fragments have also been documented (Thomás et al. 2002). Ingestion can also occur when individuals mistake debris for potential prey items (Gregory 2009; Hoarau et al. 2014; Thomás et al. 2002). Potential ingestion of marine debris varies among species and life history stages due to differing feeding strategies (Nelms et al. 2016). Ingestion of plastics and other marine debris can result in both lethal and sublethal impacts on sea turtles, with sublethal effects more difficult to detect (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). Long-term sublethal effects may include dietary dilution, chemical contamination, depressed immune system function, poor body condition, as well as reduced growth rates, fecundity, and reproductive success. However, these effects are cryptic and clear causal links are difficult to identify (Nelms et al. 2016).	Trash and debris may be accidentally discharged through fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities and cables, lines and pipeline laying, and debris carried in river outflows or windblown from onshore. Accidental releases of trash and debris are expected to be low quantity, local, and low-impact events. Direct and indirect ingestion of plastic fragments and other marine debris is well documented and has been observed in all species of sea turtles (Bugoni et al. 2001; Gregory 2009; Hoarau et al. 2014; Nelms et al. 2016; Schuylar et al. 2014; Thomás et al. 2002). Ingestion can result in both lethal and sublethal impacts on sea turtles, with sublethal effects more difficult to detect (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). However, these effects are cryptic and clear causal links are difficult to identify (Nelms et al. 2016).

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
EMF	EMFs emanate constantly from installed telecommunication and electrical power transmission cables. Sea turtles appear to have a detection threshold of magnetosensitivity and behavioral responses to field intensities ranging from 0.0047 to 4000 µT for loggerhead turtles, and 29.3 to 200 µT for green turtles, with other species likely similar due to anatomical, behavioral, and life history similarities (Normandeau et al. 2011). Juvenile or adult sea turtles foraging on benthic organisms may be able to detect magnetic fields while they are foraging on the bottom near the cables and up to potentially 82 feet (25 meters) in the water column above the cable. Juvenile and adult sea turtles may detect the EMF over relatively small areas near cables (e.g., when resting on the bottom or foraging on benthic organisms near cables or concrete mattresses). There are no data on impacts on sea turtles from EMFs generated by underwater cables, although anthropogenic magnetic fields can influence migratory deviations (Luschi et al. 2007; Snoek et al. 2016). However, any potential impacts from AC cables on turtle navigation or orientation would likely be undetectable under natural conditions, and thus would be insignificant (Normandeau et al. 2011).	During operations, future new cables would produce EMF. Submarine power cables in the geographic analysis area for sea turtles are assumed to be installed with appropriate shielding and burial depth to reduce potential EMF to low levels. (Section 5.2.7 of BOEM's 2007 Final Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf.) EMF of any two sources would not overlap. Although the EMF would exist as long as a cable was in operation, impacts, if any, would likely be difficult to detect, if they occur at all. Further, this IPF would be limited to extremely small portions of the areas used by resident or migrating sea turtles. As such, exposure to this IPF would be low, and as a result, impacts on sea turtles would not be expected.
Light: Vessels	Ocean vessels such as ongoing commercial vessel traffic, recreational and fishing activity, scientific and academic research traffic have an array of lights including navigational, deck lights, and interior lights. Such lights have some limited potential to attract sea turtles, although the impacts, if any, are expected to be localized and temporary.	Construction, operations, and decommissioning vessels associated with non-offshore wind activities produce temporary and localized light sources that could result in the attraction or avoidance behavior of sea turtles. These short-term impacts are expected to be of low intensity and occur infrequently.
Light: Structures	Artificial lighting on nesting beaches or in nearshore habitats has the potential to result in disorientation to nesting females and hatchling turtles. Artificial lighting on the OCS does not appear to have the same potential for effects. Decades of oil and gas platform operation in the Gulf of Mexico, that can have considerably more lighting than offshore WTGs, has not resulted in any known impacts on sea turtles (BOEM 2019).	Non-offshore wind activities would not be expected to appreciably contribute to this sub-IPF. As such, no impact on sea turtles would be expected.
New cable emplacement/ maintenance	Cable maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances will be local and generally limited to the emplacement corridor. Data are not available regarding effects of suspended sediments on adult and juvenile sea turtles, although elevated suspended sediments may cause individuals to alter normal movements and behaviors. However, these changes are expected to be too small to be detected (NOAA 2020). Sea turtles would be expected to swim away from the sediment plume. Elevated turbidity is most likely to affect sea turtles if a plume causes a barrier to normal behaviors, but no impacts would be expected due to swimming through the plume (NOAA 2020). Turbidity associated with increased sedimentation may result in short-term, temporary impacts on sea turtle prey species (Table E3-4).	The FCC has two pending submarine telecommunication cable application in the North Atlantic. The impact on water quality from accidental sediment suspension during cable emplacement is short-term and temporary. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any impacts would be short-term and temporary. Turbidity associated with increased sedimentation may result in short-term, temporary impacts on some sea turtle prey species (Table E3-4).

Associated IPF: Sub-IPFs	**Ongoing Activities**	**Future Non-Offshore Wind Activities Intensity/Extent**
Noise: Aircraft	Aircraft routinely travel in the geographic analysis area for sea turtles. With the possible exception of rescue operations, no ongoing aircraft flights would occur at altitudes that would elicit a response from sea turtles. If flights are at a sufficiently low altitude, sea turtles may respond with a startle response (diving or swimming away), altered submergence patterns, and a temporary stress response (National Science Foundation [NSF] and U.S. Geological Survey [USGS] 2011; Samuel et al. 2005). These brief responses would be expected to dissipate once the aircraft has left the area.	Future low altitude aircraft activities such as survey activities and navy training operations could result in short-term responses of sea turtles to aircraft noise. If flights are at a sufficiently low altitude, sea turtles may respond with a startle response (diving or swimming away), altered submergence patterns, and a temporary stress response (NSF and USGS 2011; Samuel et al. 2005). These brief responses would be expected to dissipate once the aircraft has left the area.
Noise: G&G	Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities have the potential to result in some impacts including potential auditory injuries, short-term disturbance, behavioral responses, and short-term displacement of feeding or migrating sea turtles, if present within the ensonified area (NSF and USGS 2011). The potential for PTS and TTS is considered possible in proximity to G&G surveys using air guns, but impacts are unlikely as turtles would be expected to avoid such exposure and survey vessels would pass quickly (NSF and USGS 2011). No significant impacts would be expected at the population level.	Same as ongoing activities, with the addition of possible future oil and gas exploration surveys.
Noise: Turbines	Available evidence suggests that typical underwater noise levels from operating WTGs would be below current cumulative injury and behavioral effect thresholds for sea turtles. Operating turbines were determined to produce underwater noise on the order of 110 to 125 dB RMS, occasionally reaching as high as 128 dB RMS in the 10-Hz to 8-kHz range (Tougaard et al. 2020). As measured at the Block Island Wind Facility, low-frequency operational noise barely exceeds ambient levels at 164 feet (50 meters) from the WTG base (Miller and Potty 2017). Operational noise impacts would be expected to be negligible.	This sub-IPF does not apply to future non-offshore wind development.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can result in high intensity, low exposure levels, and long-term, but localized intermittent risk to sea turtles. Impacts, potentially including behavioral responses, masking, TTS, and PTS, would be localized in nearshore waters. Data regarding threshold levels for impacts on sea turtles from sound exposure during pile driving are very limited, and no regulatory threshold criteria have been established for sea turtles. Based on current literature, the following thresholds are used to assess impacts to turtles: Potential mortal injury: 210 dB cumulative SPL or greater than 207 dB peak SPL (Popper et al. 2014) Potential mortal injury: 204 dB_{SEL}, 232 dB_{PEAK} (PTS), 189 dB_{SEL}, 226 dB_{PEAK} (TTS) (Navy 2017) Behavioral harassment: 175 dB referenced to 1 μPa RMS (Navy 2017)	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.
Noise: Cable laying/trenching	N/A	Cable laying impacts resulting from future non-offshore wind activities would be identical to those described for future offshore wind projects.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Noise: Vessels	The frequency range for vessel noise (10 to 1000 Hz; MMS 2007) overlaps with sea turtles' known hearing range (less than 1000 Hz with maximum sensitivity between 200 to 700 Hz; Bartol 1994) and would therefore be audible. However, Hazel et al. (2007) suggest that sea turtles' ability to detect approaching vessels is primarily vision-dependent, not acoustic. Sea turtles may respond to vessel approach and/or noise with a startle response (diving or swimming away) and a temporary stress response (NSF and USGS 2011). Samuel et al. (2005) indicated that vessel noise could have an effect on sea turtle behavior, especially their submergence patterns.	See Section 3.4.6. Any offshore projects that require the use of ocean vessels could result in long-term but infrequent impacts on sea turtles, including temporary startle responses, masking of biologically relevant sounds, physiological stress, and behavioral changes, especially their submergence patterns (NSF and USGS 2011; Samuel et al. 2005). However, BOEM expects that these brief responses of individuals to passing vessels would be unlikely given the patchy distribution of sea turtles and no stock or population level effects would be expected.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. Port expansion activities are localized to nearshore habitats, and are expected to result in short-term, temporary impacts, if any, on sea turtles. Vessel noise may affect sea turtles, but response would be expected to be short-term and temporary (see the Vessels: Noise sub-IPF above). The impact on water quality from sediment suspension during port expansion activities is short-term, temporary, and would be similar to those described under the New cable emplacement/maintenance IPF above.	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from Virginia to Maine is that port activity will increase modestly. The ability of ports to receive the increase in larger ships will require port modifications. Future channel deepening activities are being undertaken to accommodate deeper draft vessels for the Panama Canal Locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long-term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future. Additional impacts associated with the increased risk of vessel strikes could also occur (see the Traffic: Vessel collisions sub-IPF below).
Presence of structures: Entanglement or ingestion of lost fishing gear	The Mid-Atlantic region has more than 130 artificial reefs. Currently bridge foundations and the Block Island Wind Facility may be considered artificial reefs and may have higher levels of recreational fishing, which increases the chances of sea turtles encountering lost fishing gear, resulting in possible ingestions, entanglement, injury, or death of individuals (Berreiros and Raykov 2014; Gregory 2009; Vegter et al. 2014) if present where these structures are located. At the scale of the OCS geographic analysis area for sea turtles, there are very few areas that would serve to concentrate recreational fishing and increase the likelihood that sea turtles would encounter lost fishing gear.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.
Presence of structures: Habitat conversion and prey aggregation	The Mid-Atlantic region has more than 130 artificial reefs. Hard-bottom (scour control and rock mattresses) and vertical structures (bridge foundations and Block Inland Wind Facility WTGs) in a soft-bottom habitat can create artificial reefs, thus inducing the reef effect (Taormina et al. 2018; NMFS 2015). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans (Taormina et al. 2018), providing a potential increase in available forage items and shelter for sea turtles compared to the surrounding soft-bottoms.	The presence of structures associated with non-offshore wind development in near-shore coastal waters has the potential to provide habitat for sea turtles as well as preferred prey species. This reef effect has the potential to result in long-term, low-intensity beneficial impacts. Bridge foundations will continue to provide foraging opportunities for sea turtles with measurable benefits to some individuals.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Avoidance/ displacement	No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to this sub-IPF. There may be some impacts resulting from the existing Block Island Wind Facility, but given that there are only 5 WTGs, no measurable impacts are occurring.	Not contemplated for non-offshore wind facility sources.
Presence of structures: Behavioral disruption - breeding and migration	No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non-offshore wind facility sources.
Presence of structures: Displacement into higher risk areas (Vessels and Fishing)	No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non-offshore wind facility sources.
Traffic: Vessel collisions	Current activities contributing to this sub-IPF include port traffic levels, fairways, traffic separation schemes, commercial vessel traffic, recreational and fishing activity, and scientific and academic vessel traffic. Propeller and collision injuries from boats and ships are common in sea turtles. Vessel strike is an increasing concern for sea turtles, especially in the southeastern United States, where development along the coasts is likely to result in increased recreational boat traffic. In the United States, the percentage of strandings of loggerhead sea turtles that were attributed to vessel strikes increased from approximately 10% in the 1980s to a record high of 20.5% in 2004 (NMFS and USFWS 2007). Sea turtles are most susceptible to vessel collisions in coastal waters, where they forage from May through November. Vessel speed may exceed 10 knots in such waters, and evidence suggests that they cannot reliably avoid being struck by vessels exceeding 2 knots (Hazel et al. 2007).	Vessel traffic associated with non-offshore wind development has the potential to result in an increased collision risk. While these impacts would be high consequence, the patchy distribution of sea turtles makes stock or population-level effects unlikely (Navy 2018).
Climate change: Warming and sea level rise, storm severity/frequency	Increased storm frequency could lead to long-term, high-consequence impacts on sea turtle onshore beach nesting habitat, including changes to nesting periods, changes in sex ratios of nestlings, drowned nests, as well as loss or degradation of nesting beaches. Offshore impacts, including sedimentation of near-shore hard bottom habitats have the potential to result in long-term, high consequence changes to foraging habitat availability for green turtles.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.
Climate change: Ocean acidification	This sub-IPF has the potential to lead to long-term, high-consequence impacts on marine ecosystems by contributing to reduced growth or the decline of invertebrates that have calcareous shells.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.
Climate change: Warming and sea level rise, altered habitat/ecology	This sub-IPF has the potential to lead to long-term, high-consequence impacts on sea turtles by influencing distributions of sea turtles and/or prey resources. This sub-IPF has the potential to lead to long-term, high-consequence impacts on sea turtle breeding, foraging, and sheltering habitat use.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Climate change: Warming and sea level rise, altered migration patterns	This sub-IPF has the potential to lead to long-term, high-consequence impacts on sea turtle habitat use and migratory patterns.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.
Climate change: Warming and sea level rise, disease frequency	Climate change, influenced in part by greenhouse gas emissions, is expected to continue to contribute to a gradual warming of ocean waters, influencing the frequencies of various diseases of sea turtles such as fibropapillomatosis.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.
Climate change: Warming and sea level rise, protective measures (barriers, sea walls)	The proliferation of coastline protections have the potential to result in long-term, high-consequence impacts on sea turtle nesting by eliminating or precluding access to potentially suitable nesting habitat or access to potentially suitable habitat.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.
Climate change: Warming and sea level rise, storm severity, frequency, sediment erosion, deposition	Sediment erosion and/or deposition in coastal waters have the potential to result in long-term, high-consequence impacts on green sea turtle foraging habitat. Additionally, sediment erosion has the potential to result in the degradation or loss of potentially suitable nesting habitat.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.

Notes: µPa = micropascal; µT = microtesla; AC = alternating current; ADLS = Aircraft Detection Light System; AIS = Automatic Identification System; BMP = best management practice; BOEM = Bureau of Ocean Energy Management; BSW = Bay State Wind; CFR = Code of Federal Regulations; COP = Construction and Operations Plan; dB = decibel; dB re 1 µPa = decibels relative to one micropascal; dB RMS = decibel root mean square; DC = direct current; DP = dynamic positioning; DPS = distinct population segment; EMF = electromagnetic field; ESP = electrical service platform; FAA = Federal Aviation Administration; FCC = Federal Communications Commission; G&G = Geological and Geophysical; HRG = high resolution geophysical; Hz = hertz; IHA = Incidental Harassment Authorization; IPF = impact-producing factors; MCT = Marine Commerce Terminal; met = meteorological; NARW = North Atlantic right whale; NEPA = National Environmental Policy Act; NMFS = National Marine Fisheries Service; NRA = Navigational Risk Assessment; OCS = Outer Continental Shelf; OECC = Offshore Export Cable Corridor; PAM = passive acoustic monitoring; PSO = protected species observer; PTS = permanent threshold shift; RMS = root mean square; SEIS = Supplemental EIS; SOV = service operations vessel; SPL = sound pressure level; TTS = temporary threshold shift; USACE = U.S. Army Corps of Engineers; USCG = US Coast Guard; WDA = Wind Development Area; WTG = wind turbine generator.

Table E3-7. Summary of Activities and the Associated Impact-Producing Factors for Demographics, Employment, and Economics

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Energy generation/ security	In 2017, Massachusetts energy production totaled 125.2 trillion Btu, of which 72.4 trillion Btu was from renewable sources, including geothermal, hydroelectric, wind, solar, and biomass (U.S. Energy Information Administration 2018).	Ongoing development of onshore solar and wind energy would provide diversified, small-scale energy generation. State and regional energy markets would require additional peaker plants and energy storage to meet the electricity needs when utility scale renewables are not producing.
Light: Structures	Offshore buoys and towers emit low-intensity light, while onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.
Light: Vessels	Ocean vessels have an array of lights including navigational lights and deck lights.	Anticipated modest growth in vessel traffic would result in some growth in the nighttime traffic of vessels with lighting.
New cable emplacement/ maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be local and limited to emplacement corridors. In the geographic analysis area for demographics, employment, and economics there are six existing power cables.	The FCC has two pending submarine telecommunication cable applications in the North Atlantic. Future new cables would disturb the seafloor and cause temporary increases in suspended sediment resulting in infrequent, localized, short-term impacts over the next 30 years.
Noise: O&M	Limited to South Fork Wind Project	Not applicable
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. These disturbances are temporary, local, and extend only a short distance beyond the work area.	No future activities were identified within the geographic analysis area for demographics, employment, and economics other than ongoing activities.
Noise: Cable laying/trenching	Infrequent trenching for pipeline and cable laying activities emit noise. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	Periodic trenching would be needed over the next 30 years for repair or new installation of underground infrastructure.
Noise: Vessels	Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels.	Planned new barge route and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The Marine Commerce Terminal at the Port of New Bedford was upgraded by the port specifically to support the construction of offshore wind energy facilities.	Ports would need to perform maintenance and upgrade facilities over the next 30 years to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep-draft vessels as they continue to increase in size.
Port utilization: Maintenance/ dredging	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. As ports expand, maintenance dredging of shipping channels is expected to increase.	Ports would need to perform maintenance and upgrades over the next 30 years to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep-draft vessels as they continue to increase in size.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Allisions	An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. The likelihood of allisions is expected to continue at or near current levels.	Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. Such loss and damage are direct costs for gear owners, and are expected to continue at or near current levels.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these locations, which may be known as fish aggregating devices (FADs). Recreational and commercial fishing can occur near the FADs, although recreational fishing is more popular, because commercial mobile fishing gear is more likely to snag on FADs.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Habitat conversion	Structures, including foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly flat seascape. Structure-oriented species thus benefit on a constant basis.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure, because vessels need to avoid both the structure and each other.	Vessel traffic, overall, is not expected to meaningfully increase over the next 30 years. The presence of navigation hazards is expected to continue at or near current levels.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Viewshed	No existing offshore structures are within the viewshed of the WDA except buoys.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Transmission cable infrastructure	The existing offshore cable infrastructure supports the economy by transmitting electric power and communications between mainland and islands. Additional communication cables run between the U.S. East Coast and European countries along the eastern Atlantic.	: No known proposed structures not associated with offshore wind development are reasonably foreseeable.
Traffic: Vessels	Study area ports and marine traffic related to shipping, fishing, and recreation are important to the region's economy. No substantial changes are anticipated to existing vessel traffic volumes.	New vessel traffic near the study area would be generated by proposed barge routes and dredging demolition sites over the next 30 years. Marine commerce and related industries would continue to be important to the study area economy.
Traffic: Vessel collisions	The region's substantial marine traffic may result in occasional vessel collisions, which would result in costs to the vessels involved. The likelihood of collisions is expected to continue at or near current rates.	No substantial changes anticipated.

Associated IPFs: Sub-IPFs	**Ongoing Activities**	**Future Non-Offshore Wind Activities Intensity/Extent**
Land disturbance: Onshore construction	Onshore development activities support local population growth, employment, and economies. Disturbances can cause temporary, localized traffic delays and restricted access to adjacent properties. The rate of onshore land disturbance is expected to continue at or near current rates.	Onshore development projects would be ongoing in accordance with local government land use plans and regulations.
Climate change	Climate models predict climate change if current trends continue. Climate change has adverse implications for demographics and economic health of coastal communities, due in part to the costs of resultant damage to property and infrastructure, fisheries and other natural resources, increased disease frequency, and sedimentation, among other factors.	Onshore projects that reduce air emissions could contribute to the effort to limit climate change. Onshore solar and wind energy projects, although producing less energy than potential offshore wind developments, would also provide incremental reductions.
Regulated fishing effort	Commercial and recreational regulations for finfish and shellfish implemented and enforced by NOAA Fisheries and coastal states affect how commercial and for-hire recreational fisheries operate. Commercial and recreational for-hire fisheries are managed by FMPs, which are established to manage fisheries to avoid overfishing through catch quotas, special management areas, and closed area regulations. These can reduce or increase the size of available landings to commercial and for-hire recreational fisheries.	Reasonably foreseeable fishery management actions include measures to reduce the risk of interactions between fishing gear and the North Atlantic right whale by 60% (McCreary and Brooks 2019). This will likely have a significant impact on fishing effort in the lobster and Jonah crab fisheries in the geographic analysis area for this resource. See No Action alternative for additional fishery management actions that will affect commercial fisheries and for-hire recreational fishing.

Notes: ADLS = Aircraft Detection Light System; BOEM = Bureau of Ocean Energy Management; Btu = British thermal unit; EIS = Environmental Impact Statement; ESP = electrical service platform; FADs = fish aggregating devices; FCC = Federal Communications Commission; FMPs = fishery management plans; G&G = Geological and Geophysical; GW = gigawatts; IPF = impact-producing factors; MA = Massachusetts; NA = not applicable; NOAA = National Oceanic and Atmospheric Administration; O&M = operations and maintenance; OECC = Offshore Export Cable Corridor(s); RI = Rhode Island; SAR = search and rescue; SEIS = Supplemental Environmental Impact Statement; USCG = United States Coast Guard; WDA = Wind Development Area; WTG = wind turbine generator.

Table E3-8. Summary of Activities and the Associated Impact-Producing Factors for Environmental Justice

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Air emissions: Construction/ decommissioning	Ongoing population growth and new development within the analysis area is likely to increase traffic with resulting increase in emissions from motor vehicles. Some new industrial development may result in emissions-producing uses. At the same time, many industrial waterfront areas near environmental justice communities are losing industrial uses, and converting to more commercial or residential uses.	New development may include emissions-producing industry and new development that would increase emissions from motor vehicles. Some historically industrial waterfront locations will continue to lose industrial uses, with no new industrial development to replace it. Cities such as New Bedford are promoting start-up space and commercial uses to re-use industrial space.
Air emissions: Operations and maintenance	Ongoing population growth and new development within the analysis area is likely to increase traffic with resulting increase in emissions from motor vehicles. Some new industrial development may result in emissions-producing uses. At the same time, many industrial waterfront areas near environmental justice communities are losing industrial uses, and converting to more commercial or residential uses.	New development may include emissions-producing industry and new development that would increase emissions from motor vehicles. Some historically industrial waterfront locations will continue to lose industrial uses, with no new industrial development to replace it. Cities such as New Bedford are promoting start-up space and commercial uses to re-use industrial space.
Light: Structures	Offshore buoys and towers emit low-intensity light, while onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.
New cable emplacement/ maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be local and limited to emplacement corridors.	The FCC has two pending submarine telecommunication cable applications in the North Atlantic. Future new cables would disturb the seafloor and cause temporary increases in suspended sediment, resulting in infrequent, localized, short-term impacts over the next 30 years.
Noise: Operations and maintenance	Offshore operations and maintenance of existing wind energy projects generates negligible amounts of noise.	There are no reasonably foreseeable offshore facilities that would generate noise from operations/maintenance.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. These disturbances are temporary, local, and extend only a short distance beyond the work area.	No future activities were identified within the analysis area other than ongoing activities.
Noise: Trenching	Infrequent trenching for pipeline and cable laying activities emits noise. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	Periodic trenching would be needed over the next 30 years for repair or new installation of underground infrastructure.
Noise: Vessels	Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels.	Planned new barge route and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The MCT at the Port of New Bedford is a completed facility developed by the port specifically to support the construction of offshore wind facilities.	Ports would need to perform maintenance and upgrade facilities to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep-draft vessels as they continue to increase in size.
Presence of structures: Entanglement, gear loss/ damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. Such loss and damage are direct costs for gear owners, and are expected to continue at or near current levels.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure, because vessels need to avoid both the structure, and each other.	Vessel traffic is generally not expected to meaningfully increase over the next 30 years. The presence of navigation hazards is expected to continue at or near current levels.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Viewshed	There are no existing offshore structures within the viewshed of the WDA except buoys.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Transmission cable infrastructure	Seven subsea cable corridors cross cumulative lease areas.	Existing cable operation and maintenance activities would continue within the analysis area.
Traffic: Vessels	Study area ports and marine traffic related to shipping, fishing and recreation are important to the region's economy. No substantial changes are anticipated to existing vessel traffic volumes.	New vessel traffic near the study area would be generated by proposed barge routes and dredging demolition sites over the next 30 years. Marine commerce and related industries would continue to be important to the study area employment.
Land disturbance: Erosion and sedimentation	Potential erosion and sedimentation from development and construction is controlled by local and state development regulations.	New development activities would be subject to erosion and sedimentation regulations.
Land disturbance: Onshore construction	Onshore development supports local population growth, employment, and economics.	Onshore development would continue in accordance with local government land use plans and regulations.
Land disturbance: Onshore, land use changes	Onshore development would result in changes in land use in accordance with local government land use plans and regulations.	Development of onshore solar and wind energy would provide diversified, small-scale energy generation.
Climate change	Climate models predict climate change if current trends continue. Climate change has adverse implications for demographics and the economic health of coastal communities, due in part to the costs of resultant damage to property and infrastructure, fisheries, and other natural resources; increased disease frequency; and sedimentation, among other factors.	Onshore projects that reduce air emissions could contribute to the effort to limit climate change. Onshore solar and wind energy projects, although producing less energy than potential offshore wind developments, would also provide incremental reductions.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Regulated fishing effort	Commercial and recreational regulations for finfish and shellfish implemented and enforced by NOAA Fisheries and coastal states affect how commercial and for-hire recreational fisheries operate. Commercial and recreational for-hire fisheries are managed by FMPs, which are established to manage fisheries to avoid overfishing through catch quotas, special management areas, and closed area regulations. These can reduce or increase the size of available landings to commercial and for-hire recreational fisheries.	Reasonably foreseeable fishery management actions include measures to reduce the risk of interactions between fishing gear and the North Atlantic right whale by 60% (McCreary and Brooks 2019). This will likely have a significant impact on the fishing effort in the lobster and Jonah crab fisheries in the geographic analysis area for this resource. See No Action alternative for additional fishery management actions that will affect commercial fisheries and for-hire recreational fishing.

Notes: ADLS = Aircraft Detection Light System; ESP = electrical service platform; FCC = Federal Communications Commission; FMPs = fishery management plans; G&G = Geological and Geophysical; HMS = Highly Migratory Species; IPF = impact-producing factors; MA/RI = Massachusetts/Rhode Island; MCT = New Bedford Marine Commerce Terminal; OCS = Outer Continental Shelf; OECC = Offshore Export Cable Corridor(s); OECR = Onshore Export Cable Route; RI and MA Lease Areas = Rhode Island and Massachusetts Lease Areas; USEPA = U.S. Environmental Protection Agency; WDA = Wind Development Area; WTG = wind turbine generator

Table E3-9. Summary of Activities and the Associated Impact-Producing Factors for Cultural Resources

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See Attachment 2/Table E2-2 for water quality for a quantitative analysis of these risks. Accidental releases of fuel/fluids/hazmat occur during vessel use for recreational, fisheries, marine transportation, or military purposes, and other ongoing activities. Both released fluids and cleanup activities that require the removal of contaminated soils and/or seafloor sediments can cause impacts on cultural resources because resources are impacted during by the released chemicals as well as the ensuing cleanup activities.	Gradually increasing vessel traffic over the next 30 years would increase the risk of accidental releases within the geographic analysis area for cultural resources, increasing the frequency of small releases. Although the majority of anticipated accidental releases would be small, resulting in small-scale impacts on cultural resources, a single, large-scale accidental release such as an oil spill, could have significant impacts on marine and coastal cultural resources. A large-scale release would require extensive cleanup activities to remove contaminated materials resulting in damage to or the complete removal of terrestrial and marine cultural resources. In addition, the accidentally released materials in deep water settings could settle on seafloor cultural resources such as wreck sites, accelerating their decomposition and/or covering them and making them inaccessible/unrecognizable to researchers, resulting in a significant loss of historic information. As a result, although considered unlikely, a large-scale accidental release and associated cleanup could result in permanent, geographically extensive, and large-scale impacts on cultural resources.

Associated IPF: Sub-IPFs	**Ongoing Activities**	**Future Non-Offshore Wind Activities Intensity/Extent**
Accidental releases: Trash and debris	Accidental releases of trash and debris occur during vessel use for recreational, fisheries, marine transportation, or military purposes and other ongoing activities. While the released trash and debris can directly affect cultural resources, the majority of impacts associated with accidental releases occur during cleanup activities, especially if soil or sediment removed during cleanup affect known and undiscovered archaeological resources. In addition, the presence of large amounts of trash on shorelines or the ocean surface can impact the cultural value of TCPs for stakeholders. State and federal laws prohibiting large releases of trash would limit the size of any individual release and ongoing local, state, and federal efforts to clean up trash on beaches and waterways would continue to mitigate the effects of small-scale accidental releases of trash.	Future activities with the potential to result in accidental releases include construction and operations of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications). Accidental releases would continue at current rates along the northeast Atlantic coast.
Anchoring	The use of vessel anchoring and gear (i.e., wire ropes, cables, chain, sweep on the seafloor) that disturbs the seafloor, such as bottom trawls and anchors, by military, recreational, industrial, and commercial vessels can impact cultural resources by physically damaging maritime archaeological resources such as shipwrecks and debris fields.	Future activities with the potential to result in anchoring/gear utilization include construction and operations of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); military use; marine transportation; fisheries use and management; and oil and gas activities. These activities are likely to continue to occur at current rates along the entire coast of the eastern United States.
Gear utilization: Dredging	Activities associated with dredge operations and activities could damage marine archaeological resources. Ongoing activities identified by BOEM with the potential to result in dredging impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); tidal energy projects; marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities.	Dredging activities would gradually increase through time as new offshore infrastructure is built, such as gas pipelines and electrical lines, and as ports and harbors are expanded or maintained.
Light: Vessels	Light associated with military, commercial, or construction vessel traffic can temporarily affect coastal historic structures and TCP resources when the addition of intrusive, modern lighting changes the physical environment ("setting") of cultural resources. The impacts of construction and operations lighting would be limited to cultural resources on the shoreline for which a nighttime sky is a contributing element to historic integrity. This excludes resources that are closed at night, such as historic buildings, lighthouses, and battlefields, and resources that generate their own nighttime light, such as historic districts. Offshore construction activities that require increased vessel traffic, construction vessels stationed offshore, and construction area lighting for prolonged periods can cause more sustained and significant visual impacts on coastal historic structure and TCP resources.	Future activities with the potential to result in vessel lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the northeast coast, with a slight increase due to population increase and development over time.
Light: Structures	The construction of new structures that introduce new light sources into the setting of historic architectural properties or TCPs can result in impacts, particularly if the historic and/or cultural significance of the resource is associated with uninterrupted nighttime skies or periods of darkness. Any tall structure (commercial building, radio antenna, large satellite dishes, etc.) requiring nighttime hazard lighting to prevent aircraft collision can cause these types of impacts.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Port utilization: Expansion	Major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The MCT was upgraded by the Port of New Bedford specifically to support the construction of offshore wind facilities. Expansion of port facilities can introduce large, modern port infrastructure into the viewsheds of nearby historic properties, impacting their setting and historic significance.	Future activities with the potential to result in port expansion impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); tidal energy projects; marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Port expansion would continue at current levels, which reflect efforts to capture business associated with the offshore wind industry (irrespective of specific projects).
Presence of structures	The only existing offshore structures within the viewshed of the geographic analysis area are minor features such as buoys.	Non-offshore wind structures that could be viewed would be limited to meteorological towers. Marine activity would also occur within the marine viewshed of the geographic analysis area.
New cable emplacement/ maintenance	Current offshore construction activity is limited to subsea fiber optic and electrical transmission cables, including six existing power cables in the geographic analysis area.	Future activities with the potential to result in seafloor disturbances similar to offshore impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); tidal energy projects; marine minerals use and ocean-dredged material disposal; military use; and oil and gas activities. Such activities could cause impacts on submerged archaeological resources including shipwrecks and formerly subaerially exposed pre-contact Native American archaeological sites.
Land disturbance: Onshore construction	Onshore construction activities can impact archaeological resources by damaging and/or removing resources.	Future activities that could result in terrestrial land disturbance impacts include onshore residential, commercial, industrial, and military development activities in central Cape Cod, particularly those proximate to OECRs and interconnection facilities. Onshore construction would continue at current rates.
Climate change: Warming and sea level rise, storm severity/frequency	Sea level rise and increased storm severity and frequency would result in impacts on archaeological, architectural, and TCP resources. Increased storm frequency and severity would also result in damage to and/or destruction of architectural properties. Sea level rise would increase erosion-related impacts on archaeological and architectural resources, while sea level rise would inundate archaeological, architectural, and TCP resources.	Sea level rise and storm severity/frequency would increase due to the effects of climate change.
Climate change: Warming and sea level rise, altered habitat/ecology	Altered habitat/ecology related to warming seas and sea level rise would impact the ability of Native Americans and other communities to use maritime TCPs for traditional fishing, shell fishing, and fowling activities.	The rate of change to habitats/ecology would increase as a result of climate change.
Climate change: Warming and sea level rise, altered migration patterns	Altered migration patterns related to warming seas and sea level rise would impact the ability of Native Americans and other communities to use maritime TCPs for traditional fishing, shell fishing, and fowling activities.	The rate of change to migratory animal patterns would increase as a result of climate change.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Climate change: Warming and sea level rise, property/ infrastructure damage	Sea level rise and increased storm severity and frequency would result in impacts on archaeological, architectural, and TCP resources. Increased storm frequency and severity would result in damage to and/or destruction of architectural properties. Sea level rise would increase erosion-related impacts on archaeological and architectural resources while sea level rise would inundate archaeological, architectural, and TCP resources.	The rate of property and infrastructure damage would increase as a result of climate change.
Climate change: Warming and sea level rise, protective measures (barriers, sea walls)	The installation of protective measures such as barriers and sea walls would impact archaeological resources during associated ground-disturbing activities. Construction of these modern protective structures would alter the viewsheds from historic properties and/or TCPs, resulting in impacts on the historic and/or cultural significance of resources.	The installation of coastal protective measures would increase as a result of climate change.
Climate change: Warming and sea level rise, storm severity/frequency, sediment erosion, deposition	Sea level rise and increased storm severity and frequency would result in impacts on archaeological, architectural, and TCP resources. Increased storm frequency and severity would result in damage to and/or destruction of architectural properties. Sea level rise would increase erosion related impacts on archaeological and architectural resources while sea level rise would inundate archaeological, architectural, and TCP resources.	Sea level rise and storm severity/frequency would increase due to the effects of climate change.

Notes: ADLS = Aircraft Detection Light System; BMP = best management practice; BOEM = Bureau of Ocean Energy Management; hazmat = hazardous materials; ESP = electrical service platform; IFP = impact-producing factors; MCT = New Bedford Marine Commerce Terminal; MHC = Massachusetts Historical Commission; NEPA = National Environmental Policy Act; NHL = National Historic Landmark; NHPA = National Historic Preservation Act; NRHP = National Register of Historic Places; OCS = Outer Continental Shelf; OECC = Offshore Export Cable Corridor; OECR = Onshore Export Cable Route; RI and MA Lease Areas = Rhode Island and Massachusetts Lease Areas; SHPO = state historic preservation office; TCP = Traditional Cultural Property; WDA = Wind Development Area; WTG = wind turbine generator.

Table E3-10. Summary of Activities and the Associated Impact-Producing Factors for Recreation and Tourism

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Anchoring	Anchoring occurs due to ongoing military, survey, commercial, and recreational activities.	Impacts from anchoring would continue, and may increase due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Modest growth in vessel traffic could increase the temporary, localized impacts of navigational hazards, increased turbidity levels, and potential for direct contact causing mortality of benthic resources.
Light: Vessels	Ocean vessels have an array of lights including navigational lights and deck lights.	Anticipated modest growth in vessel traffic would result in some growth in the nighttime traffic of vessels with lighting.
Light: Structures	Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
New cable emplacement/ maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be local and limited to emplacement corridors.	Cable maintenance or replacement of existing cables in the geographic analysis area would occur infrequently, and would generate short-term disturbances.
Noise: O&M	Limited to Block Island Wind Farm	Not applicable
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. These disturbances are temporary, local, and extend only a short distance beyond the work area.	No future activities were identified within the recreation and tourism geographic analysis area other than ongoing activities.
Noise: Cable laying/trenching	Offshore trenching occurs periodically in connection with cable installation or sand and gravel mining.	No future activities were identified within the recreation and tourism geographic analysis area other than ongoing activities.
Noise: Vessels	Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels.	Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The Marine Commerce Terminal at the Port of New Bedford was upgraded by the port specifically to support the construction of offshore wind energy facilities.	Ports would need to perform maintenance and upgrade facilities over the next 30 years to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep-draft vessels as they continue to increase in size.
Port utilization: Maintenance/ dredging	No major ports are within the geographic analysis area. Periodic maintenance is necessary for harbors within the analysis area.	Ongoing maintenance and dredging of harbors within the geographic analysis area will continue as needed. No specific projects are known.
Presence of structures: Allisions	An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. The likelihood of allisions is expected to continue at or near current levels.	Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures.	No future activities were identified within the recreation and tourism geographic analysis area other than ongoing activities.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these locations. Recreational and commercial fishing can occur near these aggregation locations, although recreational fishing is more popular, because commercial mobile fishing gear is more likely to snag on structures.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Habitat conversion	Structures, including foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly flat seascape. Structure-oriented species thus benefit on a constant basis.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure, because vessels need to avoid both the structure and each other.	Vessel traffic, overall, is not expected to meaningfully increase over the next 30 years. The presence of navigation hazards is expected to continue at or near current levels.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Viewshed	The only existing offshore structures within the viewshed of the Project are minor features such as buoys.	Non-offshore wind structures that could be viewed in conjunction with the offshore components of the Project would be limited to meteorological towers. Marine activity would also occur within the marine viewshed.
Traffic: Vessels	Study area ports and marine traffic related to shipping, fishing, and recreation are important to the region's economy. No substantial changes are anticipated to existing vessel traffic volumes.	New vessel traffic near the study area would be generated by proposed barge routes and dredging demolition sites over the next 30 years. Marine commerce and related industries would continue to be important to the study area economy.
Traffic: Vessel collisions	The region's substantial marine traffic may result in occasional vessel collisions, which would result in costs to the vessels involved. The likelihood of collisions is expected to continue at or near current rates.	An increased risk of collisions is not anticipated from future activities.

Notes: ADLS = Aircraft Detection Light System; EFH = essential fish habitat; ESP = electrical service platform; FAA = Federal Aviation Administration; IPF = impact-producing factors; MW = megawatts; OECC = Offshore Export Cable Corridor; RI and MA = Rhode Island and Massachusetts; SEIS = Supplemental EIS; USCG = U.S. Coast Guard; WDA = Wind Development Area; WTG = wind turbine generator.

Table E3-11. Summary of Activities and the Associated Impact-Producing Factors for Commercial Fisheries and For-Hire Recreational Fishing

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Anchoring	Impacts from anchoring occur due to ongoing military, survey, commercial, and recreational activities. The short-term, localized impact to this resource is the presence of a navigational hazard (anchored vessel) to fishing vessels.	Impacts from anchoring may occur on a semi-regular basis over the next 30 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Anchoring could pose a temporary (hours to days), localized (within a few hundred meters of anchored vessel) navigational hazard to fishing vessels.
New cable emplacement/ maintenance	New cable emplacement and infrequent cable maintenance activities disturb the seafloor, increase suspended sediment, and cause temporary displacement of fishing vessels. These disturbances would be local and limited to the emplacement corridor.	Future new cables and cable maintenance would occasionally disturb the seafloor and cause temporary displacement in fishing vessels and increases in suspended sediment resulting in local, short-term impacts. The FCC has two pending submarine tele-communication cable applications in the North Atlantic. If the cable routes enter the geographic analysis area for this resource, short-term disruption of fishing activities would be expected.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Noise: Construction, trenching, operations and maintenance	Noise from construction occurs frequently in coastal habitats in populated areas in New England and the Mid-Atlantic, but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. Infrequent offshore trenching could occur in connection with cable installation. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Low levels of elevated noise from operational WTGs likely have low to no impacts on fish and no impacts at a fishery level. Noise is also created by operations and maintenance of marine minerals extraction, which has small, local impacts on fish, but likely no impacts at a fishery level.	Noise from construction near shore is expected to gradually increase in line with human population growth along the coast of the geographic analysis area for this resource. Noise from dredging and sand and gravel mining could occur. New or expanded marine minerals extraction may increase noise during their operations and maintenance over the next 30 years. Impacts from construction, operations, and maintenance would likely be small and local on fish, and not seen at a fishery level. Periodic trenching would be needed for repair or new installation of underground infrastructure. These disturbances would be temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise on commercial fish species are typically less prominent than the impacts of the physical disturbance and sediment suspension. Therefore, fishery-level impacts are unlikely.
Noise: G&G	Ongoing site characterization surveys and scientific surveys produce noise around sites of investigation. These activities can disturb fish and invertebrates in the immediate vicinity of the investigation and can cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions.	Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 30 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise to penetrate deep into the seabed, potentially resulting in injury or mortality to finfish and invertebrates in a small area around each sound source and short-term stress and behavioral changes to individuals over a greater area. Site characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves more similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize, but are likely local and temporary.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when ports or marinas, piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can cause injury and/or mortality to finfish and invertebrates in a small area around each pile, and can cause short-term stress and behavioral changes to individuals over a greater area, leading to temporary local impacts on commercial fisheries and for-hire recreational fishing. The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified within the analysis area other than ongoing activities.
Noise: Vessels	Vessel noise is anticipated to continue at levels similar to current levels. While vessel noise may have some impact on behavior, it is likely limited to brief startle and temporary stress responses. Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels.	Planned new barge route and dredging disposal sites would generate vessel noise when implemented.

Associated IPFs: Sub-IPFs	**Ongoing Activities**	**Future Non-Offshore Wind Activities Intensity/Extent**
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 30 years.	Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep-draft vessels as they continue to increase in size. Port utilization is expected to increase over the next 30 years, with increased activity during construction. The ability of ports to receive the increase in vessel traffic may require port modifications, such as channel deepening, leading to local impacts on fish populations. Port expansions could also increase vessel traffic and competition for dockside services, which could affect fishing vessels.
Presence of structures: Navigation hazard and allisions	Structures within and near the cumulative lease areas that pose potential navigation hazards include the Block Island Wind Farm WTGs, buoys, and shoreline developments such as docks and ports. An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. Two types of allisions occur: drift and powered. A drift allision generally occurs when a vessel is powered down due to operator choice or power failure. A powered allision generally occurs when an operator fails to adequately control their vessel movements, or is distracted.	No known reasonably foreseeable structures are proposed to be located in the geographic analysis area that could affect commercial fisheries. Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb habitats and potentially harm individuals, creating small, localized, short-term impacts on fish, but likely no impacts at a fishery level.	No future activities were identified within the analysis area other than ongoing activities.
Presence of structures: Habitat conversion and fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly sandy seascape. A large portion is homogeneous sandy seascape but there is some other hard and/or complex habitat. Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat to the new hard-structure habitat. Structure-oriented fishes are attracted to these locations. These impacts are local and can be short-term to permanent. Fish aggregation may be considered adverse, beneficial, or neither. Commercial and for-hire recreational fishing can occur near these structures. For-hire recreational fishing is more popular, as commercial mobile fishing gear risk snagging on the structures.	New cables, installed incrementally in the analysis area over the next 20 to 30 years, would likely require hard protection atop portions of the route (see New cable emplacement/maintenance IPF above). Any new towers, buoys, or piers would also create uncommon relief in a mostly flat seascape. Structure-oriented species could be attracted to these locations. Structure-oriented species would benefit (Claisse et al. 2014, Smith et al. 2016). This may lead to more and larger structure-oriented fish communities and larger predators opportunistically feeding on the communities, as well as increased private and for-hire recreational fishing opportunities. Soft bottom is the dominant habitat type in the region, and species that rely on this habitat would not likely experience population-level impacts (Guida et al. 2017; Greene et al. 2010). These impacts are expected to be local and may be long-term.
Presence of structures: Migration disturbances	Human structures in the marine environment, e.g., shipwrecks, artificial reefs, buoys, and oil platforms, can attract finfish and invertebrates that approach the structures during their migrations. This could slow species migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement than structure (Secor et al. 2018). There is no evidence to suggest that structures pose a barrier to migratory animals.	The infrequent installation of future new structures in the marine environment over the next 30 years may attract finfish and invertebrates that approach the structures during their migrations. This could tend to slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement (Secor et al. 2018). Migratory animals would likely be able to proceed from structures unimpeded. Therefore, fishery-level impacts are not anticipated.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	No known reasonably foreseeable structures are proposed for location in the geographic analysis area that could affect commercial fisheries and for-hire recreational fishing.
Presence of structures: Transmission cable infrastructure	The existing offshore cable infrastructure supports the economy by transmitting electric power and communications between mainland and islands. Seven subsea cable corridors cross cumulative lease areas. Shoreline developments are ongoing and include docks, ports, and other commercial, industrial, and residential structures.	No known proposed structures (other than those associated with offshore wind development) are reasonably foreseeable and proposed to be located in the geographic analysis area for this resource.
Traffic: Vessels and vessel collisions	No substantial changes are anticipated to the vessel traffic volumes. The study area would continue to have numerous ports and the extensive marine traffic related to shipping, fishing, and recreation would continue to be important to the region's economy. The region's substantial marine traffic may result in occasional collisions. Vessels need to navigate around structures to avoid allisions. When multiple vessels need to navigate around a structure, then navigation is more complex, as the vessels need to avoid both the structure and each other. The risk for collisions is ongoing but infrequent.	New vessel traffic in the geographic analysis area would consistently be generated by proposed barge routes and dredging demolition sites. Marine commerce and related industries would continue to be important to the regional economy.
Climate change	Impacts to commercial fisheries and for-hire recreational fishing are expected to result from climate change events such as increased magnitude or frequency of storms, shoreline changes, ocean acidification, and water temperature changes. Risks to fisheries associated with these events include habitat/distribution shifts, disease incidence, and risk of invasive species. If these risk factors result in a decrease in catch and/or an increase in fishing costs (e.g., transiting time), the profitability of businesses engaged in commercial fisheries and for-hire recreational fishing would be adversely affected. While climate change is predicted to have adverse impacts on the distribution and/or productivity of some stocks targeted by commercial fisheries and for-hire recreational fishing, other stocks may be beneficially affected. The economies of communities reliant on marine species that are vulnerable to the effects of climate change could be adversely affected. If the distribution of important stocks changes, it could affect where commercial and for-hire recreational fisheries are located. Furthermore, coastal communities with fishing businesses that have infrastructure near the shore could be adversely affected by sea level rise.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Regulated fishing effort	Commercial and recreational regulations for finfish and shellfish implemented and enforced by NOAA Fisheries and coastal states, affect how the commercial and for-hire recreational fisheries operate. Commercial and recreational for-hire fisheries are managed by FMPs, which are established to manage fisheries to avoid overfishing through catch quotas, special management areas, and closed area regulations. These can reduce or increase the size of available landings to commercial and for-hire recreational fisheries. For example, ongoing fishing restrictions designed to rebuild depleted stocks in the Northeast Multispecies (large-mesh) fishery will continue to reduce landings in that fishery.	Reasonably foreseeable fishery management actions include measures to reduce the risk of interactions between fishing gear and the North Atlantic right whale by 60% (McCreary and Brooks 2019). This will likely have a have a major adverse impact on fishing effort in the lobster and Jonah crab fisheries in the geographic analysis area for this resource. As discussed in Karp et al. (2019), changing climate and ocean conditions and the resultant effects on species distributions and productivity can have significant effects on management decisions, such as allocation, spatiotemporal closures, stock status determinations, and catch limits. See No Action alternative for additional fishery management actions that will affect commercial fisheries and for-hire recreational fishing.

Notes: BOEM = Bureau of Ocean Energy Management; COP = Construction and Operations Plan; EIS = Environmental Impact Statement; FMPs = fishery management plans; G&G = Geological and Geophysical; GHG = greenhouse gas; IPF = impact-producing factors; met = meteorological; NMFS = National Marine Fisheries Service; NOAA = National Oceanic and Atmospheric Administration; OCS = Outer Continental Shelf; OECC = Offshore Export Cable Corridor; RI and MA Lease Area = Rhode Island and Massachusetts Lease Areas; SAR = search and rescue; VMS = vessel monitoring system; WDA = Wind Development Area; WTG = wind turbine generator.

Table E3-12. Summary of Activities and the Associated Impact-Producing Factors for Land Use and Coastal Infrastructure

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/ hazmat	Various ongoing onshore and coastal construction projects include the use of vehicles and equipment that contain fuel, fluids, and hazardous materials that could be released.	Ongoing onshore construction projects involve vehicles and equipment that use fuel, fluids, or hazardous materials could result in an accidental release. Intensity and extent would vary, depending on the size, location, and materials involved in the release.
Light: Structures	Various ongoing onshore and coastal construction projects have nighttime activities, as well as existing structures, facilities, and vehicles that would use nighttime lighting.	Ongoing onshore construction projects involving nighttime activity could generate nighttime lighting. Intensity and extent would vary, depending on the location, type, direction, and duration of nighttime lighting.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The MCT at the Port of New Bedford is a completed facility developed by the port specifically to support the construction of offshore wind facilities.	Ports would need to perform maintenance and upgrade facilities to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep draft vessels as they continue to increase in size.
Presence of structures: Viewshed	The only existing offshore structures within the offshore viewshed of the Project are minor features such as buoys.	Non-offshore wind structures that could be viewed in conjunction with the offshore components would be limited to met towers. Marine activity would also occur within the marine viewshed.
Presence of structures: Transmission cable infrastructure	Onshore buried transmission cables are present in the area near the Project onshore and offshore improvements. Onshore activities would only occur where permitted by local land use authorities, which would avoid long-term land use conflicts.	No known proposed structures are reasonably foreseeable and proposed to be located in the geographic analysis area for land use and coastal infrastructure.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Land disturbance: Onshore construction	Onshore construction supports local population growth, employment, and economics.	Onshore development would continue in accordance with local government land use plans and regulations.
Land disturbance: Onshore, land use changes	New development or redevelopment would result in changes in land use in accordance with local government land use plans and regulations.	Ongoing and future development and redevelopment is anticipated to reinforce existing land use patterns, based on local government planning documents.

Notes: ADLS = Aircraft Detection Light System; IPF = impact-producing factors; MCT = New Bedford Marine Commerce Terminal; met = meteorological; NOAA = National Oceanic and Atmospheric Administration; ROW = right-of-way; USACE = U.S. Army Corps of Engineers; WTG = wind turbine generator.

Table E3-13. Summary of Activities and the Associated Impact-Producing Factors for Navigation and Vessel Traffic

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Anchoring	Larger commercial vessels (specifically tankers) sometimes anchor outside of major ports to transfer their cargo to smaller vessels for transport into port, an operation known as lightering. These anchors have deeper ground penetration and are under higher stresses. Smaller vessels (commercial fishing or recreational vessels) would anchor for fishing and other recreational activities. These activities cause temporary to short-term impacts on navigation in the immediate anchorage area. All vessels may anchor in an emergency scenario (such as power loss) if they lose power to prevent them from drifting and creating navigational hazards for other vessels or drifting into structures.	Lightering and anchoring operations are expected to continue at or near current levels, with the expectation of moderate increase commensurate with any increase in tankers visiting ports. Deep draft visits to major port visits are expected to increase as well, increasing the potential for an emergency need to anchor, creating navigational hazards for other vessels. Recreational activity and commercial fishing activity would likely stay largely the same related to this IPF.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in port usage by some fishing or recreational vessel operators.	Ports would need to perform maintenance and perform upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, and changes in port usage by some fishing or recreational vessel operators.
Presence of structures: Allisions	An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. There are two types of allisions that occur: drift and powered. A drift allision generally occurs when a vessel is powered down due to operator choice or power failure. A powered allision generally occurs when an operator fails to adequately control their vessel movements, or is distracted.	Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Fish aggregation	Items in the water, such as ghost fishing gear, buoys, and energy platform foundations can create an artificial reef effect, aggregating fish. Recreational and commercial fishing can occur near the artificial reefs. Recreational fishing is more popular than commercial near artificial reefs as commercial mobile fishing gear can risk snagging on the artificial reef structure.	Fishing near artificial reefs is not expected to change meaningfully over the next 30 years.
Presence of structures: Habitat conversion	Equipment in the ocean can create a substrate for mollusks to attach to, and fish eggs to settle near. This can create a reef-like habitat and benefit structure-oriented species on a constant basis.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Migration disturbances	Noise-producing activities, such as pile driving and vessel traffic, may interfere and adversely affect marine mammals during foraging, orientation, migration, response to predators, social interactions, or other activities. Marine mammals may also be sensitive to changes in magnetic field levels. The presence of structures and operation noise could cause mammals to avoid areas.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions. When multiple vessels need to navigate around a structure, then navigation is made more complex, as the vessels need to avoid both the structure and each other.	Absent other information, and because total vessel transits in the area have remained relatively stable since 2010, BOEM does not anticipate vessel traffic to greatly increase over the next 30 years. Even with increased port visits by deep draft vessels, this is still a relatively small adjustment when considering the whole of New England vessel traffic. The presence of navigation hazards is expected to continue at or near current levels.
Presence of structures: Space use conflicts	Currently, the offshore area is occupied by marine trade, stationary and mobile fishing, and survey activities.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Transmission cable infrastructure	See IPF for Anchoring.	See IPF for Anchoring.
New cable emplacement/ maintenance	Within the geographic analysis area for navigation and vessel traffic, existing cables may require access for maintenance activities. Infrequent cable maintenance activities may cause temporary increases in vessel traffic and navigational complexity.	The FCC has two pending submarine tele-communication cable applications in the North Atlantic. Future new cables would cause temporary increases in vessel traffic during installation or maintenance, resulting in infrequent, localized, short-term impacts over the next 30 years. Care would need to be taken by vessels that are crossing the cable routes during these activities.
Traffic: Aircraft	USCG search and rescue (SAR) helicopters are the main aircraft that may be flying at low enough heights to risk interaction with WTGs. USCG SAR aircraft need to fly low enough that they can spot objects in the water.	SAR operations could be expected to increase with any increase in vessel traffic. However, as vessel traffic volume is not expected to increase appreciably, neither should SAR operations. Draft EIS Section 3.5.6 provides a discussion of navigation impacts on fishing vessel traffic.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Traffic: Vessels	See the sub-IPF for Presence of structures: Navigation hazard.	See the sub-IPF for Presence of structures: Navigation hazard.
Traffic: Vessels, collisions	See the sub-IPF for Presence of structures: Navigation hazard.	See the sub-IPF for Presence of structures: Navigation hazard.

Notes: AIS = Automatic Identification System; BOEM = Bureau of Ocean Energy Management; COP = Construction and Operations Plan; EIS = environmental impact statement; ESP = electrical service platform; FCC = Federal Communications Commission; IPF = impact-producing factors; MA = Massachusetts; MARIPARS = Massachusetts and Rhode Island Port Access Route Study; MCT = Marine Commerce Terminal; NOAA = National Oceanic and Atmospheric Administration; OCS = Outer Continental Shelf; OECC = Offshore Export Cable Corridor(s); RI = Rhode Island; SAR = search and rescue; TSS = traffic separation scheme; USCG = U.S. Coast Guard; WDA = Wind Development Area; WTG = wind turbine generator.

Table E3-14. Summary of Activities and the Associated Impact-Producing Factors for Other Uses: Military and National Security Uses

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Allisions	Existing stationary facilities that present allision risks include the five offshore wind turbines associated with Block Island Wind Farm, dock facilities, meteorological buoys associated with offshore wind lease areas, and other offshore or shoreline-based structures.	No additional non-offshore wind stationary structures were identified within the geographic analysis area. Stationary structures such as private or commercial docks may be added close to the shoreline.
Presence of structures: Fish aggregation	Existing stationary facilities that act as FADs include offshore wind turbines associated with Block Island Wind Farm.	No future non-offshore wind additional stationary structures that would act as FADs were identified within the geographic analysis area.
Presence of structures: Navigation hazard	Existing stationary facilities within the geographic analysis area that present navigational hazards include the five WTGs in the Block Island Wind Farm, onshore wind turbines, communication towers, dock facilities, and other onshore and offshore commercial, industrial, and residential structures.	No future non-offshore wind stationary structures were identified within the offshore analysis area. Onshore, development activities are anticipated to continue with additional proposed communications towers and onshore commercial, industrial, and residential developments.
Presence of structures: Space use conflicts	Existing stationary facilities within the geographic analysis area that present a navigational hazard include the five WTGs in the Block Island Wind Farm, onshore wind turbines, communication towers, dock facilities, and other onshore and offshore commercial, industrial, and residential structures.	No future non-offshore wind stationary structures were identified within the offshore analysis area. Onshore, development activities are anticipated to continue with additional proposed communications towers and onshore commercial, industrial, and residential developments.
Presence of structures: Transmission cable infrastructure	Seven subsea cable corridors cross cumulative lease areas.	Submarine cables would remain in current locations with infrequent maintenance continuing along those cable routes for the foreseeable future.
Traffic: Vessels	Current vessel traffic in the region is described in draft EIS Section 3.5.6. Vessel activities associated with offshore wind in the cumulative lease areas is currently limited to site assessment surveys.	Continued vessel traffic in the region, as described in draft EIS Section 3.5.6.
Traffic: Vessels, collisions	Current vessel traffic in the region is described in draft EIS Section 3.5.6. Vessel activities associated with offshore wind in the cumulative lease areas is currently limited to site assessment surveys.	Continued vessel traffic in the region is described in draft EIS Section 3.5.6.

Table E3-15. Summary of Activities and the Associated Impact-Producing Factors for Other Uses: Aviation and Air Traffic

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Navigation hazard	Existing aboveground stationary facilities within the geographic analysis area that present navigational hazards include the five WTGs in the Block Island Wind Farm, onshore wind turbines, communication towers, dock facilities, and other onshore and offshore structures exceeding 200 feet in height.	No future non-offshore wind stationary structures were identified within the offshore analysis area. Onshore development activities are anticipated to continue with additional proposed communications towers.
Presence of structures: Space use conflicts	Existing aboveground stationary facilities within the geographic analysis area that could cause space use conflicts for aircraft include the five WTGs associated with Block Island Wind Farm, onshore wind turbines, communication towers, and other onshore and offshore structures exceeding 200 feet in height.	No future non-offshore wind stationary structures were identified within the offshore analysis area. Onshore, development activities are anticipated to continue with additional proposed communications towers.

Table E3-16. Summary of Activities and the Associated Impact-Producing Factors for Other Uses: Cables and Pipelines

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Allisions and navigation hazards	Structures within and near the geographic analysis area that pose potential allision hazards include the five Block Island Wind Farm WTGs, meteorological buoys associated with offshore wind lease areas, and shoreline developments such as docks, ports, and other commercial, industrial, and residential structures.	Reasonably foreseeable non-offshore wind structures that could affect submarine cables have not been identified in the geographic analysis area.
Presence of structures: Space use conflicts	Two submarine cables cross the far western portion of OCS-A 0487. These cables are associated with a larger network of submarine cables that make landfall near Charlestown, Massachusetts.	Reasonably foreseeable non-offshore wind structures have not been identified in the geographic analysis area.
Presence of structures: Transmission cable infrastructure	Seven subsea cable corridors cross cumulative lease areas.	Reasonably foreseeable non-offshore wind structures have not been identified in the geographic analysis area.

Table E3-17. Summary of Activities and the Associated Impact-Producing Factors for Other Uses: Radar Systems

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Navigation hazards	Wind developments in the direct line-of-sight with, or extremely close to, radar systems can cause clutter and interference. Existing wind developments in the area include scattered onshore wind turbines, and five WTGs in the Block Island Wind Farm.	Reasonably foreseeable non-offshore wind structures proposed for construction in the lease areas that could affect radar systems have not been identified.

Table E3-18. Summary of Activities and the Associated Impact-Producing Factors for Other Uses: Scientific Research and Surveys

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Navigation hazards	Stationary structures are limited in the open ocean environment of the geographic analysis area, and include met buoys associated with site assessment activities, the five Block Island Wind Farm WTGs, and the two CVOW WTGs. Other lease areas within the geographic analysis area are not yet developed, and are in various stages of permitting.	Reasonably foreseeable non-offshore wind activities would not implement stationary structures within the open ocean environment that would pose navigational hazards and raise the risk of allisions for survey vessels and collisions for survey aircraft.

Notes: AMSL = above mean sea level; BOEM = Bureau of Ocean Energy Management; CVOW = Coastal Virginia Offshore Wind; ESP = electrical service platform; FAA = Federal Aviation Administration; FAD = Fish Attracting Device; IPF = impact-producing factor; MA = Massachusetts; met = meteorological; NEXRAD = Next Generation Weather Radar; NMFS = National Marine Fisheries Service; NOAA = National Oceanic and Atmospheric Administration; OECC = Offshore Export Cable Corridor(s); OCS = outer continental shelf; RI = Rhode Island; SAR = search and rescue; USACE = United States Army Corps of Engineer; USCG = United States Coast Guard; WDA = Wind Development Area; WTG = wind turbine generator.

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ATTACHMENT 4

Maximum-Case Scenario Estimates for Offshore Wind Projects

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The following tables provide maximum-case scenario estimates of potential offshore wind project impacts assuming maximum buildout, using SFWF EIS geographic analysis areas and COP-designated numbers for the SFWF and SFEC. BOEM developed these estimates based on offshore wind demand, as discussed in their 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019). Estimates disclosed in this EIS's Chapter 3, No Action analyses were developed by summing acreage or number calculations across all lease areas noted as occurring within, or overlapping, a given geographic analysis area. This likely over-estimates some impacts in cases where lease areas only partially overlap analysis areas. However, this approach was used to provide the most conservative estimate of future offshore wind development.

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Table E4-1. Offshore Wind Leasing Activities on the U.S. East Coast: Projects and Assumptions (as of May 1, 2021) (part 1)

Region	Lease/Project/ Lease Remainder[1]	Status	Resource/Projects[3]						Estimated Offshore Construction Schedule[4]	Expected Turbine Size[5]	Generating Capacity (MW) (INTERNAL NOTE - FULL MW)						Generating Capacity (MW)					
			Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses			Air[a]	Water[b]	Benthic[b]	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air[6]	Water[7]	Benthic[8]	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
NE	Block Island (state waters)	Built				X			Built	6 MW				30						30		
	Total State Waters													30						30		
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA	X			X	X	X	2023	up 14 MW	800	800	800	800	800	800	800	800		800	800	800
MA/RI	South Fork (Proposed Action), OCS-A 0517	COP, PPA	X	X	X	X	X	X	2023	6 - 12 MW		120		120	120	120	130	130	130	130	130	130
MA/RI	Sunrise, OCS-A 0530	COP, PPA	X	X		X	X	X	2024	8 or 12 MW	880	880		880	880	880	880	880		880	880	880
MA/RI	Revolution, OCS-A 0486	COP, PPA	X	X		X	X	X	2023	8 or 12 MW	700	700		700	700	700	880	880		880	880	880
MA/RI	Vineyard Wind South OCS-A 0501 (includes Park City Wind)[a,b,c]	COP, PPA	X			X	X	X	2024-2026	10 - 19 MW	804	804	804	804	804	804	1,714			1,714	1,714	1,714
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA				X	X	X	2024	12 MW+	804	804	804	804	804	804				1764	1764	1764
MA/RI	Beacon Wind, part of OCS-A 0520	PPA				X	X	X	2025-2026	12 MW										1,230	1,230	1,230
MA/RI	Bay State Wind Project, part of OCS-A 0500[d]	COP (unpublished), the MW is included in the description below in the 5,148 MW.	X	X		X	X	X	By 2030, spread over 2025-2030	12 MW	1,092	1,092		1,092	1,092	1,092	1,092	1,092		1,092	1,092	1,092
MA/RI	Liberty Wind, part of OCS-A 0522[d,e]	This group is exposed to 5,800 MW of demand--for MA (4,000 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 5,148 MW.				X	X	X		12 MW	1,416	168		3,876	3,876	3,876	1,416	168		3,876	3,876	3,876
MA/RI	OCS-A 500 remainder[d,e]					X	X	X														
MA/RI	OCS-A 0487 remainder[d,e]		X	X		X	X	X														
MA/RI	OCS-A 0520 remainder[d,e]					X	X	X														
MA/RI	OCS-A 0522 remainder[d,e]					X	X	X														
	Remaining MA/RI Lease Area Total[2]	99%									2,474	1,243	0	4,900	4,900	4,900	1,243	1,243		2,500	2,500	2,500
	Total MA/RI Leases[2]									-	**6,462**	**5,231**	**2,408**	**9,008**	**9,008**	**9,008**	**6,739**	**5,025**	**130**	**10,990**	**10,990**	**10,990**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA				X	X	X	2023-2024	12 MW				1,100						1,100	1,100	1,100
NY/NJ	Empire Wind 1 and 2 of OCS-A 0512	COP, PPA				X	X	X	2024-2025	10 - 18 MW				816						2,076	2,076	2,076
NY/NJ	Atlantic Shores OCS-A 0499	COP				X	X	X	2025-2026	>12 MW										>2,400	>2,400	>2,400
NY/NJ	OCS-A 0498 remainder	This group may support up to approximately 3,480 MW of development (290 turbines) from NJ and NY.				X	X	X	By 2030, spread over 2025-2030	12 MW										3,480	3,480	3,480
	Remaining NY/NJ Lease Area Total	100%				X	X	X						3,996						3,480	3,480	3,480
	TOTAL NY/NJ LEASES													**5,912**						**9,056**	**9,056**	**9,056**
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA				X	X	X	2023	12 MW				120						120	120	120

Region	Lease/Project/ Lease Remainder[1]	Status	Resource/Projects[3]						Estimated Offshore Construction Schedule[4]	Expected Turbine Size[5]	Generating Capacity (MW) (INTERNAL NOTE - FULL MW)						Generating Capacity (MW)					
			Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses			Air[a]	Water[b]	Benthic[b]	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air[6]	Water[7]	Benthic[8]	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
DE/MD	US Wind, part of OCS-A 0490	COP, PPA				X	X	X	2024	8.6 - 12 MW				1500						1500	1500	1500
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.				X	X	X	By 2030, spread over 2023-2030	12 MW				678						1,080	1,080	1,080
DE/MD	OCS-A 0519 remainder					X	X	X		12 MW												
	Remaining DE/MD Lease Area Total	100%				X	X	X						678						1,080	1,080	1,080
	TOTAL DE/MD LEASES													**2,298**						**2,700**	**2,700**	**2,700**
VA/NC	CVOW, OCS-A 0497	Built				X	X	X	Built	6 MW				12						12	12	12
VA/NC	Dominion Commercial lease, OCS-A 0483	COP				X	X	X	2024-2025	14-16 MW				2,640						3,000	3,000	3,000
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP				X	X	X	2025-2026	14-20 MW				1,824						800	800	800
VA/NC	Avangrid remainder of OCS-A 0508	60% of the lease area, approximately 96 positions under similar spacing as Kitty Hawk Wind COP				X	X	X	2026-2030	12 MW										1,152	1,152	1,152
	TOTAL VA/NC LEASES													**4,476**						**4,964**	**4,964**	**4,964**
	OCS Total[24, 25]:										**6,462**	**5,231**	**2,408**	**21,694**		**9,008**	**6,739**	**5,025**	**130**	**27,710**	**27,710**	**27,710**

Table E4-2. Offshore Wind Leasing Activities on the U.S. East Coast: Projects and Assumptions (as of May 1, 2021) (part 2)

Region	Lease/Project/ Lease Remainder[1]	Status	Offshore Export Cable Length (Statue Miles)[9]	Offshore Export Cable Installation Tool Disturbance Width (feet)	Inter-array Cable Length (Statue Miles)[10]	Hub Height (Feet)[11]						Rotor Diameter (Feet)[12]						Total Height of Turbine (Feet)[13]					
						Air	Water/Navigation	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water/Navigation	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
NE	Block Island (state waters)	Built	28	5	2				328						541						659		
	Total State Waters		28	5	2																		
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA	98	6.5	177	358	358	358	358	358	473	538	538	538	538	538	729	627	627	627	627	627	837
MA/RI	South Fork (Proposed Action), OCS-A 0517	COP, PPA	139	6.5	28	345	345	345	345	345	492	543	543	543	543	543	722	614	614	614	614	614	853
MA/RI	Sunrise, OCS-A 0530	COP, PPA	130	6.5	186	367	367	367	367	367	574	538	538	538	538	538	787	636	636	636	636	636	968
MA/RI	Revolution, OCS-A 0486	COP, PPA	100	6.5	155	377	377	377	377	377	512	538	538	538	538	538	722	646	646	646	646	646	873
MA/RI	Vineyard Wind South OCS-A 0501 (includes Park City Wind)[abc]	COP, PPA	145	8	296	492			492	492	702	722			722	722	935	853	853	853	853	853	1171
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA	435	6.5	497				418	418	605				722	722	919				780	780	1066
MA/RI	Beacon Wind, part of OCS-A 0520	PPA	120	6.5	163.08				492	492	492				722	722	722				853	853	853
MA/RI	Bay State Wind Project, part of OCS-A 0500[d]	COP (unpublished), the MW is included in the description below in the 5,148 MW.	120	6.5	143.84	492	492		492	492	492	722	722	722	722	722	722	853	853	853	853	853	853
MA/RI	Liberty Wind, part of OCS-A 0522[d]	This group is exposed to 5,800 MW of demand--for MA (4,000 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 5,148 MW.	480	6.5	504.96	492	492		492	492	492	722	722		722	722	722	853	853		853	853	853
MA/RI	OCS-A 500 remainder[d]					492	492		492	492	492	722	722		722	722	722	853	853		853	853	853
MA/RI	OCS-A 0487 remainder[d]					492	492		492	492	492	722	722		722	722	722	853	853		853	853	853
MA/RI	OCS-A 0520 remainder[d]					492	492		492	492	492	722	722		722	722	722	853	853		853	853	853
MA/RI	OCS-A 0522 remainder[d]					492	492		492	492	492	722	722		722	722	722	853	853		853	853	853
	Remaining MA/RI Lease Area Total[2]	99%	720	6.5	761																		
	Total MA/RI Leases[2]		**2,007**		**2,407**																		
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA	194	6	209				512	512	512				788	788	788				853	853	853
NY/NJ	Empire Wind 1 and 2 of OCS-A 0512	COP, PPA	109	5	299				413	413	525				656	656	853				741	741	951
NY/NJ	Atlantic Shores OCS-A 0499	COP	441	6.5	584				>492	>492	>492				722	722	919				853	853	1049
NY/NJ	OCS-A 0498 remainder	This group may support up to approximately 3,480 MW of development (290 turbines) from NJ and NY.	120	6.5	139.4				492	492	492				722	722	722				853	853	853
	Remaining NY/NJ Lease Area Total	100%	120		136				492	492	492				722	722	722				853	853	853
	TOTAL NY/NJ LEASES		**423**		**644**																		

Region	Lease/Project/ Lease Remainder[1]	Status	Offshore Export Cable Length (Statue Miles)[9]	Offshore Export Cable Installation Tool Disturbance Width (feet)	Inter-array Cable Length (Statue Miles)[10]	Hub Height (Feet)[11]						Rotor Diameter (Feet)[12]						Total Height of Turbine (Feet)[13]					
						Air	Water/Navigation	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water/Navigation	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA	40	10	30				492	492	492				722	722	722				853	853	853
DE/MD	US Wind, part of OCS-A 0490	COP, PPA	190	6.5	151				440	440	440				722	722	722				801	801	801
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.							492	492	492				722	722	722				853	853	853
DE/MD	OCS-A 0519 remainder																						
	Remaining DE/MD Lease Area Total	100%	240	5	139																		
	TOTAL DE/MD LEASES		**470**		**320**																		
VA/NC	CVOW, OCS-A 0497	Built	27	3.3	9				364	364	364				506	506	506				620	620	620
VA/NC	Dominion Commercial lease, OCS-A 0483	COP	417	5	301				482	482	482				761	761	761				869	869	869
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP	90	6.5	149				472	472	574				728	728	935				837	837	1042
VA/NC	Avangrid remainder of OCS-A 0508	60% of the lease area, approximately 96 positions under similar spacing as Kitty Hawk Wind COP	120	6.5	148				492	492	492				722	722	722				853	853	853
	TOTAL VA/NC LEASES		**654**		**459**																		
	OCS Total[24, 25]:		**3,582**		**3,833**																		

Table E4-3. Offshore Wind Leasing Activities on the U.S. East Coast: Projects and Assumptions (as of May 1, 2021) (part 3)

Region	Lease/Project/ Lease Remainder[1]	Status	Turbine Number						Estimated Foundation Number[15]						Foundation Footprint[16] (Acres)					
			Air14	Water14	Benthic14	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
NE	Block Island (state waters)	Built				5	5	5				5	5	5				1	1	1
	Total State Waters					5	5	5				5	5	5				1	1	1
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA	62	62	62	62	62	62	63	63	63	63	63	63	1	1	1	1	1	1
MA/RI	South Fork (Proposed Action), OCS-A 0517	COP, PPA	15	15	15	15	15	11	16	16	16	16	16	12	1	1	1	1	1	0
MA/RI	Sunrise, OCS-A 0530	COP, PPA	122	106	106	122	122	73	124	108	124	124	124	75	5	4	5	5	5	3
MA/RI	Revolution, OCS-A 0486	COP, PPA	100	100	100	100	100	73	102	102	102	102	102	75	4	4	4	4	4	3
MA/RI	Vineyard Wind South OCS-A 0501 (includes Park City Wind)[abc]	COP, PPA	121			121	121	98	125			125	125	102	5			5	5	4
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA				146	146	147				152	152	151				8	8	8
MA/RI	Beacon Wind, part of OCS-A 0520	PPA				103	103	103				106	106	106				5	5	5
MA/RI	Bay State Wind Project, part of OCS-A 0500[d]	COP (unpublished), the MW is included in the description below in the 5,148 MW.	91	61	0	91	91	91	93	63	0	93	93	93				5	5	5
MA/RI	Liberty Wind, part of OCS-A 0522[d]	This group is exposed to 5,800 MW of demand--for MA (4,000 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 5,148 MW.	118	14		323	323	323	118	14		337	337	337	5	1		13	13	13
MA/RI	OCS-A 500 remainder[d]																			
MA/RI	OCS-A 0487 remainder[d]																			
MA/RI	OCS-A 0520 remainder[d]																			
MA/RI	OCS-A 0522 remainder[d]																			
	Remaining MA/RI Lease Area Total[2]	99%	206	74	0	510	510	510	208	76	0	529	529	529	5	1	0	23	23	23
	Total MA/RI Leases[2]		**717**	**418**	**283**	**1,270**	**1,270**	**1,168**	**731**	**428**	**305**	**1,310**	**1,310**	**1,206**	**21**	**11**	**11**	**57**	**57**	**52**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA				98	98	98				100	100	100				4	4	4
NY/NJ	Empire Wind 1 and 2 of OCS-A 0512	COP, PPA				237	237	116				240	240	119				12	12	6
NY/NJ	Atlantic Shores OCS-A 0499	COP				200	200	200				210	210	210				11	11	11
NY/NJ	OCS-A 0498 remainder	This group may support up to approximately 3,480 MW of development (290 turbines) from NJ and NY.				88	88	88				90	90	90				4	4	4
	Remaining NY/NJ Lease Area Total	100%				88	88	88				90	90	90				4	4	4
	TOTAL NY/NJ LEASES					**623**	**623**	**502**				**640**	**640**	**519**				**30**	**30**	**24**
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA				16	16	16				17	17	17				0.7	0.7	0.7
DE/MD	US Wind, part of OCS-A 0490	COP, PPA				125	125	125				129	129	129				5	5	5

Region	Lease/Project/ Lease Remainder[1]	Status	Turbine Number						Estimated Foundation Number[15]						Foundation Footprint[16] (Acres)					
			Air14	Water14	Benthic14	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.				90	90	90				93	93	93				3.72	3.72	3.72
DE/MD	OCS-A 0519 remainder																			
	Remaining DE/MD Lease Area Total	100%				90	90	90				93	93	93				4	4	4
	TOTAL DE/MD LEASES					**231**	**231**	**231**				**239**	**239**	**239**				**10**	**10**	**10**
VA/NC	CVOW, OCS-A 0497	Built				2	2	2				2	2	2				0.08	0.08	0.08
VA/NC	Dominion Commercial lease, OCS-A 0483	COP				205	205	205				208	208	208				8	8	8
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP				60	60	40				61	61	41				2	2	2
VA/NC	Avangrid remainder of OCS-A 0508	60% of the lease area, approximately 96 positions under similar spacing as Kitty Hawk Wind COP				94	94	94				96	96	96				4	4	3.84
	TOTAL VA/NC LEASES					**361**	**361**	**341**				**367**	**367**	**347**				**15**	**15**	**14**
	OCS Total[24, 25]:		**717**	**418**	**283**	**2,492**	**2,492**	**2,249**	**731**	**428**	**305**	**2,563**	**2,563**	**2,318**	**21**	**11**	**11**	**112**	**112**	**101**

Table E4-4. Offshore Wind Leasing Activities on the U.S. East Coast: Projects and Assumptions (as of May 1, 2021) (part 4)

Region	Lease/Project/ Lease Remainder1	Status	Seabed Disturbance Based on Addition of Scour Protection (Foundation+Scour Protection) (Acres)[17]						Offshore Export Cable Seabed Disturbance (Acres)[18]					Offshore Export Cable Operating Seabed Footprint (Acres)				
			Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
NE	Block Island (state waters)	Built				6	6	6								17	17	17
	Total State Waters					6	6	6								17	17	17
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA	33	33	33	33	33	33	117	117	117	117	117	77	77	77	77	77
MA/RI	South Fork (Proposed Action), OCS-A 0517	COP, PPA	14	14	14	14	14	10	166	166	166	166	166	110	110	110	110	110
MA/RI	Sunrise, OCS-A 0530	COP, PPA	124	108	124	124	124	75	155	155	155	155	155	102	147	102	102	102
MA/RI	Revolution, OCS-A 0486	COP, PPA	102	102	102	102	102	75	119	119	119	119	119	79	122	79	79	79
MA/RI	Vineyard Wind South OCS-A 0501 (includes Park City Wind)[abc]	COP, PPA	125			125	125	102		173	173	173	173			141	141	141
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA				380	380	378		517	517	517	517			343	343	343
MA/RI	Beacon Wind, part of OCS-A 0520	PPA				265	265	265			143	143	143			95	95	95
MA/RI	Bay State Wind Project, part of OCS-A 0500[d]	COP (unpublished), the MW is included in the description below in the 5,148 MW.	79	54		233	233	233			143	143	143			95	95	95
MA/RI	Liberty Wind, part of OCS-A 0522[d]	This group is exposed to 5,800 MW of demand--for MA (4,000 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 5,148 MW.	100	12		286	286	286	312		856	856	856	207		567	567	567
MA/RI	OCS-A 500 remainder[d]																	
MA/RI	OCS-A 0487 remainder[d]																	
MA/RI	OCS-A 0520 remainder[d]																	
MA/RI	OCS-A 0522 remainder[d]																	
	Remaining MA/RI Lease Area Total[2]	99%	177	65	0	773	773	449	0	0	856	856	856	0	0	567	567	567
	Total MA/RI Leases[2]		**653**	**374**	**272**	**2,048**	**2,048**	**1,619**	**557**	**1,247**	**2,389**	**2,389**	**2,389**	**368**	**456**	**1,608**	**1,608**	**1,608**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA				85	85	85			231	231	231			152	152	152
NY/NJ	Empire Wind 1 and 2 of OCS-A 0512	COP, PPA				96	96	95			130	130	130			66	66	66
NY/NJ	Atlantic Shores OCS-A 0499	COP				84	84	84			524	524	524			347	347	460
NY/NJ	OCS-A 0498 remainder	This group may support up to approximately 3,480 MW of development (290 turbines) from NJ and NY.				77	77	77			143	143	143			95	95	95
	Remaining NY/NJ Lease Area Total	100%				77	77	77			143	143	143			95	95	95
	TOTAL NY/NJ LEASES					**342**	**342**	**341**			**1028**	**1028**	**1028**			**661**	**661**	**773**

Region	Lease/Project/ Lease Remainder1	Status	Seabed Disturbance Based on Addition of Scour Protection (Foundation+Scour Protection) (Acres)[17]					Offshore Export Cable Seabed Disturbance (Acres)[18]						Offshore Export Cable Operating Seabed Footprint (Acres)				
			Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA				14	14	14			48	48	48			50	50	50
DE/MD	US Wind, part of OCS-A 0490	COP, PPA				110	110	110			226	226	226			150	150	150
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.				79.05	79.05	79.05			286	286	286			145.4545	145.455	145.4545
DE/MD	OCS-A 0519 remainder																	
	Remaining DE/MD Lease Area Total	100%				79	79	79			286	286	286			145	145	145
	TOTAL DE/MD LEASES					**203**	**203**	**203**			**560**	**560**	**560**			**346**	**346**	**346**
VA/NC	CVOW, OCS-A 0497	Built				2	2	2			33	33	33			11	11	11
VA/NC	Dominion Commercial lease, OCS-A 0483	COP				177	177	177			496	496	496			253	253	253
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP				52	52	41			107	107	107			71	71	71
VA/NC	Avangrid remainder of OCS-A 0508	60% of the lease area, approximately 96 positions under similar spacing as Kitty Hawk Wind COP				286	286	286			143	143	143			95	95	95
	TOTAL VA/NC LEASES					**230**	**230**	**220**			**636**					**334**		
	OCS Total[24, 25]:		**653**		**272**	**2,829**			**557**		**4,613**			**368**	**456**	**2,965**		

Table E4-5. Offshore Wind Leasing Activities on the U.S. East Coast: Projects and Assumptions (as of May 1, 2021) (part 5)

Region	Lease/Project/ Lease Remainder[1]	Status	Offshore Export Cable Hard Protection (Acres)[19]					Anchoring Disturbance (Acres)[20]					Inter-array Construction Footprint/ Seabed Disruption (Acres)[21]				
			Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
NE	Block Island (state waters)	Built													4	4	4
	Total State Waters														4	4	4
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA	35	35	35	35	35	4	4	4	4	4	126	126	126	126	126
MA/RI	South Fork (Proposed Action), OCS-A 0517	COP, PPA	50	50	50	50	50	14	14	14	14	14	36	36	36	36	26
MA/RI	Sunrise, OCS-A 0530	COP, PPA	46	46	46	46	46	13	13	13	13	13	254	254	293	293	175
MA/RI	Revolution, OCS-A 0486	COP, PPA	42	42	42	42	42	10	10	10	10	10	240	240	240	240	176
MA/RI	Vineyard Wind South OCS-A 0501 (includes Park City Wind)[abc]	COP, PPA			52	52	52			15	15	15			290	290	235
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA			155	155	155			442	442	442			350	350	353
MA/RI	Beacon Wind, part of OCS-A 0520	PPA			43	43	43			442	442	442			247	247	247
MA/RI	Bay State Wind Project, part of OCS-A 0500[d]	COP (unpublished), the MW is included in the description below in the 5,148 MW.			43	43	43			442	442	442			218	218	218
MA/RI	Liberty Wind, part of OCS-A 0522[d]	This group is exposed to 5,800 MW of demand--for MA (4,000 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 5,148 MW.	93.82		257	257	257	26.3		72	72	72	282.9		775	775	775
MA/RI	OCS-A 500 remainder[d]																
MA/RI	OCS-A 0487 remainder[d]																
MA/RI	OCS-A 0520 remainder[d]																
MA/RI	OCS-A 0522 remainder[d]																
	Remaining MA/RI Lease Area Total[2]	99%	0	0	257	257	257	0	0	72	72	72	279	0	1,224	1,224	1,224
	Total MA/RI Leases[2]		**173**	**173**	**723**	**723**	**723**	**41**	**41**	**1,454**	**1,454**	**1,454**	**936**	**657**	**3,025**	**3,025**	**2,781**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA			69	69	69			19	19	19			235	235	235
NY/NJ	Empire Wind 1 and 2 of OCS-A 0512	COP, PPA			39	39	39			11	11	11			569	569	278
NY/NJ	Atlantic Shores OCS-A 0499	COP			157	157	157			44	44	44			480	480	480
NY/NJ	OCS-A 0498 remainder	This group may support up to approximately 3,480 MW of development (290 turbines) from NJ and NY.			43	43	43			12	12	12			211	211	211.2
	Remaining NY/NJ Lease Area Total	100%			43	43	43			12	12	12			211	211	211
	TOTAL NY/NJ LEASES				**308**	**309**	**309**			**86**	**86**	**86**			**1,495**	**1,495**	**1,205**

Region	Lease/Project/ Lease Remainder[1]	Status	Offshore Export Cable Hard Protection (Acres)[19]					Anchoring Disturbance (Acres)[20]					Inter-array Construction Footprint/ Seabed Disruption (Acres)[21]				
			Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA			14	14	14			4	4	4			38	38	38
DE/MD	US Wind, part of OCS-A 0490	COP, PPA			68	68	68			19	19	19			300	300	300
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.			85.68	85.7	85.68			24	24	24			216	216	216
DE/MD	OCS-A 0519 remainder																
	Remaining DE/MD Lease Area Total	100%			86	86	86			24	24	24			216	216	216
	TOTAL DE/MD LEASES				**168**	**168**	**168**			**47**	**47**	**47**			**554**	**554**	**554**
VA/NC	CVOW, OCS-A 0497	Built			10	10	10			3	3	3			5	5	5
VA/NC	Dominion Commercial lease, OCS-A 0483	COP			149	149	149			42	42	42			492	492	492
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP			32	32	32			9	9	9			144	144	96
VA/NC	Avangrid remainder of OCS-A 0508	60% of the lease area, approximately 96 positions under similar spacing as Kitty Hawk Wind COP			43	43	43			12	12	12			226	226	226
	TOTAL VA/NC LEASES				**191**					**53**					**641**		
	OCS Total[24, 25]:		**173**		**1,390**			**41**		**1,641**			**936**		**5,720**		

Table E4-6. Offshore Wind Leasing Activities on the U.S. East Coast: Projects and Assumptions (as of May 1, 2021) (part 6)

Region	Lease/Project/ Lease Remainder[1]	Status	Inter-array Operating Footprint/ Seabed Disruption (Acres)[22]					Inter-array Cable Hard Protection (Acres)[23]					Total of Coolant fluids in WTGs (gallons)					
			Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
NE	Block Island (state waters)	Built			0.1	0.1	0.1			0.01	0.01	0.01						
	Total State Waters				0.1	0.1	0.1			0.01	0.01	0.01						
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA	90	90	90	90	90	63	63	63	63	47	26,226	26,226	26,226	26,226	26,226	26,226
MA/RI	South Fork (Proposed Action), OCS-A 0517	COP, PPA	23	23	23	23	17	23		12	12	9		6,345		6,345	6,345	4,583
MA/RI	Sunrise, OCS-A 0530	COP, PPA	154	177	177	177	107	133		133	133	133	418,948	364,004		418,948	418,948	418,948
MA/RI	Revolution, OCS-A 0486	COP, PPA	146	146	146	146	107	146		75	75	56	343,400	343,400		343,400	343,400	343,400
MA/RI	Vineyard Wind South OCS-A 0501 (includes Park City Wind)[abc]	COP, PPA			179	179	146			179	179	146	332,411					
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA			217	217	216			217	217	216						
MA/RI	Beacon Wind, part of OCS-A 0520	PPA			152	152	152			152	152	152						
MA/RI	Bay State Wind Project, part of OCS-A 0500[d]	COP (unpublished), the MW is included in the description below in the 5,148 MW.			133	133	133			133	133	133						
MA/RI	Liberty Wind, part of OCS-A 0522[d]	This group is exposed to 5,800 MW of demand--for MA (4,000 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 5,148 MW.	175.897		482	482	482	176		482	482	482	49,914	5,922		136,629	136,629	136,629
MA/RI	OCS-A 500 remainder[d]																	
MA/RI	OCS-A 0487 remainder[d]																	
MA/RI	OCS-A 0520 remainder[d]																	
MA/RI	OCS-A 0522 remainder[d]																	
	Remaining MA/RI Lease Area Total[2]	99%	173	0	756	756	756	0	0	0	482	482	87,197	31,291	0	215,698	215,698	215,698
	Total MA/RI Leases[2]		**587**	**436**	**1,873**	**1,873**	**1,724**	**365**	**63**	**964**	**1,446**	**1,372**	**1,208,182**	**771,266**	**26,226**	**1,010,617**	**1,010,617**	**1,008,854**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA			143	143	143			0	0	0				39,690	39,690	39,690
NY/NJ	Empire Wind 1 and 2 of OCS-A 0512	COP, PPA			178	178	178			0	0	0				112,812	112,812	206664
NY/NJ	Atlantic Shores OCS-A 0499	COP			300	300	300			0	0	0				686,800	686,800	686,800
NY/NJ	OCS-A 0498 remainder	This group may support up to approximately 3,480 MW of development (290 turbines) from NJ and NY.			129	129	128.7			0	0	0				302,192	302192	302192
	Remaining NY/NJ Lease Area Total	100%			129	129	129			0	0	0				302,192	302,192	302,192
	TOTAL NY/NJ LEASES				**750**	**750**	**750**			**0**	**0**	**0**				**1,141,494**	**1,141,494**	**1,235,346**

Region	Lease/Project/ Lease Remainder[1]	Status	Inter-array Operating Footprint/ Seabed Disruption (Acres)[22]					Inter-array Cable Hard Protection (Acres)[23]					Total of Coolant fluids in WTGs (gallons)					
			Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA			24	24	24			0	0	0				6,768	6,768	6,768
DE/MD	US Wind, part of OCS-A 0490	COP, PPA			184	184	184			0	0	0				52,875	52,875	52,875
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.			481.91	481.91	481.91			0	0	0				38070	38070	38070
DE/MD	OCS-A 0519 remainder																	
	Remaining DE/MD Lease Area Total	100%			482	482	482			0	0	0				38,070	38,070	38070
	TOTAL DE/MD LEASES				**691**	**691**	**691**			**0**						**97,713**		
VA/NC	CVOW, OCS-A 0497	Built			3	3	3			0	0	0				846	846	846
VA/NC	Dominion Commercial lease, OCS-A 0483	COP			297	297	297			0	0	0				86,715	86,715	86715
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP			87	87	59			0	0	0				25,380	25,380	16,920
VA/NC	Avangrid remainder of OCS-A 0508	60% of the lease area, approximately 96 positions under similar spacing as Kitty Hawk Wind COP			137	137	137			0	0	0				39,762	39,762	39,762
	TOTAL VA/NC LEASES				**388**					**0**						**112,941**		
	OCS Total[24, 25]:		**587**		**3,701**			**365**		**964**						**2,362,765**		

Table E4-7. Offshore Wind Leasing Activities on the U.S. East Coast: Projects and Assumptions (as of May 1, 2021) (part 7)

Region	Lease/Project/ Lease Remainder[1]	Status	Total Coolant fluids in ESP (gallons)						Total of Oils and Lubricants in WTGs (gallons)						Total Oils and Lubricants in ESP (gallons)					
			Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
NE	Block Island (state waters)	Built																		
	Total State Waters																			
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA	23	23	23	23	23	23	237,460	237,460	237,460	237,460	237,460	237,460	61,780	61,780	61,780	61,780	61,780	61,780
MA/RI	South Fork (Proposed Action), OCS-A 0517	COP, PPA		23		23	23	27		57,450		57,450	57,450	41,492		61,780		61,780	61,780	72,076
MA/RI	Sunrise, OCS-A 0530	COP, PPA	46	46		46	46	46	402,966	350,118		402,966	402,966	241,119	317,640	317,640		317,640	317,640	317,640
MA/RI	Revolution, OCS-A 0486	COP, PPA	46	46		46	46	46	330,300	330,300		330,300	330,300	242,220	159,138	159,138		159,138	159,138	132,615
MA/RI	Vineyard Wind South OCS-A 0501 (includes Park City Wind)[abc]	COP, PPA	74						319,730						254,621					
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA																		
MA/RI	Beacon Wind, part of OCS-A 0520	PPA																		
MA/RI	Bay State Wind Project, part of OCS-A 0500[d]	COP (unpublished), the MW is included in the description below in the 5,148 MW.																		
MA/RI	Liberty Wind, part of OCS-A 0522[d]	This group is exposed to 5,800 MW of demand--for MA (4,000 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 5,148 MW.	69	23		322	322	322	451,940	53,620		1,237,090	1,237,090	1,237,090	185,339	61,780		864,913	864,913	864,913
MA/RI	OCS-A 500 remainder[d]																			
MA/RI	OCS-A 0487 remainder[d]																			
MA/RI	OCS-A 0520 remainder[d]																			
MA/RI	OCS-A 0522 remainder[d]																			
	Remaining MA/RI Lease Area Total[2]	99%	45	45	0	431	431	431	789,513	283,318	0	1,953,007	1,953,007	1,953,007	185,339	121,868	0	1,157,744	1,157,744	1,157,744
	Total MA/RI Leases[2]		**234**	**183**	**23**	**569**	**569**	**573**	**2,079,970**	**1,258,646**	**237,460**	**2,981,183**	**2,981,183**	**2,715,298**	**978,517**	**722,205**	**61,780**	**1,758,081**	**1,758,081**	**1,741,854**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA				0	0	0				65,268	65,268	65,268				159,138	159,138	159,138
NY/NJ	Empire Wind 1 and 2 of OCS-A 0512	COP, PPA				0	0	0				604,824	604,824	474,092				241,719	241,719	310,665
NY/NJ	Atlantic Shores OCS-A 0499	COP				230	230	230				660,600	660,600	660,600				617,795	617,795	617,795
NY/NJ	OCS-A 0498 remainder	This group may support up to approximately 3,480 MW of development (290 turbines) from NJ and NY.				46	46	46				660600	660600	660600				123,559	123559	123559
	Remaining NY/NJ Lease Area Total	100%				46	46	46				660,600	660,600	660600				123,559	123,559	123559
	TOTAL NY/NJ LEASES					**276**	**276**	**276**				**1,991,292**	**1,991,292**	**1,860,560**				**1,142,211**	**1,142,211**	**1,211,157**

Region	Lease/Project/ Lease Remainder[1]	Status	Total Coolant fluids in ESP (gallons)						Total of Oils and Lubricants in WTGs (gallons)						Total Oils and Lubricants in ESP (gallons)					
			Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA				46	46	46				61,280	61,280	61,280				61,780	61,780	61,780
DE/MD	US Wind, part of OCS-A 0490	COP, PPA				184	184	184				478,750	478,750	478,750				247,118	247,118	247,118
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.				322	322	322				344700	344700	344700				185338.5	185338.5	185338.5
DE/MD	OCS-A 0519 remainder																			
	Remaining DE/MD Lease Area Total	100%				69	69	69				344,700	344,700	344,700				185,339	185,339	185338.5
	TOTAL DE/MD LEASES					**299**						**884,730**						**494,236**		
VA/NC	CVOW, OCS-A 0497	Built				0	0	0				7,660	7,660	7660				0	0	0
VA/NC	Dominion Commercial lease, OCS-A 0483	COP				69						785,150	785,150	785150				185,339	185,339	185338.5
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP				23	23	23				229,800	229,800	229,800				61,780	61,780	61,780
VA/NC	Avangrid remainder of OCS-A 0508	60% of the lease area, approximately 96 positions under similar spacing as Kitty Hawk Wind COP				46	46	46				360,020	360,020	360,020				123,559	123,559	123,559
	TOTAL VA/NC LEASES					**92**						**1,022,610**						**247,118**		
	OCS Total[24, 25]:					**1,236**						**6,879,815**						**3,641,646**		

Table E4-8. Offshore Wind Leasing Activities on the U.S. East Coast: Projects and Assumptions (as of May 1, 2021) (part 8)

Region	Lease/Project/ Lease Remainder[1]	Status	Total Diesel Fuel in WTGs (gallons)						Total Diesel Fuel in ESP (gallons)						Construction Emissions NOx (tons)	Construction Emissions VOC (tons)	Construction Emissions CO (tons)	Construction Emissions PM10 (tons)	Construction Emissions PM2.5 (tons)
			Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Air	Air	Air	Air
NE	Block Island (state waters)	Built																	
	Total State Waters																		
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA	49,166	49,166	49,166	49,166	49,166	49,166	2,848	2,848	2,848	2,848	2,848	2,848	4,961	122	1,116	172	166
MA/RI	South Fork (Proposed Action), OCS-A 0517	COP, PPA		11,895		11,895	11,895	8,591		2,848		2,848	2,848	3,323	1,451	59	284	49	47
MA/RI	Sunrise, OCS-A 0530	COP, PPA	96,746	84,058		96,746	96,746	57,889	105,668	105,668		105,668	105,668	105,668	5,876	138	2,441	108	108
MA/RI	Revolution, OCS-A 0486	COP, PPA	79,300	79,300		79,300	79,300	58,153	105,668	105,668		105,668	105,668	88,057	6,691	130	1,617	220	216
MA/RI	Vineyard Wind South OCS-A 0501 (includes Park City Wind)[abc]	COP, PPA	76,762						169,069						9,014	190	2,110	355	344
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA																	
MA/RI	Beacon Wind, part of OCS-A 0520	PPA										158,502	158,502	158,502					
MA/RI	Bay State Wind Project, part of OCS-A 0500[d]	COP (unpublished), the MW is included in the description below in the 5,148 MW.										105,668	105,668	105,668					
MA/RI	Liberty Wind, part of OCS-A 0522[d]	This group is exposed to 5,800 MW of demand--for MA (4,000 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 5,148 MW.	93,574	11,102		256,139	256,139	256,139	8,544	2,848		39,872	39,872	39,872					
MA/RI	OCS-A 500 remainder[d]																		
MA/RI	OCS-A 0487 remainder[d]																		
MA/RI	OCS-A 0520 remainder[d]																		
MA/RI	OCS-A 0522 remainder[d]																		
	Remaining MA/RI Lease Area Total[2]	99%	163,468	58,661	0	404,369	404,369	404,369	5,618	5,618	0	53,371	53,371	53,371	16,388	401	3,686	569	547
	Total MA/RI Leases[2]		**465,443**	**283,080**	**49,166**	**641,476**	**641,476**	**578,169**	**388,871**	**222,650**	**2,848**	**534,573**	**534,573**	**517,437**	**44,381**	**1,040**	**11,253**	**1,474**	**1,428**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA				77,714	77,714	77,714				105,668	105,668	105,668					
NY/NJ	Empire Wind 1 and 2 of OCS-A 0512	COP, PPA				0	0	0				2,400	2,400	4,800					
NY/NJ	Atlantic Shores OCS-A 0499	COP				158,600	158,600	158,600				28,480	28,480	28,480					
NY/NJ	OCS-A 0498 remainder	This group may support up to approximately 3,480 MW of development (290 turbines) from NJ and NY.				69,784	69784	69784				5,696	5696	5696					
	Remaining NY/NJ Lease Area Total	100%				69,784	69,784	69784				5,696	5,696	5696					
	TOTAL NY/NJ LEASES					**306,098**	**306,098**	**306,098**				**142,244**	**142,244**	**144,644**					

Region	Lease/Project/ Lease Remainder[1]	Status	Total Diesel Fuel in WTGs (gallons)						Total Diesel Fuel in ESP (gallons)						Construction Emissions NOx (tons)	Construction Emissions VOC (tons)	Construction Emissions CO (tons)	Construction Emissions PM10 (tons)	Construction Emissions PM2.5 (tons)
			Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Water	Benthic	Birds/Bats/Finfish-Invertebrates-EFH/Marine Mammals/Sea Turtles/Commercial Fisheries	Navigation	Demographics/Environmental Justice/Cultural/Visual/ Recreation-Tourism/Other Uses	Air	Air	Air	Air	Air
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA				12,688	12,688	12,688				2,848	2,848	2,848					
DE/MD	US Wind, part of OCS-A 0490	COP, PPA				99,125	99,125	99,125				11,392	11,392	11,392					
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.				71370	71370	71370				8544	8544	8544					
DE/MD	OCS-A 0519 remainder																		
	Remaining DE/MD Lease Area Total	100%				71,370	71,370	71370				8,544	8,544	8544					
	TOTAL DE/MD LEASES					**183,183**						**22,784**							
VA/NC	CVOW, OCS-A 0497	Built				1,586	1,586	1586				0	0	0					
VA/NC	Dominion Commercial lease, OCS-A 0483	COP				162,565	162,565	162565				8,544	8,544	8544					
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP				47,580	47,580	31,720				2,848	2,848	2,848					
VA/NC	Avangrid remainder of OCS-A 0508	60% of the lease area, approximately 96 positions under similar spacing as Kitty Hawk Wind COP				74,542	74,542	74,542				5,696	5,696	5,696					
	TOTAL VA/NC LEASES					**211,731**						**11,392**							
	OCS Total[24, 25]:					**1,342,488**						**710,993**							

Table E4-9. Offshore Wind Leasing Activities on the U.S. East Coast: Projects and Assumptions (as of May 1, 2021) (part 9)

Region	Lease/Project/ Lease Remainder[1]	Status	Total Diesel Fuel in WTGs (gallons)	Construction Emissions SO2 (tons)	Construction Emissions CO2 (tons)	Operation Emissions NOx (tpy)	Operation Emissions VOC (tpy)	Operation Emissions CO (tpy)	Operation Emissions PM10 (tpy)	Operation Emissions PM2.5 (tpy)	Operation Emissions SO2 (tpy)	Operation Emissions CO2 (tpy)
			Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
NE	Block Island (state waters)	Built										
	Total State Waters											
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP, PPA	49,166	38	318,660	71	2	18	2	2	0.3	5,487
MA/RI	South Fork (Proposed Action), OCS-A 0517	COP, PPA		33	97,026	281	6	58	10	10	2	18,894
MA/RI	Sunrise, OCS-A 0530	COP, PPA	96,746	6	637,986	590	14	246	11	11	1	64,145
MA/RI	Revolution, OCS-A 0486	COP, PPA	79,300	21	449,456	953	14	234	31	30	1	64,391
MA/RI	Vineyard Wind South OCS-A 0501 (includes Park City Wind)[abc]	COP, PPA	76,762	53	505,810	398	7	98	13	13	1	8,710
MA/RI	Mayflower (North), part of OCS-A 0521	COP, PPA										
MA/RI	Beacon Wind, part of OCS-A 0520	PPA										
MA/RI	Bay State Wind Project, part of OCS-A 0500[d]	COP (unpublished), the MW is included in the description below in the 5,148 MW.										
MA/RI	Liberty Wind, part of OCS-A 0522[d]	This group is exposed to 5,800 MW of demand--for MA (4,000 MW remaining), CT (900 MW remaining), and RI (900 MW expected). Collectively the remaining technical capacity is 5,148 MW.	93,574									
MA/RI	OCS-A 500 remainder[d]											
MA/RI	OCS-A 0487 remainder[d]											
MA/RI	OCS-A 0520 remainder[d]											
MA/RI	OCS-A 0522 remainder[d]											
	Remaining MA/RI Lease Area Total[2]	99%	163,468	127	1,052,650	234	7	60	8	8	1	18,126
	Total MA/RI Leases[2]		**465,443**	**277**	**3,061,587**	**2,527**	**49**	**712**	**75**	**74**	**5**	**179,752**
NY/NJ	Ocean Wind, part of OCS-A 0498	COP, PPA										
NY/NJ	Empire Wind 1 and 2 of OCS-A 0512	COP, PPA										
NY/NJ	Atlantic Shores OCS-A 0499	COP										
NY/NJ	OCS-A 0498 remainder	This group may support up to approximately 3,480 MW of development (290 turbines) from NJ and NY.										
	Remaining NY/NJ Lease Area Total	100%										
	TOTAL NY/NJ LEASES											

Region	Lease/Project/ Lease Remainder[1]	Status	Total Diesel Fuel in WTGs (gallons)	Construction Emissions SO2 (tons)	Construction Emissions CO2 (tons)	Operation Emissions NOx (tpy)	Operation Emissions VOC (tpy)	Operation Emissions CO (tpy)	Operation Emissions PM10 (tpy)	Operation Emissions PM2.5 (tpy)	Operation Emissions SO2 (tpy)	Operation Emissions CO2 (tpy)
			Air	Air	Air	Air	Air	Air	Air	Air	Air	Air
DE/MD	Skipjack, part of OCS-A 0519	COP, PPA										
DE/MD	US Wind, part of OCS-A 0490	COP, PPA										
DE/MD	GSOE I, OCS-A 0482	Collectively the technical capacity of this is group is 1,080 MW (90 turbines). The remaining capacity may be utilized by demand from NJ or MD.										
DE/MD	OCS-A 0519 remainder											
	Remaining DE/MD Lease Area Total	100%										
	TOTAL DE/MD LEASES											
VA/NC	CVOW, OCS-A 0497	Built										
VA/NC	Dominion Commercial lease, OCS-A 0483	COP										
VA/NC	Kitty Hawk Wind, OCS-A 0508	COP										
VA/NC	Avangrid remainder of OCS-A 0508	60% of the lease area, approximately 96 positions under similar spacing as Kitty Hawk Wind COP										
	TOTAL VA/NC LEASES											
	OCS Total[24, 25]:											

Notes: COP = Construction and Operations Plan, CT = Connecticut, DE = Delaware, EFH =essential fish habitat, FDR = Facility Design Report, FIR = Fabrication and Installation Report, MA = Massachusetts, MD = Maryland, MW = megawatt, NE = New England, NJ = New Jersey, nm = nautical mile, NY = New York, OSS = offshore substation, PPA = Power Purchase Agreement, RAP = Research Activities Plan, RI = Rhode Island, tpy = tons per year, WTG = wind turbine generator

1. The spacing/layout for projects/regions are as follows: NE State water projects include a single strand of WTGs and no OSSs; for projects in the RI and MA Lease Areas, a 1 × 1–nm grid spacing is assumed; for the projects in the New Jersey/New York and the Delaware/Maryland lease areas, BOEM assumes that a 1 × 1–nm grid spacing also would be utilized; for the Coastal Virginia Offshore Wind Project, the spacing is 0.7 nm; and the Dominion commercial lease area off the coast of Virginia would utilize 0.5 nm average spacing, which is less than the 1 × 1–nm spacing due to the need to attain the state's goals.
2. Because development could occur anywhere within the RI and MA Lease Areas and assumes a continuous 1 x 1–nm grid, the actual development for these projects is expected to be approximately 73% of the collective technical capacity. Under the cumulative scenario described in in this appendix (Appendix E), the total area in the RI and MA Lease Areas is greater than the area needed to meet state demand. Therefore, if a project is not constructed, BOEM assumes that another future project would be constructed to fulfill the unmetdemand.
3. This column identifies lease areas that are applicable to each resource based on the geographic analysis areas shown in Attachment 1 of this appendix.
4. The estimated construction schedule is based on information known at the time of this analysis and could be different when an applicant submits a COP. Furthermore, for this cumulative analysis BOEM assumes that construction of all the foundations would be installed during year 1 of construction and the balance of the work would be completed in year 2.
5. It is difficult to accurately predict future technology for planned but currently unscheduled offshore wind awards, including turbine spacing and capacity. For those projects with announced WTG sizes, BOEM used the assumption of an 8- or 12-MW WTG based on maximum-impact case for the resource. BOEM understands that it is feasible that in the future, turbine capacity could be greater than 12 MW. For future procurements and projects under this cumulative analysis, BOEM assumes the largest turbine that is presently commercially available, a 12-MW WTG, to evaluate potential impacts.
6. The generating capacity for the lease areas within the air quality geographic analysis area without a known project size has been assumed to be a percentage of the technical capacity (7,304 MW). The percentage (73%) has been calculated based on the amount of lease area acreage for the specific lease areas (359,146 acres [1,453 km^2]) divided by the remaining “RI and MA Lease Areas” total (491,515 acres [1,989 km^2]). The air quality geographic analysis area includes 100% of the following leases: Bay State Wind Project, part of OCS-A 0500; OCS-A 0500 and OCS-A 0487 remainder; OCS-A 0520 (Equinor Massachusetts); and OCS-A 0521 remainder.
7. The generating capacity for the lease areas within the water quality geographic analysis area without a known project size has been assumed to be a percentage of the technical capacity (7,304 MW). The percentage (63%) has been calculated based on the amount of lease area acreage for the specific lease areas (310,041 acres [1,255 km^2]) divided by the remaining “RI and MA Lease Areas” total (491,515 acres [1,989 km^2]). The water quality geographic analysis area includes the following leases: 100% of Bay State Wind Project, part of OCS-A 0500; 22% of OCS-A 0500 and OCS-A 0487 remainder; and 63% of OCS-A 0520 (Equinor Massachusetts).
8. The generating capacity for the lease areas within the benthic resources geographic analysis area without a known project size has been assumed to be a percentage of the technical capacity (7,304 MW). The percentage (63%) has been calculated based on the amount of lease area acreage for the specific lease areas (310,041 acres [1,255 km^2]) divided by the “MA/RI Lease Area” total (491,515 acres [1,989 km^2]). The benthic resources geographic analysis areas includes the following leases: 100% of the Bay State Wind Project, part of OCS-A 0500; 9% of OCS-A 0500 and OCS-A 0487 remainder; and 63% of OCS-A 0520 (Equinor Massachusetts).
9. BOEM assumes that each offshore wind development would have its own cable (both onshore and offshore) and that future projects would not utilize a regional transmission line. The length of offshore export cable for those lease areas without a known project size has been assumed to include two offshore cables totaling 120 miles (193 kilometers). The offshore export cable would be buried a minimum of 6 feet (1.8 meters) but not more than 10 feet (3.1 meters).
10. The length of inter-array cabling has been assumed for all lease areas, except the SFWF and Vineyard Wind 1 which have been calculated by the applicant, to be the average amount per foundation based on the COPs submitted to date, which is 1.48 miles (2.4 kilometers). In addition, for those lease areas that require more than one OSS, it has been assumed that an additional 6.2 miles (9.9 kilometers) of inter-link cable would be required to link the two OSSs. Inter-array cable is assumed to be buried between 4 and 6 feet.
11. The hub height for lease areas is based on worst-case scenario for the resource area.
12. The rotor diameter for lease areas is based on worst-case scenario for the resource area.
13. The total height of the turbine for lease areas is based on worst-case scenario for the resource area.
14. The number of turbines for those lease areas without a known project size has been calculated based on the generating capacity and a 12-MW turbine.
15. The estimated number of foundations is the total number of turbines plus OSSs, and it has been assumed that for every 50 turbines there would be one OSS installed. There are some exceptions to this assumption where additional relevant information is available in publicly available COPs for future projects.
16. The foundation footprint has been assumed to be 0.1 acre, which is based on the largest monopile reported (12 MW) for all lease areas other than the SFWF and Vineyard Wind 1, which have been calculated by the applicant.
17. The seabed disturbance with the addition of scour protection was calculated based on scour protection expected in submitted COPs. It is assumed that for all lease areas that a 12-MW foundation with addition of scour protection would be 1.0 acre per foundation other than SFWF and Vineyard Wind 1, which have been calculated by the applicant.
18. Offshore export cable seabed bottom disturbance is assumed to be due to installation of the export cable, the use of jack-up vessels, and the need to perform dredging.
19. For projects other than the SFWF, which has been calculated by the applicant, the offshore export cable hard protection is assumed to be similar to Vineyard Wind 1 Project, which is 0.357 acre (1.445 square meters [m^3]) per mile of offshore export cable. It is assumed that 10% of the offshore export cable would require protection.
20. Anchoring disturbance for the SFWF has been calculated by the applicant. Anchoring disturbance for other lease areas has been assumed to be a rate equal to 0.10 acres (405 m^3) per mile of offshore export cable, with the exception of Vineyard Wind 1 Project, which is 0.044 acres per mile of offshore export cable.
21. Inter-array construction seabed disturbance for the SFWF has been calculated by the applicant. Inter-array construction seabed disturbance for other lease areas has been assumed to be a rate equal to the average area per foundation, 2.4 acres (9.712 m^3) per foundation, with the exception of Vineyard Wind 1 Project, which is 2.04 acres (8.256 m^3) per foundation.

22. The inter-array operating footprint for the SFWF has been calculated by the applicant. The inter-array operating footprint for other lease areas is assumed to be a rate equal to the average amount per foundation of 1.43 acres (5.787 m^3) per foundation for all other lease areas.
23. Inter-array cable hard protection for the SFWF has been calculated by the applicant. The inter-array cable hard protection for other lease areas is assumed to be zero for all other lease areas with the exception of Vineyard Wind 1 Project, Vineyard Wind South OCS-A 5001, and Revolution Wind OCS-A 0486.
24. BOEM recognizes that the estimates presented within this cumulative analysis are likely high, conservative estimates; however, BOEM believes that this analysis is appropriately capturing the potential cumulative impacts and errs on the side of maximum impacts. Totals by lease area and by OCS may not fully sum due to rounding errors.
25. New York's demand is not double-counted, this total comes from looking at New York's state demand, not adding up the potential of the areas because that would double-count New York.

a. The construction and operations plan for the southern portion of OCA-A 0501 contemplates fully developing the remaining lease area as part of the northeast leases' 1 × 1–nm grid over two phases.

b. CO_2 estimated based on project size relative to other projects.

c. Emissions values represent 80% of the total for this development, as only 80% of the development lies within the geographic scope of direct impacts from the proposed action.

d. Emissions estimated by taking the average for each pollutant per foundation for the most advanced commercial plan, Vineyard Wind 1 (13-MW turbine), and multiplying by the number of foundations in remainder/unspecified area within air quality scope.

e. Emissions values represent 5% of the total for this development, as only 5% of the development lies within the geographic scope of direct impacts from the proposed action.

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LITERATURE CITED

Bureau of Ocean Energy Management (BOEM). 2019. *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf*. Available at: https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/IPFs-in-the-Offshore-Wind-Cumulative-Impacts-Scenario-on-the-N-OCS.pdf. Accessed December 2020.

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APPENDIX F

Supplemental Information

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CONTENTS

Figures

Tables

INTRODUCTION

This appendix provides information by resource, as applicable, that supplements the information provided in the South Fork Wind Farm (SFWF) and South Fork Export Cable (SFEC) Project environmental impact statement (EIS).

AVIAN AND BAT POST-CONSTRUCTION MONITORING FRAMEWORK

Introduction

South Fork Wind, LLC (SFW) is proposing the approximately 130-megawatt (MW) SFWF Project located in the Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0517 (Lease Area). The Project will consist of up to 15 wind turbine generators (WTGs) with a capacity of 6 to 12 MW per turbine, submarine cables between the WTGs, and an offshore substation. This SFWF Avian and Bat Post-Construction Monitoring Framework (hereafter the Framework) focuses solely on the offshore footprint of the Project within the Lease Area and does not apply to the offshore export cable, cable landfall, or onshore portions of the Project.

SFW has developed this Framework to outline an approach to post-construction monitoring that supports advancement of the understanding of bird and bat interactions with offshore wind farms. It addresses the monitoring options set forth in Section 3.4.3.4 of the SFW draft environmental impact statement (draft EIS) (BOEM 2021a) and Section 6.1.2 in the SFW biological assessment (BA) (BOEM 2021b) and associated U.S. Fish and Wildlife Service (USFWS) concurrence letter (dated March 4, 2021). The scope of monitoring is designed to meet federal requirements (30 CFR 585.626(b)(15) and 585.633(b)) and is scaled to the size and risk profile of the Project with a focus on species of conservation concern.

The intent of the Framework is to outline overarching monitoring objectives, proposed monitoring elements, and reporting requirements. A detailed Avian and Bat Post-Construction Monitoring Plan (Monitoring Plan), based on this Framework, will be developed in coordination with BOEM, the USFWS, and other relevant regulatory agencies. Where feasible, monitoring conducted at the SFWF will be coordinated with monitoring at other Ørsted offshore wind projects in the Northeast region to facilitate integrated analyses across a broader geographic area.

Monitoring objectives and associated methods are summarized in Table F-1. Technical approaches were selected based on offshore logistical constraints, their ability to address monitoring objectives, and the effectiveness in the marine environment. Emerging technologies, such as multi-sensor radar/camera collision detection systems, are not proposed under this Framework because they have not yet been broadly deployed offshore or demonstrated to effectively reduce uncertainties related to potential impacts on birds and bats.

Table F-1. Monitoring Objectives, General Approaches to Be Used, and Types of Data Generated

Taxa	SFWF Monitoring Objective	Approach	Duration	Data Output
Bats	Monitor occurrence of bats	Acoustics	2 years	Presence; temporal and weather patterns
Birds	Monitor occurrence of nocturnal migratory birds	Acoustics	2 years	Presence; temporal and weather patterns
Birds	Determine use by roseate terns	Radio-tags	Up to 3 years	Presence; temporal and weather patterns
Birds	Conduct behavior observations around turbines	Boat-based observers	1 year	Species, flight height, activity, avoidance behavior
Both	Document mortality	Incidental observations	Project lifetime	Incidence, identification

Bat Acoustic Monitoring

The presence of bats in the marine environment has been documented in the United States (BOEM 2013; Cryan and Brown 2007; Dowling et al. 2017; Grady and Olson 2006; Hatch et al. 2013; Johnson et al. 2011). However, there remains uncertainty regarding the extent to which bats occur offshore, particularly within offshore wind farms. Acoustic detectors are commonly used to study bat movements and migration (Johnson et al. 2011). SFW will conduct bat acoustic monitoring to assess bat activity at the SFWF, targeting key data gaps related to species presence/composition, temporal patterns of activity, and correlation with weather and atmospheric conditions.

Acoustic monitoring of bat presence will be conducted for 2 years post-construction. Two ultrasonic bat detector stations will be installed on the offshore substation, wind turbine platforms, and/or buoys in early spring or late winter (March) and removed in late fall or early winter (December) after migration, or the most appropriate period, as determined in cooperation with BOEM, the USFWS, and other relevant regulatory agencies. The detectors will record calls of both cave-hibernating bats, including the northern long-eared bat (*Myotis septentrionalis*), and migratory tree bats; the resulting information can be used to identify bats to species. All acoustic data recorded will be processed with approved software to filter out poor-quality data and identify the presence of bat calls. High-frequency calls will then be classified by an experienced acoustician to the highest resolution possible (e.g., species, genus, family).

All bat calls detected and identified will be analyzed to understand relationships with time of day, season, and weather/atmospheric conditions. The results will provide information on bat presence offshore and the conditions under which they may occur near offshore wind turbines.

Nocturnal Migratory Bird Acoustic Monitoring

Some North American breeding songbirds are known to migrate over the Atlantic OCS (Adams et al. 2015a, 2015b; Drury and Keith 1962), but there is uncertainty about the extent to which migrants use the offshore environment. Acoustic detectors are commonly used to study songbird migration (Farnsworth 2005) and have been used at offshore wind facilities (Hüppop et al. 2016), including at the Block Island Wind Farm (Stantec 2018). SFW will conduct avian acoustic monitoring to assess nocturnal migratory songbird occurrence in the SFWF, targeting key data gaps related to species presence/composition, temporal patterns of offshore activity, and correlation to weather conditions.

Acoustic monitoring for birds will be conducted for 2 years post-construction. Two acoustic detector stations will be installed at the substation and/or buoy to collect data from spring through fall during each monitoring year, capturing both migratory periods; detector stations will not be installed on wind turbines due to sound interference from turbine blades. The acoustic data will be processed through a filter and then a final species group identification will be conducted by a qualified biologist. Given the potential for large numbers of acoustic detections, the acoustic data could be sub-sampled to focus on peak migration periods, as well as nights when migration rates are expected to be high, based on factors such as weather conditions and results from NEXRAD radar data (e.g., Welcker and Vilela 2020).

Acoustic data on birds will be analyzed to determine which species are migrating through the SFWF, and identify any relationships with time of day, season, and weather/atmospheric conditions. The results will provide information on the presence of vocalizing nocturnal migrants offshore and the conditions under which they may occur near offshore wind turbines.

Motus Tracking Network and Roseate Tern Use Study

Tracking studies indicate that at least some individual Endangered Species Act (ESA)–listed roseate terns (*Sterna dougallii*) pass through the Rhode Island/Massachusetts Wind Energy Area (RI/MA WEA), within which the SFWF is located (Loring et al. 2018, 2019). However, due to limited coverage of onshore automated telemetry receiving stations and low probability of detecting tags (hereafter, Motus receivers and tags) in the offshore environment (Loring et al. 2019), there remains uncertainty related to offshore movements of roseate terns during migration in the vicinity of the SFWF. SFW will install offshore Motus receiver stations and contribute funding to a roseate tern radio-tagging effort to address this data gap. The Motus receivers will also provide opportunistic presence/absence data on other species carrying Motus tags, such as piping plover (*Charadrius melodus*), red knot (*Calidris canutus rufa*), migratory songbirds, and bats.

Movements of radio-tagged roseate terns in the vicinity of the SFWF will be monitored for up to 3 years post-construction, during spring, summer, and fall. Motus receivers will be installed at up to four locations within the SFWF to determine the presence/absence of ESA-listed species. The specific number and location of offshore receiver stations will be selected to optimize coverage and will be determined using a design tool currently being developed through a New York State Energy Research and Development Authority (NYSERDA)–funded project.[1] In addition, existing Motus receiver stations at up to two onshore locations near the SFWF (e.g., Block Island, Buzzards Bay) will be refurbished to confirm the presence and movements of radio-tagged roseate terns in waters adjacent to the SFWF (refurbishment needs will be discussed with the USFWS). Funding for up to 50 Motus tags per year will be provided to researchers working with roseate terns for up to 3 consecutive years.

Roseate tern presence/absence in the SFWF will be analyzed by comparing detections within the wind farm to coastal receiver towers. All detections will be analyzed to understand relationships with time of day, season, and weather. The results will provide data on if tagged terns occur in the SFWF.

Ship-Based Avian Point Count Surveys

While marine bird collision and displacement vulnerability has been well researched in Europe (Goodale and Milman 2016), these studies have been conducted on relatively small turbines. There is a data gap on how species that are vulnerable to collision, such as gulls, will behave around the larger SFWF turbines and if birds vulnerable to displacement will fly between turbines spaced 1 nautical mile apart. To rapidly collect data on bird behavior, SFW will use vessel-based field biologists to conduct observations of birds around the turbines using traditional behavioral study methods such as time-activity budgets. The data collected through field observation will increase understanding in the following areas: 1) avoidance and attraction to the turbines; 2) changes in flight height and speed in relation to distance from the turbines and the rotor-swept zone; and 3) general behavior of birds near turbines.

[1] https://www.briloon.org/renewable/automatedvhfguidance.

Monitoring of bird behavior around turbines in the SFWF will occur for 1 year post-construction (two surveys per seasons for a total of eight surveys). The exact number of point counts will be determined in consultation with BOEM, the USFWS, and other relevant regulatory agencies. Point count surveys will be designed to document bird movement behavior at micro- and meso-scales around turbines, including flight height, position relative to turbines, perching behavior, movement, and behavior. Observations will be made from a survey vessel, with flight height estimates potentially aided by laser rangefinders or other measuring technology.

Point count and focal-animal sampling data will be analyzed to determine the extent of interaction of different bird species with turbines. Metrics relative to turbines, such as mean closest approach and range, flight height relative to behavior, time spent in different behaviors, perching time, and other behavioral metrics, will provide quantitative information on collision and displacement vulnerability.

Documentation of Dead and Injured Birds and Bats

SFW, or its designated operator, will implement a reporting system to document dead or injured birds or bats found incidentally on vessels and project structures during construction, operation, and decommissioning. The location will be marked using a global positioning system; an Incident Reporting Form will be filled out; and digital photographs taken. Any animals detected that could be ESA-listed, will have their identity confirmed by consulting biologists and a report will be submitted to the designated staff at SFW, who will then report it to BOEM, the USFWS, and other relevant regulatory agencies. Carcasses with federal or research bands or tags will be reported to the U.S. Geological Survey Bird Band Laboratory, BOEM, and the USFWS.

Adaptive Monitoring

Adaptive monitoring is an important principle underlying SFW's post-construction monitoring Framework. Over the course of monitoring, SFW will work with BOEM, the USFWS, and other relevant regulatory agencies to determine the need for adjustments to monitoring approaches, consideration of new monitoring technologies, and/or additional periods of monitoring based on an ongoing assessment of monitoring results. Potential triggers for adaptive monitoring may include, but not be limited to, equipment failure, an unexpected impact to birds or bats identified through monitoring, or new opportunities to collaborate with adjacent project(s). The monitoring plan will include a series of potential adaptive monitoring actions, developed in coordination with BOEM, the USFWS, and other relevant regulatory agencies, to be considered as appropriate.

Reporting

SFW will submit an annual report to BOEM and the USFWS summarizing post-construction monitoring activities, preliminary results as available, and any proposed changes in the monitoring program. SFW will participate in an annual meeting with BOEM and the USFWS to discuss the report.

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COMMERCIAL FISHERIES AND FOR-HIRE RECREATIONAL FISHING

Information in this section provides an overview of the commercial fisheries data used in EIS Section 3.5.1 Commercial Fisheries and For-Hire Recreational Fishing.

Overview of Commercial Fisheries Data Used in the Environmental Impact Statement Section 3.5.1

The primary source of data was summarized Vessel Trip Report (VTR) data provided by NMFS (2021a). Included were annual VTR data (2008–2019) for specific geographic areas relevant to the Project showing commercial fishing revenue, trips, and the number of unique vessels for each fishery management plan (FMP) fishery, species, gear, and port of landing.[2] These data were also used to analyze the distribution of commercial fishing revenue from the SFWF Lease Area across fishing vessels. In addition, the VTR data provided by NMFS (2021a) described the activities of for-hire recreational fishing vessels, including landings by species and the number of angler trips by port.

[2] NMFS requires all federally permitted commercial fishing vessels (with the exception of those vessels that only have a lobster permit) to submit a VTR for every fishing trip (50 CFR 648.7). The VTR data provide a broad census of fishing activity that encompasses the majority of commercial fisheries active near the SFWF and offshore SFEC. VTRs include a single fishing location (reported in latitude and longitude coordinates) for each trip. VTR location information is only an approximation of fishing activity, particularly with respect to use of mobile gear, because fishermen self-report only one set of coordinates for a fishing trip, despite the fact that one trip may include multiple gear tows that take place in many different locations across a much wider area. VTR instructions require that fishermen record the haulback position where most of the fishing occurred (NMFS 2020).

A fisherman with a vessel with a federal lobster permit is only required to fill out a VTR if he or she has another federal permit. Approximately 63% of the lobster fleet fishing in statistical area 537, which encompasses most of the RI-MA WEA, reports through VTRs (Atlantic States Marine Fisheries Commission [ASMFC] 2018).

A second source of data was the website at NMFS (2021c), which summarizes commercial fisheries data for each proposed WEA along the U.S. Atlantic coast. These data were downloaded and used to summarize revenue at risk across all proposed offshore wind projects under the No Action alternative.

In addition, polar histograms (EIS Figure 3.5.1-1 through Figure 3.5.1-4) developed by BOEM based on NMFS Vessel Monitoring System (VMS) data provided by NMFS (2019) are included in Section 3.5.1.[3] From 2014–2019, VMS coverage levels ranged between 90% and 100% for the following FMP fisheries: Atlantic Herring; Bluefish; Mackerel, Squid, and Butterfish; Monkfish; Northeast Multispecies (large-mesh); Northeast Multispecies (small-mesh); Sea Scallop; Spiny Dogfish; Summer Flounder, Scup, Black Sea Bass; and Surfclam/Ocean Quahog. Average VMS coverage levels were lower for the following FMP fisheries: Skate (75%); Highly Migratory Species (48%); Jonah Crab (14%); and American Lobster (11%) (NMFS 2021a).

A final source of commercial fisheries revenue data was the website at BOEM (2020) under the section Socio-Economic Impact of Outer Continental Shelf Wind Energy Development on Fishing in the U.S. Atlantic. GIS data provided by the website were used to develop the revenue intensity figures provided in Appendix C. These data were also used for comparisons of alternative SFEC landfall sites, and for the assessment of impacts of the Vessel Transit Lane alternative (Transit alternative). The data provided revenue for each of the FMP fisheries in the form of raster files[4] for 2007–2018, with a separate file for each year.

The remainder of this section describes in more detail the data provided by NMFS (2021a). As indicated above, annual data were provided for seven specific geographic areas relevant to the Project, as shown in Table F-1. Tables F-2, F-3, and F-4 show the FMP fisheries, gears, and ports for which NMFS GARFO provided annual data subject to data confidentiality restrictions.[5]

Table F-1. Specific Geographic Areas for Which NMFS GARFO Provided VTR Data

Areas Directly Related to the Proposed Action	Areas Directly Related to the Transit Alternative	Other Relevant Areas
Lease Area (OCS-A 0517)	Reduced Lease Area (OCS-A 0517)	RI-MA WEA
Maximum work area (MWA)	Reduced MWA	Areas specifically excluded by BOEM from the RI-MA WEA
Offshore Export Cable to Beach Lane	Adjusted Offshore Export Cable to Beach Lane	All areas in the mid-Atlantic and New England region managed by NMFS
Offshore Export Cable to Hither Hills	Adjusted Offshore Export Cable to Hither Hills	

[3] VMS data are generated from automated transmissions from transponders that are required to be on board and operating whenever permitted vessels are fishing or transiting with the intent to harvest fish or shellfish. Data are transmitted once every 60 minutes for all FMPs except for the Sea Scallop FMP, which are transmitted once every 30 minutes. Each transmission includes the current directional bearing and vessel speed as well as the average bearing and vessel speed since the last transmission. Using the average vessel speed, NMFS uses an algorithm to assign an assumed activity (either fishing or transiting) to each transmission.

[4] A raster file is a matrix of cells organized into rows and column where each cell contains a value representing information about the cell. The raster files in the BOEM GIS data sets are 500 meters on each side and show the revenue that was estimated to have been generated from that cell. A raster file for a widely utilized FMP on the U.S. East Coast could contain 4 million or more cells, each representing the revenue generated in a 500 × 500–meter cell.

[5] In general, NMFS GARFO requires that a no less than three vessels and three dealers be included in any data point released to the public. FMP fishery, gear, or port data that did not meet these data confidentiality requirements were combined into a "Non-Disclosed" bin.

Table F-2. FMP Fisheries for Which NMFS GARFO Provided VTR Data

American Lobster	Atlantic Herring	Bluefish	Golden and Blueline Tilefish
Highly Migratory Species	Jonah Crab	Mackerel, Squid, and Butterfish	Northeast Multispecies (large-mesh)
Monkfish	Sea Scallop	Skate	Northeast Multispecies (small-mesh)
Spiny Dogfish	No federal FMP	Surfclam, Ocean Quahog	Summer Flounder, Scup, Black Sea Bass
Non-Disclosed FMPs			

Table F-3. Gears for Which NMFS GARFO Provided VTR Data

Dredge-clam	Dredge-scallop	Gillnet-other	Gillnet-sink
Handline	Longline-bottom	Other gears	Pot-other
Trawl-bottom	Trawl-midwater	Non-disclosed gears	

Table F-4. Ports for Which NMFS GARFO Provided VTR Data

New London, CT	Stonington, CT	Barnstable, MA	Boston, MA	Chatham, MA	Chilmark, MA
Fairhaven, MA	Fall River, MA	Falmouth, MA	Gloucester, MA	Harwichport, MA	Menemsha, MA
Nantucket, MA	New Bedford, MA	Sandwich, MA	Westport, MA	Vineyard Haven, MA	Woods Hole, MA
Beaufort, NC	Wanchese, NC	Atlantic City, NJ	Belford, NJ	Cape May, NJ	Point Pleasant, NJ
Freeport, NY	Greenport, NY	Hampton Bays, NY	Montauk, NY	Other Ny, NY	Shinnecock, NY
Bristol, RI	Davisville, RI	Little Compton, RI	Newport, RI	New Shoreham, RI	North Kingstown, RI
Point Judith, RI	Tiverton, RI	Chincoteague, VA	Hampton, VA	Newport News, VA	Non-disclosed ports

Average Annual Revenues and Non-Disclosure Issues

In general, Section 3.5.1 provides information on the average annual revenue over the 2008–2018 period. However annual data were provided only for the years for which data could be disclosed. If an annual data-point for a given FMP, gear, or port within a given geographic area could not be disclosed because there were insufficient number of vessels or dealers, then NMFS-GARFO added the data-point to a "non-disclosed" category. By combining all the data-points that could not disclosed, NMFS-GARFO was able to report to the annual total revenue for every year. However, this methodology for reporting non-disclosed data points hampers accurate estimation of average annual revenue because there were often non-disclosed data for 1 or more years, particularly if the geographic area is small, or if there were relatively low levels of participation. Table F-5 is provided to demonstrate these issues.

Table F-5 shows the annual data for gears as provided by NMFS-GARFO for the SFWF Lease Area. Note that for nine of the gear types for which data were provided, there were no revenues reported for the SFWF Lease Area. For two gear types, fewer than 12 years of data were reported—there were 5 years of data reported for dredge-clam gear and 11 years reported for trawl-midwater gear. It is not possible to determine whether a gear that was not reported for a year had zero landings and revenue and thus were not provided, or whether there were landings and revenues, but they could not be disclosed because of data confidentiality restrictions. Due to these restrictions, the analytical team determined that unless six or more data points of the 12-year period from 2008 to 2019 were available, the data for that row could not be reported. Further, the analytical team determined that the average for rows that had 6 or more years of data that the "annual average" revenue would be calculated as the total reported revenue for the period divided by the number of reported years. Thus, in Table 3.5.1-11, the annual average revenue for dredge-clam gear is shown as NA (not available) and the revenues—estimated to be $64,100 in revenue from the 5 reported years—are assigned to the “All other gear” category.

Table F-5. National Marine Fisheries Service-Greater Atlantic Regional Fisheries Office Commercial Fishing Annual Revenue Data for the SFWF Lease Area

Gear	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Reported Years
Dredge-clam	ND	$11.6	$11.3	ND	$8.3	ND	ND	$16.2	$16.8	ND	ND	ND	5
Dredge-other	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0
Dredge-scallop	$47.9	$87.6	$20.8	$36.0	$0.7	$8.5	$27.0	$24.2	$19.4	$13.1	$3.1	$25.3	12
Gillnet-other	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0
Gillnet-sink	$98.0	$70.8	$61.9	$62.6	$48.3	$63.2	$52.6	$25.2	$24.3	$24.2	$15.3	$11.3	12
Handline	$0.3	$0.6	$0.4	$3.6	$0.3	$0.1	$0.2	$0.5	$10.8	$0.2	$1.2	$0.4	12
Longline-bottom	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0
Longline-pelagic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0
Other	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0
Pot-other	$52.4	$37.7	$41.1	$27.1	$33.0	$29.2	$111.7	$30.6	$43.0	$28.9	$24.4	$12.7	12
Seine-other	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0
Seine-purse	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0
Trawl-bottom	$35.7	$42.6	$32.1	$33.5	$38.6	$55.2	$72.7	$49.4	$64.7	$37.8	$33.6	$26.7	12
Trawl-midwater	$0.9	$12.2	$0.3	ND	$2.5	$6.1	$5.3	$1.9	$11.2	$0.2	ND	ND	9
Weir-trap	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0
All other gear*	$7.8	$0.8	$11.5	$22.1	$0.5	$46.9	$23.3	$31.2	$5.7	$24.8	$13.5	$35.4	12
All gear types	**$235.2**	**$263.1**	**$167.9**	**$162.8**	**$131.8**	**$162.2**	**$269.4**	**$148.0**	**$190.4**	**$104.4**	**$77.5**	**$76.4**	**12**

Source: NMFS (2021a).

Notes: Revenue is adjusted for inflation to thousands of 2019 dollars. ND = not disclosed.

Caveats on the Use and Applicability of Commercial Fisheries Revenue Intensity Figures in EIS Appendix C

As indicated above, the revenue intensity figures for commercial fisheries shown in EIS Appendix C have been developed to provide a visual representation of harvesting locations across FMP fisheries, gears, and ports. These figures rely on raster files that were originally developed by NMFS specifically for the purpose of assessing the impacts of proposed wind energy projects. These raster files are available to the public at BOEM’s Renewable Energy GIS data website (BOEM 2020). The BOEM GIS raster files provide information specific to FMP fisheries as well as information for gears, ports, states, and specific species many of which are not included in FMP fisheries (e.g., American Lobster and Jonah Crab). Raster files for FMP fisheries are available for 2007–2018; however, raster files for gears, ports, states, and specific species are only available for 2007–2012.

Although the NMFS-GARFO data are deemed the best available data for numerical assessment of the existing conditions in commercial fisheries and for assessing impacts of the alternatives, NMFS has not yet released the corresponding GIS data raster files that enable the visualization of fishing activity associated with particular locations such as the SFWF. NMFS-GARFO indicates that GIS raster files summarizing these data will be available in early 2021. They also indicate that because NMFS-GARFO data (and eventually the raster files) use improved algorithms for estimation of revenues and improved algorithms for the assignment of harvests to specific geographic locations, they are superior to previously developed raster files available from BOEM (2020).

The average annual inflation-adjusted revenues for these two data sets were compared across all proposed wind energy projects included in the No Action alternative (summarized in EIS Table 3.5.1-16). Estimated average annual revenues using NMFS-GARFO data were 1.3% higher that estimated average annual revenue revenues using the BOEM GIS raster files. Thus, although the BOEM GIS data may slightly understate revenues within the proposed future wind energy project sites, they are clearly comparable and representative. In the absence of other GIS-based data, the revenue intensity figures provide insights into the fish harvesting locations.

The revenue intensity figures provided in Appendix C for gears and ports, and for American Lobster and Jonah Crab, summarize harvest locations for the years 2007–2012 rather than for 2007–2018. Although the overall inflation-adjusted average annual revenue for the 2007–2012 period is only 0.1% less than inflation-adjusted average annual revenue for the 2008–2018 period, it is possible that harvesting locations may have shifted in later years. Also please note that revenue intensity figures for gear have been aggregated into two broad gear types—mobile gear and fixed gear.

Analysis of the Economic Dependency on Fishing Grounds in the Lease Area among Commercial Fishing Vessels

To analyze differences in the economic importance of fishing grounds in the Lease Area across the commercial fishing fleet, information was obtained from NMFS (2021a) on the number of federally permitted commercial fishing vessel that fished annually in the Lease Area during the 2008–2019 period, together with the percentage of each vessel's total fishing revenue that came from within the area.

The vessel-level annual revenue percentages were divided into quartiles, which were created by ordering the data from lowest to highest percentage value and then dividing the data into four groups of equal size. The 1st quartile represents the lowest 25% of ranked percentages, while the 4th quartile represents the highest 25%. In addition, NMFS (2021a) reported the number of "outlier" vessels in the distribution of percent revenue. In addition, NMFS (2021a) reported the number of outlier vessels in the revenue distribution of the percentage of revenue. In the context of this analysis, an outlier is a vessel that derived an exceptionally high proportion of its annual revenue from the Lease Area in comparison to other vessels that fished in the area.[6]

[6] Technically, an outlier in a boxplot distribution is an observation that is more than 1.5 times the length of the box away from either the 1st quartile (Q1) or 3rd quartile (Q3). Specifically, if an observation is less than Q1 – (1.5 × IQR) or greater than Q3 + (1.5 × IQR), it is an outlier; where IQR = interquartile range = Q3 – Q1.

As shown in Table F-6, from 2008 through 2019, an average of 249 vessels per year fished in the Lease Area, with a high of 284 vessels in 2008 and a low of 213 vessels in 2019. The average annual number of outliers was 37 (15% of all vessels), with a high of 49 outliers in 2014 (18% of all vessels) and a low of 21 outliers in 2019 (9% of all vessels).

Table F-6. Number of Federally Permitted Vessels in the SFWF Lease Area (2008–2019)

	Number of Vessels	Number of Outliers	Number of Outliers as a Percentage of Total Vessels
2019	213	35	16%
2018	219	30	14%
2017	241	40	17%
2016	274	44	16%
2015	252	44	17%
2014	270	49	18%
2013	268	45	17%
2012	241	38	16%
2011	228	31	14%
2010	223	21	9%
2009	269	34	13%
2008	284	32	11%
Average	249	37	15%

Source: NMFS (2021a).

More detailed information about the distribution of the vessel-level annual revenue percentages is provided in the boxplot below (see Figure F-1). The boxplot begins at the 1st quartile, or the value beneath which 25% of all vessel-level revenue percentages fall. A thick line within the box identifies the median, the observation at which 50% of vessel-level revenue percentages are above or beneath. The box ends at the 3rd quartile, or the vessel-level revenue percentage beneath which 75% of observations fall. Nonparametric estimates of the minimum and maximum values are also indicated by the "whiskers" (dashed line terminating in a vertical line) that jut out from each side of the box. Any points outside of these whiskers are vessel-level revenue percentages that are considered outliers.

A total of three-quarters of the vessels that fished in the Lease Area derived less than 0.2% of their total annual revenue from the area (NMFS 2021b). The highest percentage of total annual revenue coming from within the Lease Area by an outlier varied from year to year, ranging from 39% in 2016 to 5% in 2012. Over the 2008–2019 period as a whole, the average maximum revenue percentage among outliers was 24% (NMFS 2021b). Although outliers derived a high proportion of their annual revenue from the Lease Area in comparison to other vessels that fished in the area, Figure F-1 shows that in any given year, the revenue percentage for the majority of outliers was below 5%. From 2008 through 2019, the average percentage of all vessels fishing in the Lease Area that derived 5% or more of their total fishing income from the Lease Area was around 2%. During any given year, the highest percentage, which occurred in 2008, was 5%, while the lowest was less than 1%. In short, some vessels depended heavily on the Lease Area, but most vessels derived a small percentage of their total annual revenue from the area.

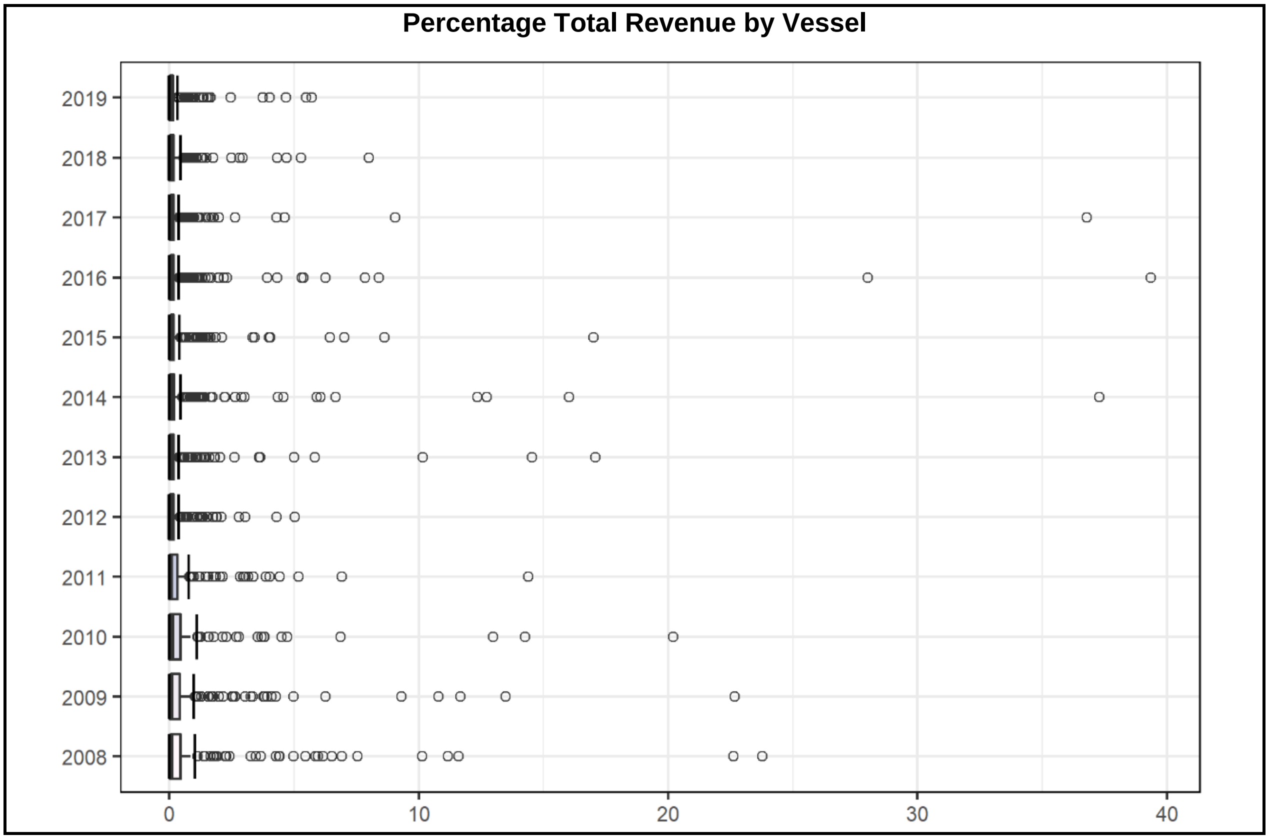

Figure F-1. Percentage of Total Commercial Fishing Revenue of Federally Permitted Vessels Derived from the SFWF Lease Area by Vessel (2008–2019).

Source: NMFS (2021a).

In addition to examining differences in the level of economic dependency on fishing grounds in the Lease Area across vessels, the analysis examined the relationship between vessels' average annual percent of total revenue inside the area and their average annual total revenue during the 2008–2019 period. As shown in Table F-7, average annual total revenue per vessel was negatively correlated with average annual revenue percentage. Vessels in the 4th quartile (i.e., vessels with a higher level of economic dependence on fishing grounds in the Lease Area), tended to have lower total commercial fishing incomes. In short, the Lease Area generally accounted for a higher proportion of the revenue of vessels that had lower total commercial fishing revenue.

Table F-7. Commercial Fishing Revenue of Federally Permitted Vessels in the SFWF Lease Area by Quartile (2008–2019)

	1st Quartile	2nd Quartile	3rd Quartile	4th Quartile	Outliers (included in 4th quartile)
Average annual number of vessels	63	63	63	64	37
Average annual revenue in the SFWF Lease Area as a percentage of total revenue	0.003%	0.020%	0.089%	0.989%	NA
Average annual total revenue in the mid-Atlantic and New England regions per vessel	$1,009,953	$810,655	$551,006	$219,899	NA
Average annual revenue in the SFWF Lease Area per vessel	$29	$164	$488	$2,175	$3,208

NA indicates that the number cannot be calculated with the available data. Average annual revenue per vessel or in total was not available for outliers alone.
Source: NMFS (2021a).

Table F-7 also shows the average annual revenue per vessel in the Lease Area and the mid-Atlantic and New England regions as a whole. The highest average annual revenue per vessel in the Mid-Atlantic and New England regions are from vessels in the first quartile—annual average revenue per vessel declines with each successive quartile. Average annual revenue per vessel in the mid-Atlantic and New England regions in the 4th quartile ($219,899) was 22% of the annual average revenue per vessel in the 1st quartile ($1,009,953). Average annual revenue per vessel within the Lease Area shows an opposite trend across quartiles. The highest average annual revenue per vessel from the Lease Area was among outliers. The average vessel in the 4th quartile Lease Area had an average annual revenue of around $2,175. This was 1% of the 4th quartile annual average revenue per vessel in the Mid-Atlantic and New England region as a whole. In other words, if the average vessel in the 4th quartile was displaced from the Lease Area, on average, it would likely need to increase its revenue in other fishing areas by 1% to maintain its level of annual fishing income. Vessels that were outliers on average earned $3,208 per year from the Lease Area. Sufficient information was not available for this analysis to calculate the percentage of revenue needed to maintain current levels of fishing revenue if outlier vessels are displaced from the Lease Area.

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DEMOGRAPHICS, EMPLOYMENT, AND ECONOMICS

Project capital expenditures (CapEx) during development and construction of the Project coupled with annual operating expenditures once the Project is up and running would be the key drivers of economic activity in the analysis area. This appendix section summarizes the development of estimates of CapEx and operational expenditures (OpEx) for the SFWF. The intent of this section is to provide a basis for quantitative estimates of economic impacts of the SFWF in terms of local spending for materials, supplies, and services, and for estimates of direct, indirect, and induced employment and earnings generated in each phase of the Project: 1) the development and construction phase, 2) the operation and maintenance phase, and 3) the conceptual decommissioning phase.

Also included in this section are details of estimates of local employment from future wind farm projects.

Estimates of South Fork Wind Farm Capital and Operating Expenditures

Estimates of CapEx and OpEx for the Project were developed using the 2017 version of the *Jobs and Economic Development Impacts Offshore Wind Model* (JEDI-OWM)—an interactive spreadsheet model developed and maintained by the National Renewable Energy Laboratory (NREL). JEDI-OWM is available to the public (NREL 2017).

JEDI-OWM generates estimates of CapEx and OpEx for user-specified wind farms. Key user inputs to the JEDI-OWM include 1) the project state, 2) total farm capacity, 3) wind turbine generator (WTG) capacity, 4) water depth, 5) distance to primary port, 6) length of the export cable, and 7) length of the onshore interconnection cable(s).

A critical set of inputs into the JEDI-OWM are the assumptions with respect to the wind turbine itself. Table 3.1-3 of the construction and operations plan (COP) (Jacobs Engineering Group Inc. [Jacobs] 2021)[7] was used for these key inputs, including parameters for turbine blade lengths and the height of the hub. Estimates of the total cost of each 6-megawatt (MW) turbine assembly were based on information documented in the *2017 Cost of Wind Energy Review* (Stehly et al. 2018). Stehly et al. (2018) report that a

[7] The most recent COP—*South Fork Wind Farm and South Fork Export Cable Construction and Operations Plan*— is referred to frequently throughout the EIS, and therefore the author-date citation is provided here at first mention only.

5.64-MW turbine is expected to cost $1,557 per kilowatt (kW). This cost per kW was assumed for the Project's 6-MW turbines resulting in a total of $9.34 million per 6-kW turbine. Beiter et al. (2018), in the 2017 *Offshore Wind Technologies Market Update,* reports that in the future, CapEx savings are likely to be significant if using a 12-MW turbine rather than a 6-MW turbine because fewer turbines, towers, and interconnections would need to be purchased and installed. Although the cost per turbine for a 12-MW turbine would exceed the cost of a 6-MW turbine, the total Project CapEx would be much lower. Based on information in these reports, it is assumed that the cost per kW of a 12-MW turbine would be almost equal to $1,092 per kW or 13.1 million per 12-MW turbine.

JEDI-OWM was used to generate estimates of CapEx and OpEx for a range of assumptions including six of the potential primary ports (New Bedford, Massachusetts; Providence, Rhode Island; New London, Connecticut; Norfolk, Virginia; Sparrows Point, Maryland; and Paulsboro, New Jersey), two landing sites (Beach Lane and Hither Hills, Long Island, New York), and two levels of overall capacity each using 15 WTGs (90 MW total with 6 MW per WTG or 180 MW total with 12 MW per WTG). Water depth—the other key input for JEDI-OWM calculations—was set at 35.1 meters for all options. As reported in the COP, the onshore cable from the Hither Hills landing site to the new interconnection facility adjacent to the existing East Hampton substation would be 11.9 miles, whereas the length of the cable from the Beach Lane landing site to the interconnection facility would be 4.1 miles (Jacobs 2021). Table F-8 shows assumed distances from the WTG work area (WTG-WA) to each landing site and primary port.

Table F-8. Distances from the Wind Turbine Generator Work Area to Landing Sites and Selected Primary Ports

Port/ Landing Site	Beach Lane, NY	Hither Hills, NY	New Bedford, MA	Providence, RI	New London, CT	Norfolk, VA	Paulsboro, NJ	Sparrows Point, MD
Distance from WTG-WA (kilometers)	98.80	79.80	60.51	65.24	93.73	660.80	878.6	879.2

Notes: CT = Connecticut, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, RI = Rhode Island, VA = Virginia.

JEDI-OWM results for total CapEx without taxes or financing charges and interest for the options are shown in Table F-9. It is important to note that there is very little variation in these CapEx estimates across the different ports and states, even though there is considerable variation in the distance from the WTG-WA and the primary ports.[8, 9] There are much more noticeable differences when looking at CapEx across landing sites and capacity options. On average, the CapEx difference between using the Beach Lane landing site or the Hither Hills landing site is estimated by JEDI-OWM to range from $44.4 million to $49.0 million depending on SFWF capacity. The average CapEx of building a 180-MW wind farm is approximately $178 million greater than the CapEx of a 90-MW wind farm. The range of average cost is $4,133 to $4,533 per kW if total capacity is 180 MW, and $6,380 to $6,970 per kW if total capacity is 90 MW.

[8] Estimates of CapEx do not include costs of any port upgrades or expansions that may be needed.

[9] Estimates of CapEx using Quonset Point are not meaningfully different than CapEx estimates for Providence and are therefore not reported in Table F-9.

Table F-9. Estimated Total Capital Expenditures before Taxes and Financing Charges for the South Fork Wind Farm, Assuming a Range of Primary Ports, Landing Sites, and Capacity

Primary Port and State	Beach Lane @ 90 MW	Hither Hills @ 90 MW	Beach Lane @ 180 MW	Hither Hills @ 180 MW
New Bedford, MA	$618.39	$574.19	$792.63	$743.89
Providence, RI	$619.40	$575.00	$794.00	$745.07
New London, CT	$619.48	$575.08	$794.29	$745.36
Norfolk, VA	$624.65	$580.25	$809.49	$760.56
Paulsboro, NJ	$627.25	$582.66	$815.89	$766.76
Sparrows Point, MD	$627.26	$582.66	$815.91	$766.78
Average: All ports	$622.74	$578.31	$803.70	$754.74

Notes: CapEx is shown in millions of 2019 dollars. CT = Connecticut, MA = Massachusetts, MD = Maryland, NJ = New Jersey, RI = Rhode Island, VA = Virginia.

Estimates of annual OpEx (excluding taxes and finance charges) were set equal to $144,000 per installed MW of capacity based on OpEx estimates for the reference project in the *2017 Cost of Wind Energy Review* (Stehly et al. 2018). Total annual OpEx without taxes and finance charges for the SFWF are estimated by JEDI-OWM to be $25.9 million with 180 MW of installed capacity and $13.0 million with 90 MW of installed capacity.

Estimates of Total Conceptual Decommissioning Expenditures

Expenditures and employment for conceptual decommissioning of the offshore infrastructure are estimated to occur 25 years after Project startup. Bureau of Ocean Energy Management (BOEM) guidance indicates that estimates of conceptual decommissioning costs should be approximately 50% of the original installation and construction costs (AECOM 2017). As documented above, the JEDI-OWM model generates estimates of total CapEx. JEDI-OWM provides additional elements for CapEx including 1) materials and other equipment, 2) installation labor, 3) insurance during construction, 4) development costs and third-party contactors, and 5) other miscellaneous costs. It is assumed that conceptual decommissioning costs can therefore be approximated as 50% of the sum of elements 2 through 5. For the SFWF, the sum of these four CapEx elements ranges from $221.6 million to $272.5 million, and therefore conceptual decommissioning costs are expected to range from $110.8 million to $136.3 million. Because these costs are primarily labor and contracting costs, a relatively high percentage of these expenditures would accrue to local economies.

JOBS AND ECONOMIC DEVELOPMENT IMPACTS OFFSHORE WIND MODEL ESTIMATES OF LOCAL EXPENDITURES AND JOBS FOR THE SOUTH FORK WIND FARM

In addition to total CapEx and OpEx, JEDI-OWM also estimates local expenditures and local jobs. It should be noted that JEDI-OWM defines local expenditures as “in-state” or “in the region”—JEDI-OWM does not provide results indicating total United States spending or total spending outside of the United States. South Fork Wind, LLC (SFW) has indicated that during development and construction, it expects hiring and expenditures to occur throughout the four-state region of New York, Connecticut, Rhode Island, and Massachusetts. It is also important to note that SFW expects that development and construction of the SFWF and SFEC could take up to 48 months (as shown in Table 1.5-1 of the COP). For purposes of the EIS, is assumed that local expenditures and employment during development and construction would occur over a 3-year period from 2021 to 2023. SFW has also indicated (Table 3.0-1 of the COP) that operations and maintenance (O&M) facilities would be based in either Montauk, New York, or Quonset Point, Rhode Island.

Table F-10 summarizes JEDI-OWM estimates of the local share of CapEx with percentages of total pre-tax CapEx depending primarily on capacity of the WTGs and the landing site. Estimates of local CapEx shares are presented before and after estimated sales taxes. JEDI-OWM estimates of local shares of CapEx for the SFWF over the potential set of configurations range from 26.0% to 28.34% of pre-tax CapEx.[10] If sales taxes are added for each of the four states, the range of local shares increases to 29.6% to 32.34%.

Table F-10. Estimated Average Local Spending for Capital Expenditures for the South Fork Wind Farm by Landing Sites and Capacity

Estimate	Beach Lane @ 90 MW	Hither Hills @ 90 MW	Beach Lane @ 180 MW	Hither Hills @ 180 MW
Local CapEx before taxes	$161.85 (26.0%)	$160.80 (27.8%)	$214.56 (26.7%)	$213.36 (28.4%)
Local estimated sales tax	$22.48 (3.6%)	$21.64 (3.7%)	$32.35 (4.0%)	$30.70 (4.1%)
Local CapEx with taxes	$184.24 (29.6%)	$182.41 (31.6%)	$246.81 (30.7%)	$244.01 (32.4%)

Note: Each cell shows estimated local (i.e., in state) CapEx in millions of 2019 dollars with the percentage of average total CapEx, as shown in Table F-7.

Table F-11 summarizes estimates from JEDI-OWM of local shares for OpEx to be 48% of total OpEx, or $6.16 million annually for a 90-MW wind farm, and $12.32 million annually if a 180-MW wind farm is built. These estimates do not include local taxes.

Table F-11. Estimated Average Local Spending for Operational Expenditures for the South Fork Wind Farm by Landing Sites and Capacity

Estimate	Beach Lane @ 90 MW	Hither Hills @ 90 MW	Beach Lane @ 180 MW	Hither Hills @ 180 MW
Total OpEx (millions of 2019 dollars)	$12.96	$12.96	$25.92	$25.92
Local OpEx (millions of 2019 dollars)	$6.16	$6.16	$12.32	$12.32
Local OpEx as a percentage of total OpEx	48%	48%	48%	48%

Note: Each cell shows estimated local (i.e., in state) OpEx in millions of 2019 dollars.

Table F-12 summarizes JEDI-OWM estimates of local CapEx and OpEx spending in terms of full-time equivalent (FTE) jobs with the low- and high-generation capacity for the Project assuming the Beach Lane landing site. It must be noted that JEDI-OWM defines “local” as being within the state from which construction operations are based. There are two sections to the table: the upper section shows total local FTE jobs and income during the 3-year development and construction period. The lower section shows annual jobs and income during O&M. Both sections show direct, indirect, and induced jobs and income. Total jobs from CapEx in are expected to range from 1,226 to 1,611 FTE jobs over the assumed 3-year development period. It is important to note that the total number of jobs are presented in job-years, which does not account for the timing of the work or the duration of the work. In other words, if development and construction occur over a 3-year period (as assumed), then the number of FTE jobs per year would be

[10] Given the uncertainty with respect to hiring locations, primary port bases, and the location of suppliers likely to provide goods and services to SFW as it develops and builds the SFWF, it is not possible with the information currently available to make a reliable estimate regarding the distribution of local CapEx within the economic region of impact in the states of Virginia, Maryland, New Jersey, Connecticut, Rhode Island, and Massachusetts.

one-third the number shown in the table. Total direct, indirect, and induced local income for the entire 3-year development and construction period is estimated to range from $87.75 million to $115.82 million, depending on the final capacity of the SFWF. The table also indicates that annual FTE jobs related to Project OpEx are expected to range from 47 to 96 and are likely to be concentrated in Montauk, New York, and/or Quonset Point, Rhode Island. Local annual income for OpEx-related jobs are expected to range from $3.95 to $8.04 million.

In February 2019, Orsted North America provided an assessment of economic development of jobs that can be expected from the SFWF and SFEC (Navigant Consulting, Inc. 2019). The reported estimated levels of local jobs and income are similar to those reported in Table F-12. For example, the report estimates that 413 direct, indirect, and induced jobs would be generated in New York as a result of the Project.[11]

Table F-12. Estimated Local Jobs and Income from Capital Expenditures and Operational Expenditures for the South Fork Wind Farm, Average over All Ports and States

Source of Jobs and Income	Local FTE Jobs with SFWF/ Beach Lane @ 90 MW	Local FTE Jobs with SFWF/Beach Lane @ 180 MW	Local Income with SFWF/Beach Lane @ 90 MW*	Local Income with SFWF/Beach Lane @ 180 MW*
Jobs and income during the 3-year development and construction period				
Direct expenditures by SFW during 3-year development and construction period	331	432	$27.91	$31.96
Expenditures within the supply chain during 3-year development and construction period	538	704	$36.94	$52.55
Induced spending from direct and indirect income during 3-year development and construction period	357	475	$22.90	$31.31
Total jobs and income during 3-year development and construction period	**1,226**	**1,611**	**$87.75**	**$115.82**
Annual jobs and income during the operational period				
Annual direct expenditures by SFW during O&M	5	11	$0.55	$1.09
Annual expenditures within the supply chain during O&M	30	61	$2.61	$5.31
Annual induced spending from direct and indirect income during O&M	12	24	$0.79	$1.64
Total annual jobs and income during O&M	**47**	**96**	**$3.95**	**$8.04**

* Shown in millions of 2019 dollars.

[11] The Navigant Consulting, Inc. (2019) report does not directly specify the size of the individual turbines that were modelled—thus, it is unclear whether the total size of the modelled windfarm is 90 MW or 180 MW or some variant between the two extremes. Because of this uncertainty, the Navigant Consulting, Inc. (2019) report is used as a secondary resource.

ASSUMPTIONS REGARDING LOCAL HIRING PRACTICES

Section 4.6.1.2 of the COP provides indicative descriptions of SFW's expected hiring practices during construction of the SFWF (Jacobs 2021). These are summarized in the bulleted list below:

- The SFWF would be constructed using multiple ports and access locations in different states throughout the analysis area.
- Workers involved in the construction of the offshore portions of the Project would be housed on board vessels at the offshore work sites.
- Non-local construction personnel would typically include mariners, export cable manufacturing personnel, and other specialists.
- The size of the non-local construction workforce could be large relative to the construction workforce hired locally.
- Local workers would be hired to the extent practical for SFWF and SFEC management, fabrication, and construction.
- Because of the short duration of construction activities, it is unlikely that non-local workers would relocate families to the area.

ASSUMPTIONS REGARDING THE ABILITY OF "LOCAL SUPPLIERS" TO MEET PROJECT DEMANDS FOR SPECIALIZED PROJECT COMPONENTS

Several recent studies describe the offshore wind industry in the United States as being in its early developmental stages, and that as it currently exists, a relatively large share of the CapEx and the resulting jobs and income for offshore wind projects are likely to leak out to economies outside both the analysis area and the United States as a whole. In its study for the U.S. Department of Energy, Navigant Consulting, Inc. (2013) states that because of the lack of United States demand for offshore components, "no domestic manufacturing facilities are currently serving the offshore wind market." More recently, AECOM (2017) in its white paper, *Potential Economic Benefits of Offshore Wind*, developed for BOEM, states the following:

> At each phase of offshore wind energy development, there is the potential to generate economic benefits locally, regionally, nationally, and/or internationally, depending on the extent to which these geographic areas can deliver the materials and skills necessary to develop offshore wind energy. Imported materials and services into the particular region being assessed represent lost opportunities for local production and employment. As the offshore wind energy industry advances in the U.S., more opportunities for domestic value can be created along the value chain and for supporting services. Supporting services could include consulting services, financial services, education and training, and research and development. (AECOM 2017)

From a more quantitative perspective, BVG Associates Limited (BVG) (2017) concludes that for offshore projects constructed before 2022, the United States as a whole can expect to realize a minimum of 35% of the total expected jobs needed to meet United States demand—including jobs in the supply chain, development, and construction. In addition, BVG concludes that there is high probability that United States–based jobs could be between 50% and 63% offshore wind-related jobs by 2022.

For the SFWF, estimates of the local share of CapEx and OpEx and the jobs and income that result from those expenditures, were taken from the JEDI-OWM. The estimates of local shares within JEDI-OWM are limited to expenditures within the state with which the Project would be associated. As documented in this appendix, estimates of the local share of CapEx range from 26% to 28% of pre-tax CapEx. If sales taxes are added for each of the four states, the range of local shares increases to 30% to 32%. JEDI-OWM also estimates local shares for OpEx (excluding local taxes) would range from 48% of total OpEx (excluding taxes and finance charges), or $6.16 million annually for a 90-MW wind farm, and $12.32 million annually if a 180-MW wind farm is built.

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ENVIRONMENTAL JUSTICE

This appendix section provides additional details on the methodology used to determine whether the minority or low-income percentages in an individual census block group in the analysis area (see EIS Section 3.5.4 for description) are meaningfully greater than the percentages in the reference populations of the county or state.

The section is organized into three parts:

1. Maps indicating the percentage of minority and low-income populations in each census block group in the analysis area
2. A discussion of the methodology used to determine whether a census block group has a meaningfully greater percentage of minority or low-income populations compared to the county or state in which it is located
3. Maps showing census block groups that are areas of potential environmental justice concern

Minority and Low-Income Populations in Census Block Groups

Figure F-2 shows low-income populations by census block groups for ports and landing sites from Eastern Long Island in the lower left to Providence and New Bedford with insets for wind farm ports in New Jersey, Maryland, and Virginia. Figure F-3 shows minority populations for the same areas.

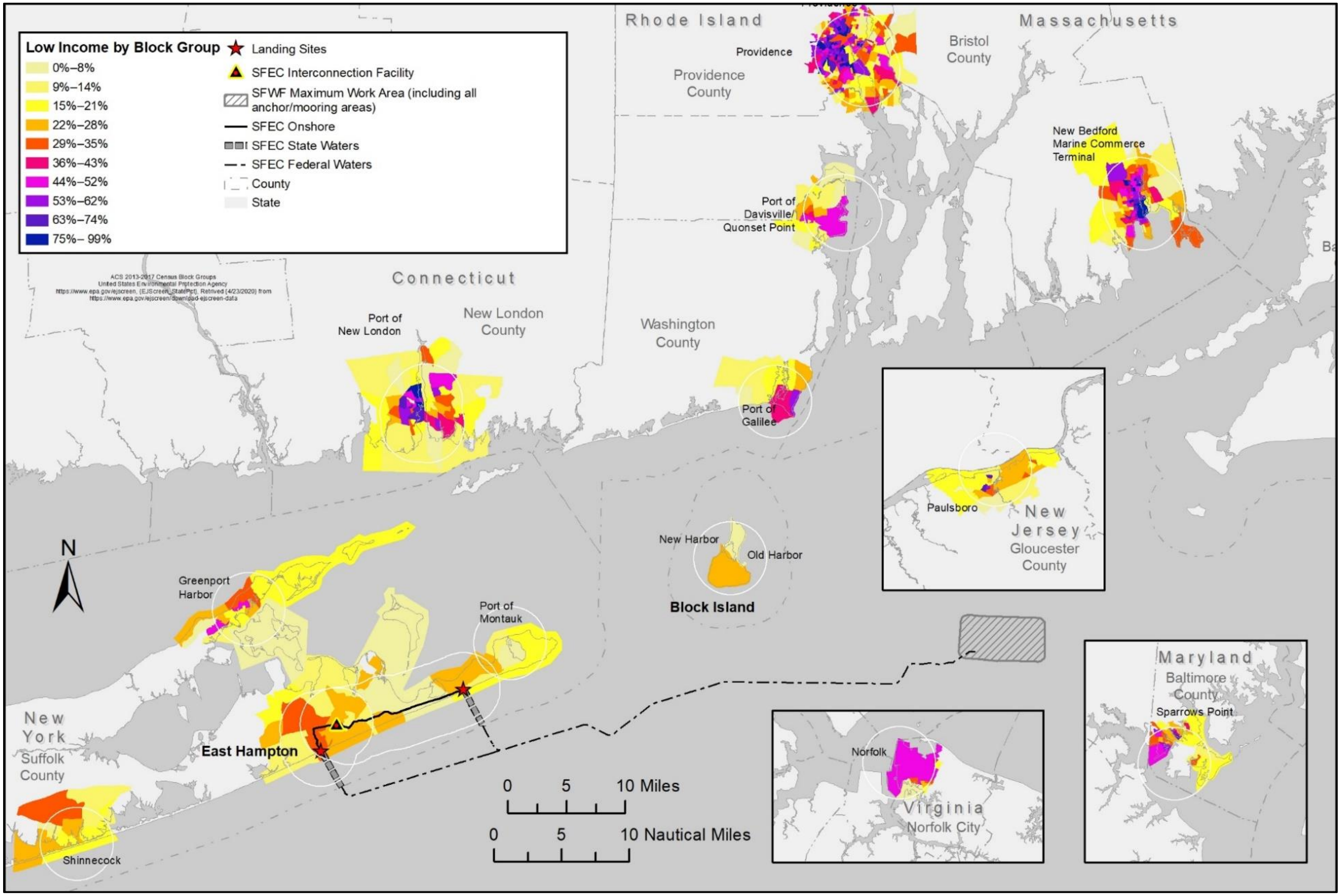

Figure F-2. Low-income populations: Eastern Long Island, Connecticut, Rhode Island, Massachusetts, New Jersey, Maryland, and Virginia.

Source: Developed by Northern Economics based on information from U.S. Environmental Protection Agency (EPA) (2020).

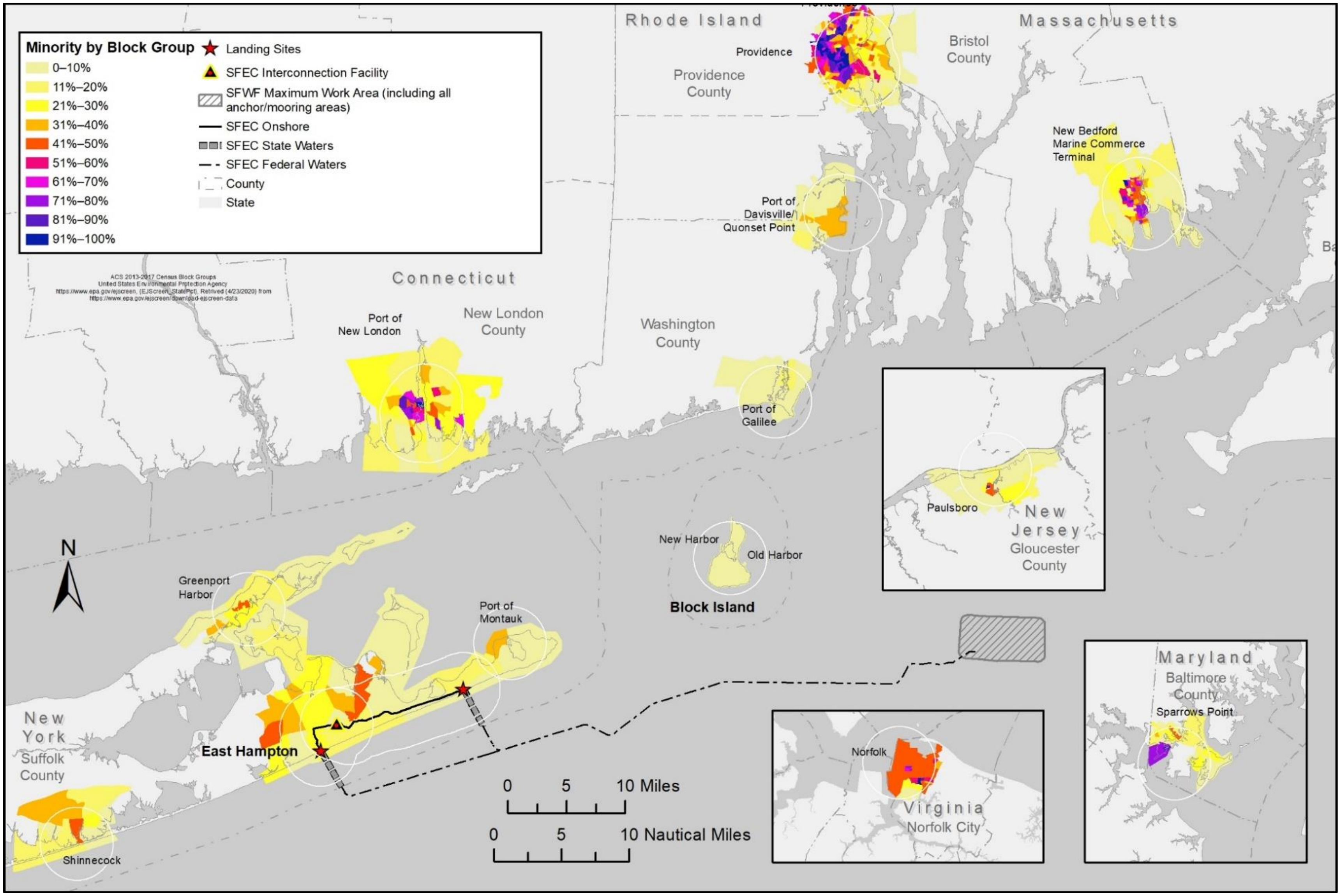

Figure F-3. Minority populations: Eastern Long Island, Connecticut, Rhode Island, Massachusetts, New Jersey, Maryland, and Virginia.

Source: Developed by Northern Economics based on information from EPA (2020).

Methodology

Factors used to estimate criteria for meaningfully greater percentages of minority or low-income populations in each census block group were scaled according to percentage sizes. As shown in Table F-13, for reference populations containing smaller percentages of minorities or low-income individuals, the factors in the middle column are larger. The factors decrease as the percentages within a reference population increase. The minority or low-income percentage of the population of a county or state (whichever is lowest) is multiplied by the factor in Table F-13. If the percent minority or low-income in a given census block population meets or exceed the resulting criterion, that population is considered to have a meaningfully greater percentage than the reference population.

Table F-13. Factors Used to Determine If Census Block Groups in 5-Kilometer Zones Have Meaningfully Greater Percentages of Minority or Low-Income Populations

Range of Percentages for Minority and Low-Income Populations for the County or State	Factor Used to Estimate Criteria for Meaningfully Greater Minority and Low-Income Populations for the Census Block Group	Range of Meaningfully Greater Minority and Low-Income Populations for the Census Block Group to Meet the Criteria
0%–5%	200%	0%–10%
5%–10%	189%	9%–19%
10%–15%	179%	18%–27%
15%–20%	169%	25%–34%
20%–25%	159%	32%–40%
25%–30%	151%	38%–45%
30%–35%	142%	43%–50%
35%–40%	135%	47%–54%
40%–45%	127%	51%–57%
45%–50%	120%	54%–60%
50%–55%	113%	57%–62%

Census Block Groups That Are Areas of Potential Environmental Justice Concern

This section provides maps showing the locations of census block groups that have been determined to have meaningfully greater percentages of low-income or minority populations relative to the county or state in which they are located. In all, 563 census block groups were compared to county or state populations, 227 block groups were determined to have meaningfully greater minority populations, and 213 were determined to have meaningfully greater low-income populations. In Figures F-4 though F-7, census block groups shaded yellow have meaningfully greater percentages of low-income populations; census block groups shaded blue have meaningfully greater percentages of minority populations; and census block groups shaded red have meaningfully greater percentages of both minority and low-income populations. Maps are provided for the following groups of communities:

- Eastern Long Island including Montauk, East Hampton, Greenport Harbor, and Shinnecock.
- New London, Old Harbor/New Harbor (Block Island), and the Port of Galilee (Narragansett/Point Judith)
- Providence, Davisville/Quonset Point and New Bedford
- Norfolk, Sparrows Point, and Paulsboro

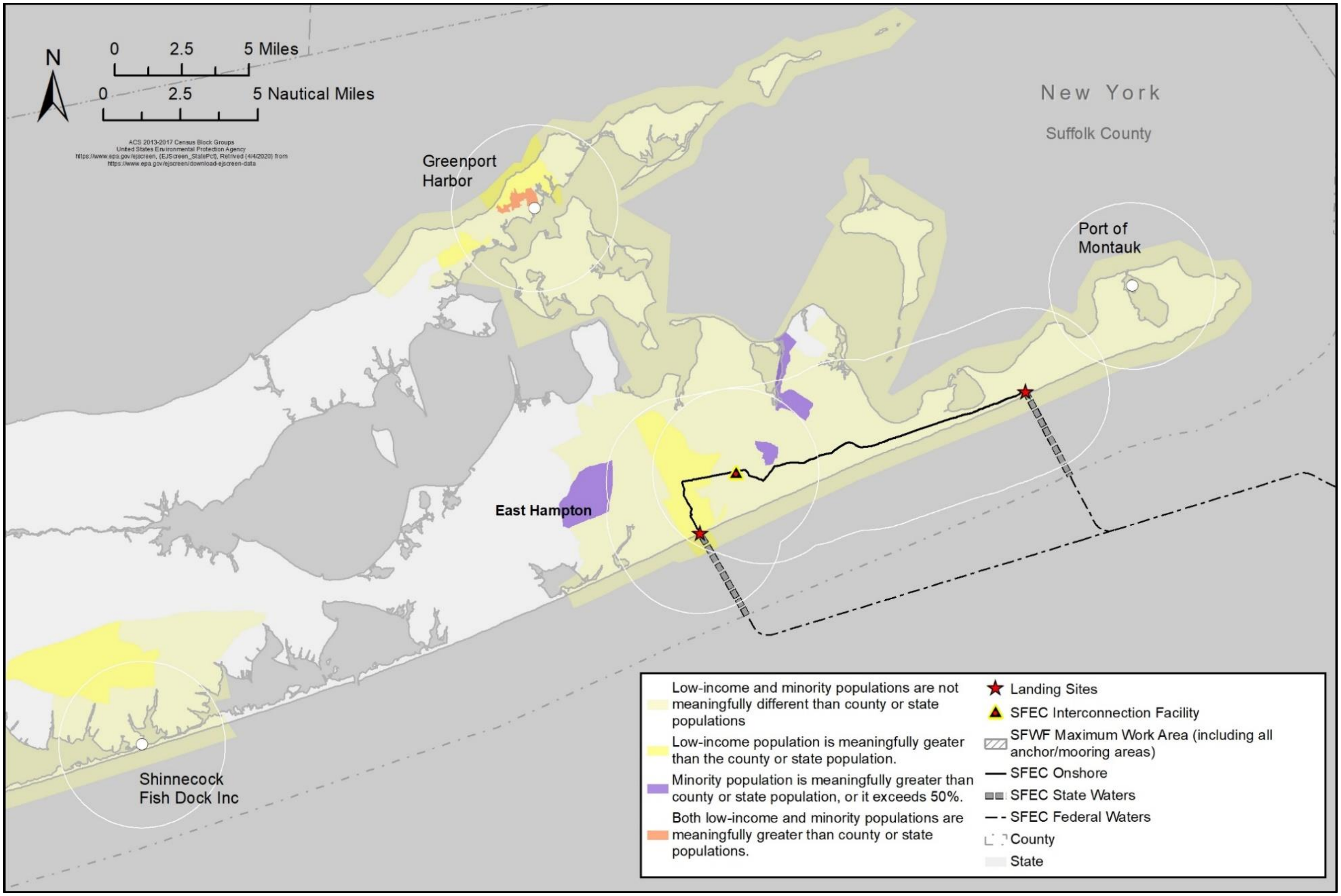

Figure F-4. Census block groups that are areas of potential environmental justice concern: Eastern Long Island.

Source: Developed by Northern Economics based on information from EPA (2020).

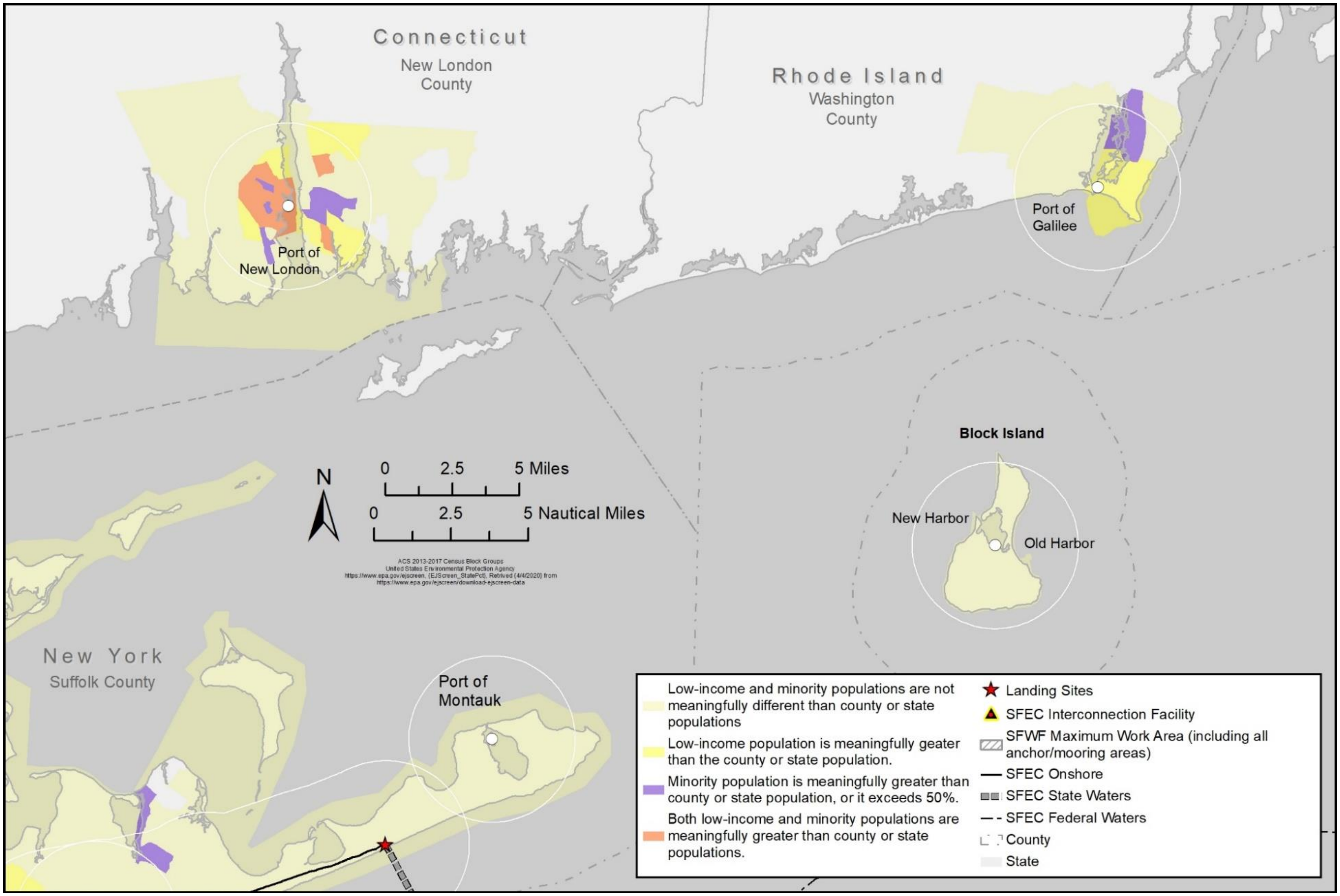

Figure F-5. Census block groups that are areas of potential environmental justice concern: New London, Old Harbor/New Harbor (Block Island), and the Port of Galilee (Narragansett/Point Judith).

Source: Developed by Northern Economics based on information from EPA (2020).

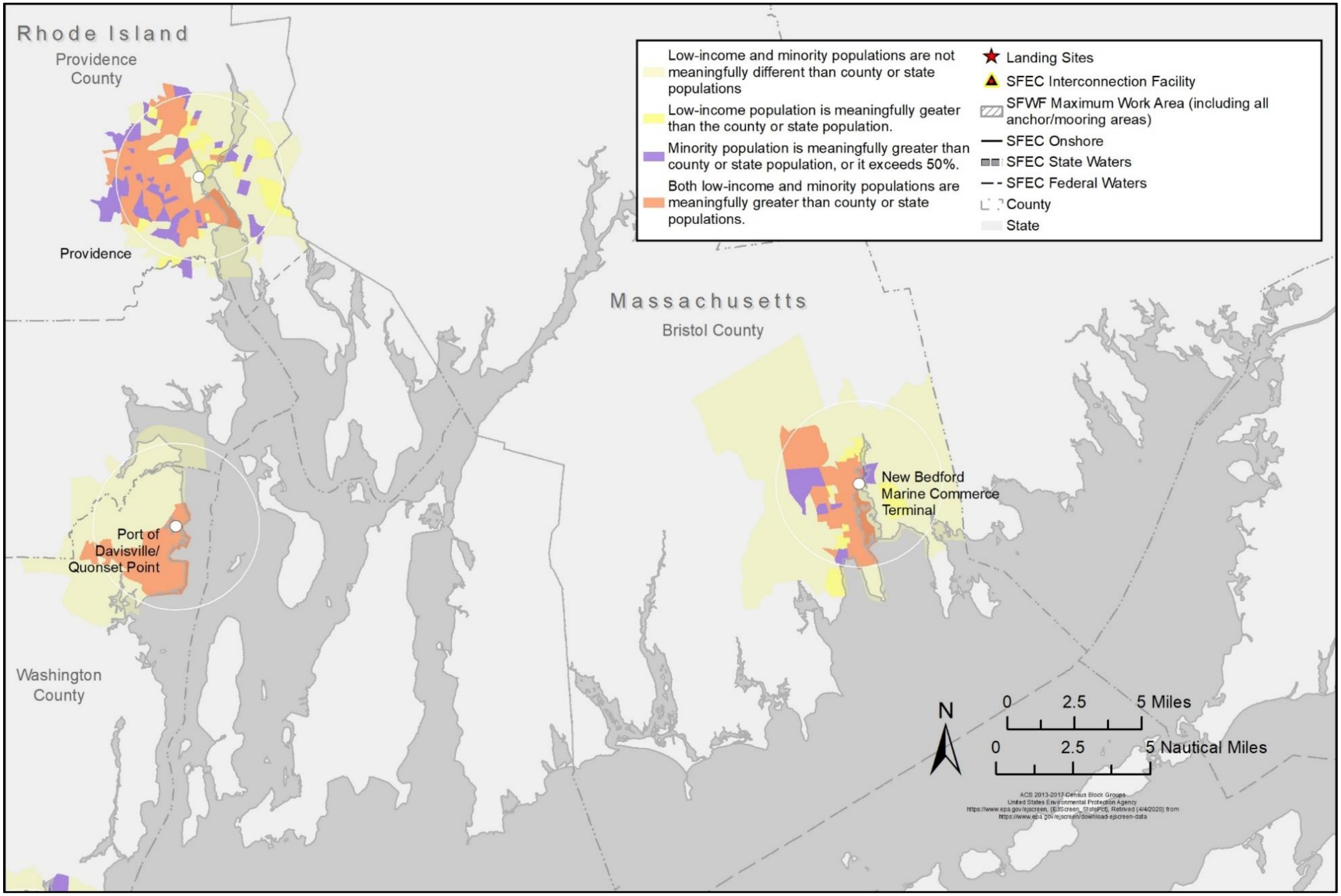

Figure F-6. Census block groups that are areas of potential environmental justice concern: Providence, Davisville/Quonset Point, and New Bedford.

Source: Developed by Northern Economics based on information from EPA (2020).

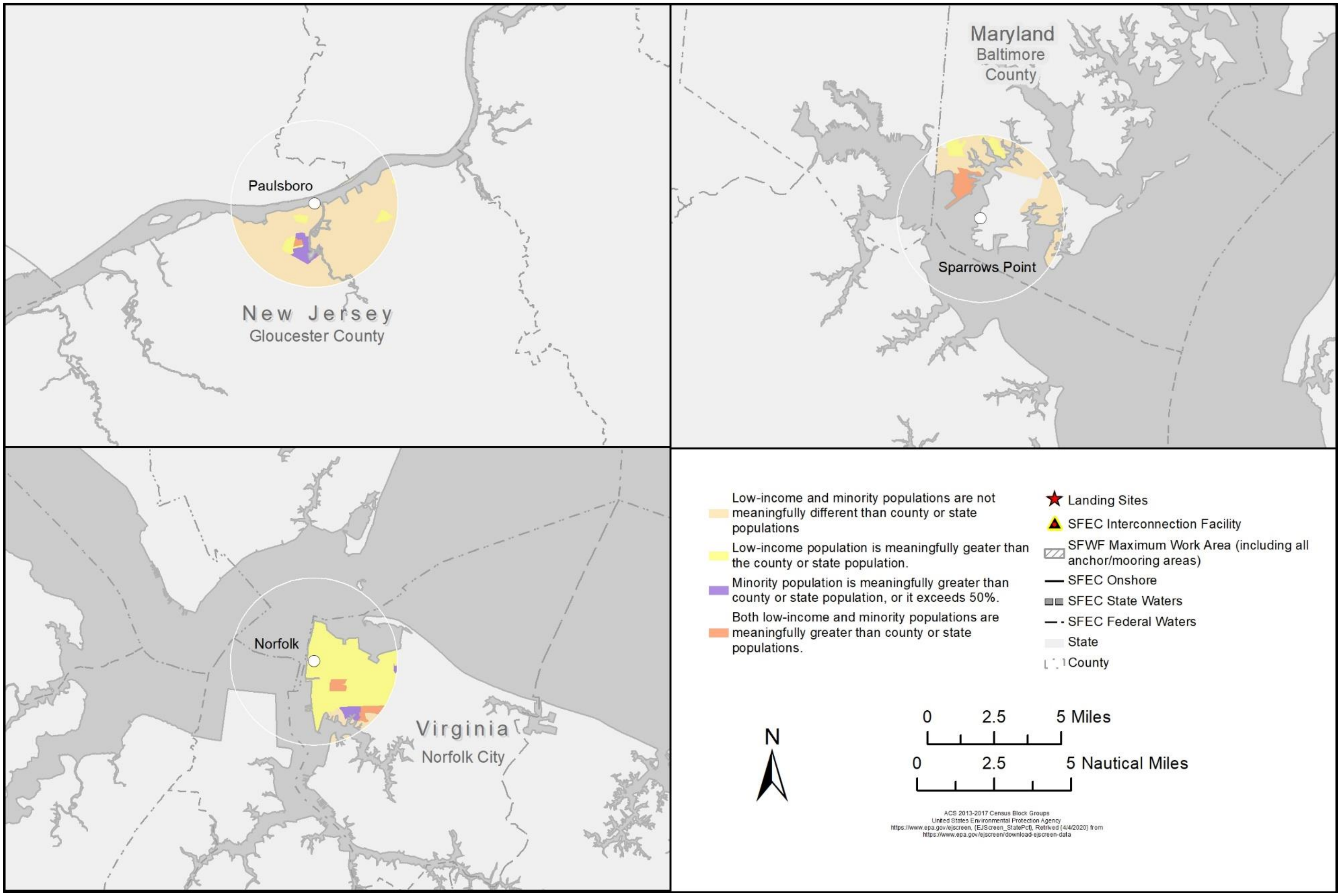

Figure F-7. Census block groups that are areas of potential environmental justice concern: Norfolk, Sparrows Point, and Paulsboro.

Source: Developed by Northern Economics based on information from EPA (2020).

Literature Cited

U.S. Environmental Protection Agency (EPA). 2020. EJSCREEN: Environmental Justice Screening and Mapping Tool. Available at: https://www.epa.gov/ejscreen/download-ejscreen-data. Accessed April 22, 2020.

BENTHIC HABITAT, ESSENTIAL FISH HABITAT, INVERTEBRATES, FINFISH, AND MARINE MAMMALS

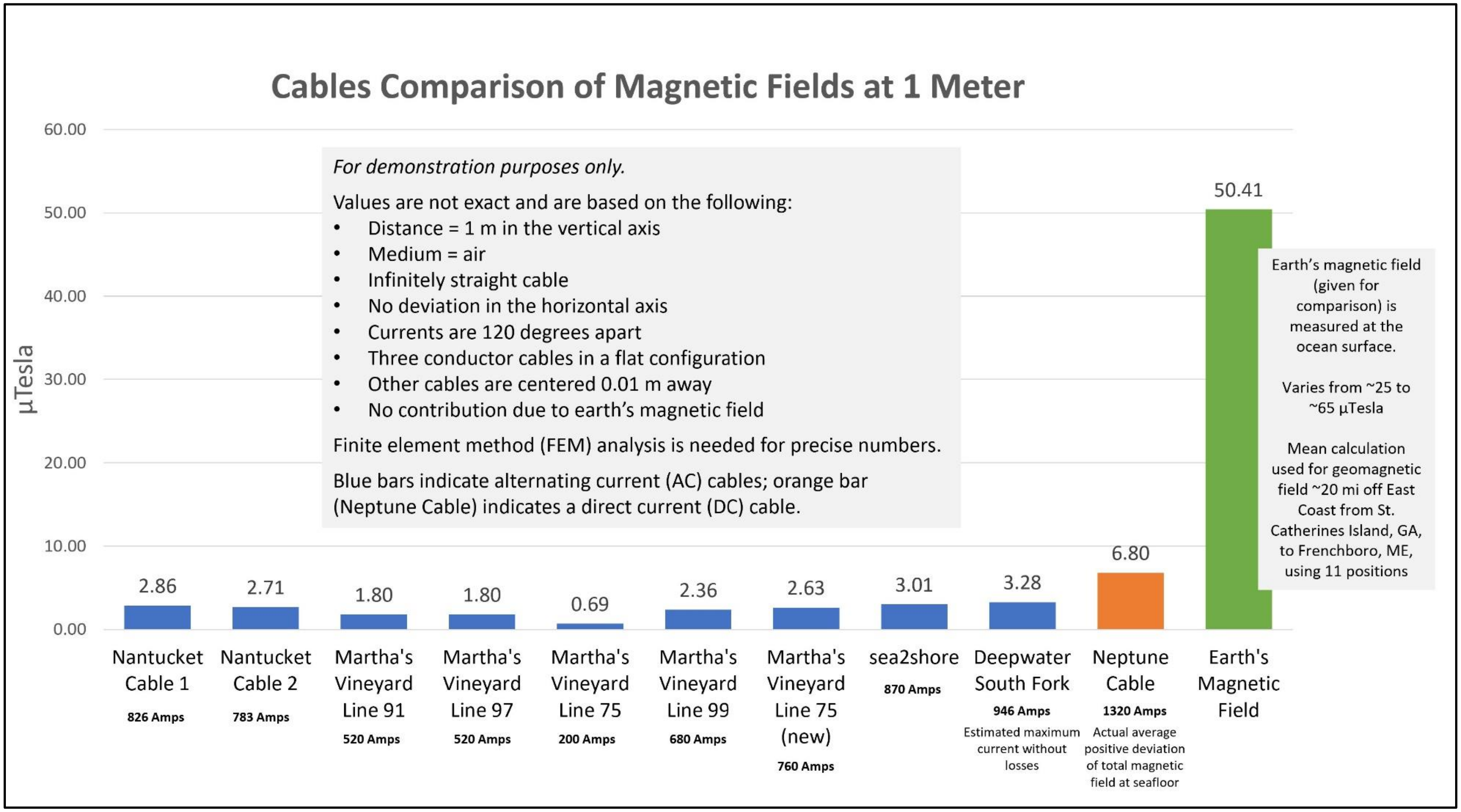

Figure F-8. Comparison of electromagnetic fields produced by offshore wind farm transmission cables to the earth's background magnetic field.

APPENDIX G

Environmental Protection Measures, Mitigation, and Monitoring

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CONTENTS

Tables

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INTRODUCTION

The South Fork Wind Farm (SFWF) and the South Fork Export Cable (SFEC) Project final environmental impact statement (final EIS) assesses the potential biological, socioeconomic, physical, and cultural impacts that could result from the construction and installation, operations and maintenance (O&M), and conceptual decommissioning of a wind energy project (Project) located in Bureau of Ocean Energy Management's (BOEM's) Renewable Energy Lease Area OCS-A 0517, approximately 18 miles southeast of Block Island, Rhode Island, and 34 miles east of Montauk Point, New York in the Atlantic Ocean. The Project comprises the siting and development of the SFWF and the SFEC. South Fork Wind, LLC (SFW) is proposing the Project, which is designed to contribute to New York's renewable energy requirements, particularly, the state's goal of 2,400 megawatts of offshore wind energy generation by 2030.

As part of the Project, SFW has committed to self-implement measures to avoid, reduce, mitigate, and/or monitor impacts on the resources discussed in Chapter 3 of the final EIS. Said environmental protection measures (EPMs) are summarized in Table G-1 of this appendix. BOEM considers as part of the Proposed Action only those measures that SFW has committed to in the construction and operations plan (COP) (Jacobs Engineering Group Inc. [Jacobs] 2021). BOEM may select alternatives and/or require additional mitigation or monitoring measures to further protect and monitor these resources. Additional mitigation and monitoring measures may result from reviews under several environmental statutes (Clean Air Act, Endangered Species Act [ESA], Magnuson-Stevens Fisheries Conservation and Management Act, Marine Mammal Protection Act, and National Historic Preservation Act) as discussed in Appendix A of the final EIS. Additional mitigation measures identified by BOEM, as well as those that may result from reviews under these statutes, are shown in Table G-2. Please note that not all of these mitigation measures are within BOEM's statutory and regulatory authority but could be adopted and imposed by other governmental entities. Table G-2 provides descriptions of these mitigation or monitoring measures, as well as those that BOEM has identified for analysis in the final EIS.

BOEM is still undergoing consultation with NMFS under the ESA related to the full suite of proposed actions; once that consultation is concluded, which will occur before the issuance of the record of decision (ROD), additional mitigation measures may be required and added to the final mitigation table in the ROD. These measures will not alter the analyses contained within the final EIS because 1) any such additional measures will benefit listed species by minimizing, monitoring, and/or reporting incidental take; 2) the benefit of such measures may range from low to high benefit to listed species depending on the measure, and such measures may also result in incidental benefits to other non-listed marine wildlife; and 3) these measures, however, should not result in material changes to the proposed action described in the final EIS because such measures "may not alter the basic design, location, scope, duration, or timing of the action," and may "involve only minor changes" (50 Code of Federal Regulations [CFR] 402.14(i))(2)).

If BOEM decides to approve the COP, its record of decision (ROD) would state which of the mitigation and monitoring measures identified by BOEM in Table G-2 have been adopted, and if not, why they were not. Thus, the ROD would inform terms and conditions of COP approval and would compel compliance with or execution of identified mitigation and monitoring measures (40 CFR 1505.3). SFW would be required to certify compliance with certain terms and conditions, as required under 30 CFR 585.633(b). Furthermore, BOEM would periodically review the activities conducted under the approved COP. The frequency and extent of the review would be based on the significance of any changes in available information and on onshore or offshore conditions affecting, or affected by, the activities conducted under the COP. If the review indicated that the COP should be revised to meet the requirement of BOEM's renewable energy regulations, SFW would be required to submit the needed revisions (30 CFR 585.634(b)).

Monitoring measures may be required to evaluate the effectiveness of a mitigation measure or to identify if resources are responding as predicted to impacts from the Proposed Action. Monitoring programs would be developed in coordination between BOEM and agencies with jurisdiction over the resource to be monitored. The information generated by monitoring may be used to 1) adapt how a mitigation measure identified in the COP or ROD is being implemented, 2) revise or develop new mitigation or monitoring measures required under the SFW COP in accordance with 30 CFR 585.634(b) or develop measures for future projects, and/or 3) contribute to regional efforts for better understanding of the impacts and benefits resulting from offshore wind energy projects in the Atlantic (e.g., potential cumulative impact assessment tool). Unless specified, the proposed mitigation and monitoring measures described below would not change the impact ratings on the affected resource, as described in Chapter 3 of the final EIS, but would further reduce expected impacts or inform the development of addition mitigation measures if required.

In this appendix, distances in miles are in statute miles (miles used in the traditional sense) or nautical miles (miles used specifically for marine navigation). Statute miles are more commonly used and are referred to simply as *miles*, whereas nautical miles are referred to by name or by their abbreviation *nm*.

Table G-1. Environmental Protection Measures Committed to by South Fork Wind, LLC

Description	Resource Area Mitigated
Provided in COP Table ES-1	
Vessels providing construction or maintenance services for the SFWF will use low-sulfur fuel where possible.	Air quality
Vessel engines will meet the appropriate U.S. Environmental Protection Agency (EPA) air emission standards for nitrogen oxide emissions when operating within Emission Controls Areas.	Air quality
Equipment and fuel suppliers will provide equipment and fuels that comply with the applicable EPA or equivalent emission standards.	Air quality
Marine engines with a model year of 2007 or later and non-road engines complying with the Tier 3 standards (in 40 Code of Federal Regulations [CFR] 89 or 1039) will be used to satisfy best available control technology.	Air quality
The use of wind to generate electricity reduces the need for electricity generation from new traditional fossil fuel powered plants on the South Fork of Long Island that produce greenhouse gas emissions.	Air quality
Installation of the SFWF Inter-array Cable and SFEC - Offshore will occur using equipment such as a mechanical cutter, mechanical plow, and/or jet plow. Compared to open cut dredging, this method would minimize turbidity and total suspended solids.	Water quality
Vessels will comply with regulatory requirements related to the prevention and control of discharges and accidental spills.	Water quality
Accidental spill or release of oils or other hazardous materials will be managed through the Oil Spill Response Plan (OSRP) (COP Appendix D).	Water quality
At the onshore horizontal directional drilling (HDD) work area for the SFEC, drilling fluids will be managed within a contained system to be collected for reuse as necessary	Water quality
An HDD Inadvertent Release Plan will minimize the potential risks associated with release of drilling fluids or a frac-out.	Water quality
A Stormwater Pollution Prevention Plan, including erosion and sedimentation control measures, and a Spill Prevention, Control, and Countermeasures Pan, will minimize potential impacts to water quality during construction of the SFEC - Onshore.	Water quality
SFW has designed the Project to account for site-specific oceanographic and meteorological conditions within the Lease Area; therefore, no additional measures are necessary.	Water quality
Lighting during operations will be limited to the minimum required by regulation and for safety, therefore minimizing the potential for attraction (or attraction of insect prey) and possibly collision of bats at night.	Bats
SFEC - Onshore will be located underground in previously disturbed areas, such as roadways and railroad ROW, therefore minimizing potential impacts from clearing.	Bats
The SFWF and SFEC offshore will minimize impacts to complex bottom habitats and to important habitats for finfish species to the extent practicable.	Benthic habitat, EFH, invertebrates, and finfish
Installation of the SFWF Inter-array Cable and SFEC - Offshore will occur using equipment such as a mechanical cutter, mechanical plow, and/or jet plow. Compared to open cut dredging, this method will minimize sediment disturbance and alteration of demersal finfish habitat and minimize long-term impacts to the benthic habitat.	Benthic habitat, EFH, invertebrates, and finfish
Use of monopiles with associated scour protection will minimize impacts to benthic habitat compared to other foundation types.	Benthic habitat, EFH, invertebrates, and finfish
The SFWF Inter-array Cable and SFEC - Offshore will be buried to a target depth of 4 to 6 feet (1.2 to 1.8 m)	Benthic habitat, EFH, invertebrates, and finfish
Installation of the offshore sections of the SFEC will use equipment such as a mechanical cutter, mechanical plow, and/or jet plow. Compared to open cut dredging, this method will minimize turbidity and total suspended solids.	Benthic habitat, EFH, invertebrates, and finfish
Use of dynamic positioning vessel for cable installation for the SFWF Inter-array Cable and SFEC – Offshore will minimize impacts to benthic and shellfish resources, finfish and essential fish habitat (EFH) resources as compared to use of a vessel relying on multiple anchors.	Benthic habitat, EFH, invertebrates, and finfish
The SFEC sea-to-shore transition will be installed via HDD to avoid impacts to the dunes, beach, and nearshore zone, including benthic and shellfish, finish and EFH resources.	Benthic habitat, EFH, invertebrates, and finfish
A plan for vessels will be developed prior to construction to identify no-anchor areas inside the maximum work area (MWA) to protect sensitive areas or other areas to be avoided.	Benthic habitat, EFH, invertebrates, and finfish
The SFWF and SFEC - Offshore will minimize impacts to important habitats for finfish species.	Benthic habitat, EFH, invertebrates, and finfish
Siting of the SFWF and SFEC – Offshore were informed by site-specific benthic habitat assessments and Atlantic cod spawning surveys.	Benthic habitat, EFH, invertebrates, and finfish
SFW is committed to collaborative science with commercial and recreational fishing industries pre-, during, and post-construction.	Benthic habitat, EFH, invertebrates, and finfish
SFW will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.	Benthic habitat, EFH, invertebrates, and finfish
Accidental spill or release of oils or other hazardous materials will be managed through the OSRP (COP Appendix D).	Benthic habitat, EFH, invertebrates, and finfish
The SFWF WTGs will be widely spaced apart allowing avian species to avoid individual WTGs and minimize risk of potential collision.	Birds
The location of the SFWF, more than 18 miles (30 kilometers [km], 16 nm) offshore, will avoid the coastal areas, which are known to attract birds, particularly shorebirds and seaducks.	Birds
Lighting during operations will be limited to the minimum required by regulation and for safety, therefore minimizing the potential for attraction or disorientation.	Birds
SFW will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.	Birds
Accidental spill or release of oils or other hazardous materials will be managed through the OSRP (COP Appendix D).	Birds
The SFEC sea-to-shore transition will be installed via HDD to avoid impacts to the dunes, beach, and nearshore zone.	Birds
An avian management plan for listed species will be prepared for the SFEC - Onshore.	Birds
The SFEC - Onshore cable will be buried; therefore avoiding the risk to birds associated with overhead lines.	Birds
Exclusion and monitoring zones for marine mammals will be established for pile driving and high resolution geophysical (HRG) survey activities.	Marine mammals

Description	Resource Area Mitigated
Mitigation measures will be implemented for pile-driving and HRG survey activities. These measures will include soft-start measures, shut-down procedures, protected species monitoring protocols, use of qualified and National Oceanic and Atmospheric Administration (NOAA)–approved protected species observers (PSOs), and noise attenuation systems such as bubble curtains, as appropriate.	Marine mammals
Impact pile-driving activities will not occur at the SFWF from January 1 to April 30 to minimize potential impacts to the North Atlantic right whale (NARW), which will also have a protective effect for other marine mammal species.	Marine mammals
Vessels will follow NOAA guidelines for marine mammal strike avoidance measures, including vessel speed restrictions.	Marine mammals
All personnel working offshore will receive training on marine mammal awareness and marine debris awareness.	Marine mammals
SFW will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.	Marine mammals
Accidental spill or release of oils or other hazardous materials will be managed through the OSRP (COP Appendix D).	Marine mammals
The SFWF inter-array cable and SFEC Offshore will be buried to a target depth of 4 to 6 feet (1.2 to 1.8 m).	Marine mammals
SFEC - Onshore will be sited within previously disturbed existing ROWs.	Terrestrial coastal habitats and fauna
The SFEC sea-to-shore transition will be installed via HDD to avoid impacts to the dunes, beach, and nearshore zone. Accidental spill or release of oils or other hazardous materials will be managed through the OSRP (COP Appendix D).	Terrestrial coastal habitats and fauna
A Stormwater Pollution Prevention Plan, including erosion and sedimentation control measures, and a Spill Prevention, Control, and Countermeasures Plan, will minimize potential impacts to water quality during construction of the SFEC - Onshore.	Terrestrial coastal habitats and fauna
Exclusion and monitoring zones will be established for sea turtles during pile-driving activities and HRG survey activities.	Sea turtles
Mitigation measures will be implemented for impact pile-driving and HRG survey activities. These measures would include soft-start measures, shut-down procedures, protected species monitoring protocols, use of qualified and NOAA-approved protected species observers, and noise attenuation systems such as bubble curtains, as appropriate. Impact pile driving activities will not occur at the SFWF from January 1 to April 30 to minimize potential impacts to the North Atlantic right whale, which would also have a protective effect for sea turtles.	Sea turtles
Vessels will follow NOAA guidelines for sea turtle strike avoidance measures, including vessel speed restrictions.	Sea turtles
All personnel working offshore will receive training on sea turtle awareness and marine debris awareness.	Sea turtles
SFW will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.	Sea turtles
Accidental spill or release of oils or other hazardous materials will be managed through the OSRP (COP Appendix D).	Sea turtles
The SFWF inter-array Cable and SFEC Offshore would be buried to a target depth of 4 to 6 feet (1.2 to 1.8 m).	Sea turtles
SFW is committed to a spacing of approximately 1.15 mile (1.8 km), or one nautical mile (nm), between turbines.	Commercial fisheries and for-hire recreational fishing, navigation and vessel traffic
The inter-array cable and SFEC - Offshore will be buried to a target depth of 4 to 6 feet (1.2 to 1.8 m).	Commercial fisheries and for-hire recreational fishing
The SFEC sea-to-shore transition will be installed via HDD to avoid impacts to the dunes, beach, and nearshore zone, including sensitive shoreline habitats and shoreline fishing areas.	Commercial fisheries and for-hire recreational fishing
As appropriate and feasible, Best Management Practices would be implemented to minimize impacts on fisheries, as described in the *Guidelines for Providing Information on Fisheries Social and Economic Conditions for Renewable Energy Development* (BOEM 2015).	Commercial fisheries and for-hire recreational fishing
Siting of the SFWF and SFEC - Offshore were informed by site-specific benthic habitat assessments and Atlantic cod spawning surveys.	Commercial fisheries and for-hire recreational fishing
SFW is committed to collaborative science with the commercial and recreational fishing industries pre-, during, and post-construction.	Commercial fisheries and for-hire recreational fishing
Each WTG will be marked and lit with both USCG and approved aviation lighting.	Commercial fisheries and for-hire recreational fishing
SFW will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.	Commercial fisheries and for-hire recreational fishing
Accidental spill or release of oils or other hazardous materials will be managed through the OSRP (COP Appendix D).	Commercial fisheries and for-hire recreational fishing
Communications and outreach with the commercial and recreational fishing industries will be guided by the Project-specific Fisheries Communications Plan (COP Appendix B). This outreach will be led by the SFW Fisheries Liaisons. Fisheries Representatives from the ports of Montauk, Point Judith, and New Bedford represent the fishing community.	Commercial fisheries and for-hire recreational fishing
SFW is committed to a gear loss SFW is committed to a Gear Loss Prevention and Claim Procedure for the commercial fishing industry	Commercial fisheries and for-hire recreational fishing
A comprehensive communication plan will be implemented during offshore construction to inform all mariners, including commercial and recreational fishermen, and recreational boaters of construction activities and vessel movements. Communication will be facilitated through a Fisheries Liaison, a Project website, and public notices to mariners and vessel float plans (in coordination with USCG).	Commercial fisheries and for-hire recreational fishing
The location of SFWF WTGs, approximately 19 miles (30.6 km, 16.6 nm) from Block Island, 21 miles (33.7 km, 18.2 nm) from Martha's Vineyard, and 35 miles (56.3 km, 30.4 nm) from Montauk, restricts available views from visually sensitive above-ground historic properties.	Cultural resources
SFWF WTGs will have uniform design, speed, height, and rotor diameter.	Cultural resources
The color of the SFWF WTGs (less than 5% grey tone) generally blends well with the sky at the horizon and eliminates the need for daytime lights or red paint marking of the blade tips.	Cultural resources
The SFEC - Onshore cable will be buried, therefore minimizing potential visual impacts to aboveground historic properties.	Cultural resources
The SFEC - Interconnection Facility will be located adjacent to an existing substation on parcel zoned for commercial and industrial/utility use.	Cultural resources
The SFEC interconnection facility land parcel is currently screened by mature trees. After construction, additional screening will be considered to further reduce potential visibility and visual impact.	Cultural resources

Description	Resource Area Mitigated
The SFWF and SFEC - Offshore will avoid or minimize impacts to potential submerged cultural sites, to the extent practicable.	Cultural resources
Native American tribes were involved, and will continue to be involved, in marine survey protocol design, execution of the surveys, and interpretation of the results.	Cultural resources
A plan for vessels will be developed prior to construction to identify no-anchor areas inside the MWA to protect sensitive areas or other areas to be avoided. An Unanticipated Discovery Plan will be implemented that will include stop-work and notification procedures to be followed if a cultural resource is encountered during installation.	Cultural resources
As appropriate, SFW will conduct additional archaeological analysis and/or investigation to further assess potential sensitive areas.	Cultural resources
Geophysical and geotechnical (G&G) survey coverage is sufficient to support design changes, if minor refinement of SFWF facility locations is necessary to avoid paleolandforms.	Cultural resources
The route for the SFEC - Onshore will minimize impacts to, or avoid, potential terrestrial archeological resources, to the extent practicable.	Cultural resources
Native American tribes were involved, and will continue to be involved, in terrestrial survey protocol design, execution of the surveys, and interpretation of the results.	Cultural resources
Analysis shows that most of the SFEC - Onshore route has been previously disturbed; therefore, the risk of potentially encountering undisturbed archaeological deposits is minimized.	Cultural resources
An Unanticipated Discovery Plan will be implemented that will include stop-work and notification procedures to be followed if a cultural resource is encountered during installation.	Cultural resources
SFW will conduct additional archaeological investigation to further assess potential sensitive areas.	Cultural resources
Where possible, local workers will be hired to meet labor needs for Project construction, O&M, and conceptual decommissioning.	Demographics, employment, and economics
The location of SFWF WTGs restricts available views from visually sensitive public resources and population centers.	Demographics, employment, and economics
The SFEC - Onshore construction schedule has been designed to minimize impacts to the local community during the summer tourist season.	Demographics, employment, and economics
At the SFEC Interconnection Facility, additional screening will be considered to further reduce potential visibility and noise.	Demographics, employment, and economics
New York State Law requires that the SFEC - Onshore be constructed in compliance with a detailed plan that includes traffic and other control measures.	Demographics, employment, and economics
The use of wind to generate electricity will have a beneficial impact on air emissions in East Hampton, as it reduces the need for electricity generation from traditional fossil fuel powered plants on the South Fork of Long Island that produce greenhouse gas emissions.	Environmental Justice
Where possible, local workers will be hired to meet labor needs for Project construction, O&M, and decommissioning.	Environmental Justice
New York State Law requires that the SFEC - Onshore be constructed in compliance with a detailed plan that includes traffic and other control measures.	Environmental Justice
SFW will also coordinate with local authorities during SFEC - Onshore construction to minimize local traffic and noise impacts	Environmental Justice
SFEC - Onshore will be located underground in previously disturbed areas, such as roadways and railroad ROW	Land use and coastal infrastructure
The SFEC sea-to-shore transition will be installed via HDD to avoid impacts to the dunes, beach, and near-shore zone. New York State Law requires that the SFEC - Onshore be constructed in compliance with a detailed plan that includes traffic and other control measures.	Land use and coastal infrastructure
SFW will also coordinate with local authorities during SFEC – Onshore construction to minimize local traffic and noise impacts.	Land use and coastal infrastructure
A Stormwater Pollution Prevention Plan, including erosion and sedimentation control measures, and a Spill Prevention, Control, and Countermeasures Plan, will minimize potential impacts to adjacent lands uses during construction of the SFEC - Onshore.	Land use and coastal infrastructure
The SFEC - Onshore cable will be buried; therefore, minimizing potential impacts to adjacent properties.	Land use and coastal infrastructure
SFW is committed to a spacing of approximately 1.15 mile (1.8 km), or one nautical mile, between turbines.	Navigation and vessel traffic
Each WTG will be marked and lit with both USCG and approved aviation lighting. An Automatic Identification System will be installed at the SFWF marking the corners of the wind farm to assist in safe navigation.	Navigation and vessel traffic
All appropriate lighting and marking schemes, based on current regulations, will be implemented.	Navigation and vessel traffic
SFW will require all construction and operations vessels to comply with regulatory requirements related to the prevention and control of spills and discharges.	Navigation and vessel traffic
Accidental spill or release of oils or other hazardous materials will be managed through the OSRP (COP Appendix D).	Navigation and vessel traffic
Project construction, O&M, and decommissioning activities will be coordinated with appropriate contacts at USCG and U.S. Department of Defense command headquarters.	Navigation and vessel traffic; Other Marine Uses
A comprehensive communication plan will be implemented during offshore construction to inform all mariners, including commercial and recreational fishermen, and recreational boaters of construction activities and vessel movements. Communication will be facilitated through a Fisheries Liaison, Project website, and public notices to mariners and vessel float plans (in coordination with USCG)	Navigation and vessel traffic
The location of SFWF WTGs restricts available views from visually sensitive public resources and population centers.	Recreation and tourism
A comprehensive communication plan will be implemented during offshore construction to inform all mariners, including commercial and recreational fishermen, and recreational boaters of construction activities and vessel movements. Communication will be facilitated through a Project website, public notices to mariners and vessel float plans, and a fisheries liaison. SFW will submit information to the USCG to issue Local Notice to Mariners during offshore installation activities.	Recreation and tourism
The communication plan will also include outreach to stakeholders in the offshore recreational and tourism industry to minimize impacts to recreational events (e.g., sailboat races).	Recreation and tourism
The SFEC - Onshore construction schedule has been designed to minimize impacts to the local community during the summer tourist season.	Recreation and tourism
New York State Law requires that the SFEC - Onshore be constructed in compliance with a detailed plan that includes traffic and other control measures.	Recreation and tourism
SFW will also coordinate with local authorities during SFEC onshore construction to minimize local traffic and noise impacts.	Recreation and tourism

Description	Resource Area Mitigated
The location of SFWF, approximately 19 miles (30.6 km, 16.6 nm) from Block Island, 21 miles (33.7 km, 18.2 nm) from Martha's Vineyard, and 35 miles (56.3 km, 30.4 nm) from Montauk, restricts available views from visually sensitive public resources and population centers	Visual resources
SFWF WTGs will have uniform design, speed, height, and rotor diameter.	Visual resources
The color of the SFWF WTGs (less than 5% grey tone) generally blends well with the sky at the horizon and eliminates the need for daytime lights or red paint marking of the blade tips.	Visual resources
Use of an Aircraft Detection Lighting System will mitigate nighttime visual impacts.	Visual resources
The SFEC - Interconnection Facility will be located adjacent to an existing substation on a parcel zoned for commercial and industrial use.	Visual resources
At the SFEC - Interconnection Facility, additional screening will be considered to further reduce potential visibility and noise	Visual resources

Table G-2. Potential Additional Mitigation and Monitoring Measures

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
Potential Additional Mitigation and Monitoring Measures				
1	Construction and installation	Tree clearing time-of-year restriction	SFW agreed to a NYSDEC requirement that tree clearing activities occur between December 1 and February 28 to avoid potential impacts to northern long-eared bat. If any proposed clearing activities are performed outside of the December 1 through February 28 window, roosting tree surveys shall be conducted in accordance with a northern long-eared bat monitoring and impact minimization plan, in coordination with NYSDEC. A roosting tree survey plan will be developed for the SFEC-Interconnection Facility and SFEC-Onshore in the Project Area, in consultation with NYSDEC, and will be included as part of the EM&CP. As part of the survey, biological monitors shall identify and evaluate any potential roosting trees for the northern long-eared bat. Emergence counts will be taken no more than 24 hours before tree removal to confirm that there are no northern long-eared bats roosting. This would occur through a combination of acoustic and visual surveys. If the certificate holder or NYSDEC identify roosting trees within 150 feet of the Project Area, the certificate holder will coordinate with NYSDEC regarding any potential minimization and mitigation measures required to comply with 6 NYCRR § 182 and applicable federal laws and regulations promulgated by the U.S. Fish and Wildlife Service (USFWS). If presence/probable absence surveys are conducted pursuant to current U.S. Fish and Wildlife Service (USFWS) protocols and no northern long-eared bats are documented, this measure may not be necessary for ESA compliance relative to this species.	Bats
2	Construction and installation	Onshore time-of-year restrictions	In accordance with the conditions of the New York Article VII certification, SFW must eliminate onshore construction activities from Memorial Day through Labor Day that would impede traffic or access to recreational areas.	Recreation and tourism
3	Construction and installation	Vegetation Disturbance	Scenic easements near the interconnection facility will be staked or clearly identified to avoid vegetation disturbance.	Visual
4	Construction and installation	Vegetation Screening	SFW will work with local officials to identify appropriate vegetation screening options during governmental permitting processes.	Visual
5	Construction and installation	Nearshore time-of-year restrictions	To minimize impacts to threatened and endangered shorebirds, no construction or maintenance activities shall occur within 1,000 meters of the southern edge of the beach/pavement boundary between April 1 and September 1 and within 152 meters (500 feet) from September 2 to November 1. (USFWS ESA Consultation comment 3/4/21 & Ørsted permit with NY)	Birds
6	Construction and installation	Nearshore time-of-year restrictions	To protect nesting shorebirds on the beach front in the East Hampton locations, Red knot surveys should be conducted from April 1 to November 30. If red knots are detected a 300m buffer between project activities and red knots. (USFWS comment on DEIS 4/22/21)	Birds
7	Construction and installation	Nearshore time-of-year restrictions	Seabeach amaranth surveys and avoidance measures should also be applied from May 1 to November 1 for work on East Hampton beaches. (USFWS comment on DEIS 4/22/21)	Plant
8	Construction, O&M, and conceptual decommissioning	Annual bird mortality reporting	By January 31 of each year, the lessee must submit an annual report to DOI (renewable_reporting@boem.gov and protectedspecies@bsee.gov) and USFWS documenting any dead (or injured) birds or bats found on vessels and structures during construction, operations, and decommissioning. The report must contain the following information: the name of species, date found, location, a picture to confirm species identity (if possible), and any other relevant information. Carcasses with Federal or research bands must be reported to the United States Geological Survey Bird Band Laboratory, available at https://www.pwrc.usgs.gov/bbl/.Require an annual report of any dead or injured birds discovered on Project vessels or structures. The report would contain the following information: species, photographs to confirm species, location, date, and other relevant information. Carcasses with federal or research bands must be reported to the U.S. Geological Survey Bird Band Laboratory, BOEM, and USFWS.	Birds
9	O&M	Aircraft Detection Lighting System (ADLS)	Lessee must use FAA-approved ADLS, which will only activate the FAA hazard lighting when an aircraft is in the vicinity of the wind facility to reduce the visibility of nighttime lighting and nighttime visual impacts. The Lessee must confirm use of FAA-approved ADLS in the FIR. require use of Federal Aviation Administration (FAA)–approved ADLS, which would only activate the FAA hazard lighting when an aircraft is in the vicinity of the wind facility, to reduce the visibility of nighttime lighting and thus reduce nighttime visual impacts.	Birds, cultural resources, recreation and tourism
10	O&M	Post-installation cable monitoring	SFW must provide BOEM with a cable monitoring report within 45 calendar days following each inter-array and export cable inspection to determine cable location, burial depths, state of the cable, and site conditions. An inspection of the inter-array cable and export cable is expected to include HRG methods, such as a multi-beam bathymetric survey equipment, and identify seabed features, natural and man-made hazards, and site conditions along federal sections of the cable routing. In federal waters, the initial inter-array and export cable inspection would be carried out within 6 months of commissioning and subsequent inspections would be carried out at years 1, 2, and every 3 thereafter and after a major storm event. Major storm events are defined as when metocean conditions at the facility meet or exceed the 1 in 50-year return period calculated in the metocean design basis, to be submitted to BOEM with the Facility Design Report (FDR). If conditions warrant adjustment to the frequency of inspections following the Year 2 survey, a revised monitoring plan may be provided to BOEM for review. In addition to inspection, the export cable would be monitored continuously with the as-built Distributed Temperature Sensing System. If Distributed Temperature Sensing data indicate that burial conditions have deteriorated or changed significantly and remedial actions are warranted, the Distributed Temperature Sensing data, a seabed stability analysis, and report of remedial actions taken or scheduled must be provided to BOEM within 45 calendar days of the observations. The Distributed Temperature Sensing data, cable monitoring survey data, and cable conditions analysis for each year must be provided to BOEM as part of the Annual Compliance Reports, required by 30 CFR § 585.633(b).	Benthic habitat, EFH, invertebrates, and finfish; commercial fisheries and for-hire recreational fishing

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
11	Construction, O&M	Dredging	Avoid dredging and placement between April 15 to July 15 minimizes potential impacts to horseshoe crab spawning. Dredge disposal/placement may result in the loss of horseshoe crabs and their eggs and larvae, and their habitat, resulting in a reduction in prey species for several federally managed species and adverse effects to their EFH. As noted in the EFH assessment, horseshoe crabs are known to occur within Lake Montauk.	Benthic habitat, EFH, invertebrates, and finfish
12	Construction, O&M	Gillnet surveys	Conduct surveys according to the Fisheries Research Monitoring Plan.	Benthic habitat, EFH, invertebrates, and finfish
13	Construction, O&M	Beam Trawl surveys	Conduct surveys according to the Fisheries Research Monitoring Plan.	Benthic habitat, EFH, invertebrates, and finfish
14	Construction, O&M	Ventless Trap, Lobster surveys	Conduct surveys according to the Fisheries Research Monitoring Plan.	Benthic habitat, EFH, invertebrates, and finfish
15	Construction, O&M	Ventless Fish Pot surveys	Conduct surveys according to the Fisheries Research Monitoring Plan.	Benthic habitat, EFH, invertebrates, and finfish
16	Construction, O&M	Acoustic Telemetry	Conduct surveys according to the Fisheries Research Monitoring Plan.	Benthic habitat, EFH, invertebrates, and finfish
17	Construction, O&M	Benthic surveys – sediment profile imaging	Conduct surveys according to the Fisheries Research Monitoring Plan.	Benthic habitat, EFH, invertebrates, and finfish
18	Construction	Removal of Turbines and inter-array cable	Remove turbine locations and associated cable from development to reduce adverse impacts to complex habitats. The proposed turbine locations WTG 5, WTG 6, WTG 9, WTG 16A, and WTG 17A would result in substantial adverse impacts to complex habitats. These locations were identified by SFW in a June 14, 2021, communication. The specific locations were selected taking into consideration the reduction of impacts to complex habitats from the WTGs and cabling along with other technical considerations such as minimizing boulder removal as well as transmission considerations.	Benthic habitat, EFH, invertebrates, and finfish
19	Construction	Avoid identified shipwrecks, debris fields, and submerged landform features that can be avoided	Require SFW to avoid the shipwrecks, potentially significant debris fields, and as many as possible of the submerged, landform features identified during marine archaeological surveys of the WDA and OECC. While avoidance of shipwrecks and debris fields is typically simple, avoidance of all submerged landform features is typically not possible due to their size and orientation.	Cultural resources
20	Construction, O&M, decommissioning	Submarine cable system burial plan	A copy of the submarine cable system burial plan shall be submitted by SFW as part of their FDR and Fabrication and Installation Report that depict precise planned locations and burial depths of the entire cable system. This plan shall be reviewed by the USCG and BOEM.	Navigation and vessel traffic
21	Construction	Boulder relocation reporting	The locations of any boulder (which would protrude >2 m or more on the sea floor) relocated during cable installation activities must be reported to BOEM, USCG, NOAA, and the local harbormaster within 30 days of relocation. These locations must be reported in latitude and longitude degrees to the nearest 10 thousandth of a decimal degree (roughly the nearest meter), or as precise as practicable.	Navigation and vessel traffic
22	Construction, O&M, decommissioning	Vessel safety practices	All Project vessels involved in construction, operations, maintenance, and decommissioning activities would comply with U.S. or SOLAS standards, as applicable, with regards to vessel construction, vessel safety equipment, and crewing practices.	Navigation and vessel traffic
23	Construction, O&M, decommissioning	WTG and OSS marking	Each WTG and OSS would be marked with PATONs, subject to the approval of the Commander (dpw-1), First Coast Guard District. SFW would do the following: Provide BOEM and USCG with a proposed lighting, marking, and signaling plan, which must be approved by BOEM after consultation with the USCG. The plan should conform to the International Association of Marine Aids to Navigation and Lighthouse Authorities Recommendation O-139, The Marking of Man-Made Offshore Structures. Should any part of the recommendation conflict with federal law or regulation, or if SFW seeks an alternative to the recommendation, SFW must consult with the USCG. Mark each individual WTG and OSS with clearly visible, unique, alphanumeric identification characters. Light each WTG and OSS in a manner that is visible by mariners in a 360-degree arc around the WTG and OSS. Apply to the First Coast Guard District to establish PATONs for the facility. Approval for all PATONs must be obtained before installation of the SFW structures begins. Ensure each WTG is lighted with red obstruction lighting consistent with the FAA Advisory Circular 70/7460-1L Change 2 (FAA 2018), so long as this requirement does not preclude the use of an ADLS. Provide signage that covers 360-degrees of the wind turbine structures warning vessels of the air draft of the turbine blades as determined at highest astronomical tide. Cooperate with USCG and NOAA to ensure that cable routes and wind turbines are depicted on appropriate government produced and commercially available nautical charts. Provide mariner information sheets on SFW's website with details on the location of the turbines and specifics such as blade clearance above sea level.	Navigation and vessel traffic
24	Construction, O&M, decommissioning	WTG shut-down mechanism	Equip all WTG rotors (blade assemblies) with control mechanisms operable from the SFW control centers available 24 hours a day, 7 days a week. The control mechanisms shall enable control room operators to shut down the requested WTGs within an agreed upon time of notification between the USCG and SFW. A formal shut-down procedure would be part of the standard operating procedures and periodically tested. Normally, USCG-ordered shut downs would be limited to those WTGs in the immediate vicinity of an emergency and for as short a period as is safely practicable under the circumstances, as determined by the USCG.	Navigation and vessel traffic: Other marine uses
25	Construction, O&M, decommissioning	USCG Training and Exercises	SFW would participate in periodic USCG-coordinated training and exercises to test and refine notification and shut-down procedures and to provide SAR training opportunities for USCG vessels and aircraft.	Navigation and vessel traffic; Other marine uses

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
26	Construction, O&M, decommissioning	Operations and maintenance plan	Prior to operation of the Project, SFW shall submit a written plan for operations and maintenance, which includes control center(s), for review by BOEM and the USCG. The plan must demonstrate that the control center(s) would be adequately staffed to perform standard operating procedures, communications capabilities, and monitoring capabilities. The plan shall include, but not be limited to, the following topics, which may be modified through ongoing discussions with the USCG: Standard Operating Procedures: Methods for establishing and testing WTG rotor shut-down; methods of lighting control; method(s) for notifying the USCG of mariners in distress or potential/actual SAR incidents; method(s) for notifying the USCG of any events or incidents that may impact maritime safety or security; and methods for providing the USCG with environmental data, imagery, communications and other information pertinent to SAR or marine pollution response. Staffing: Number of personnel intended to staff the control center(s) to ensure continuous monitoring of WTG operations, communications, and surveillance systems. Communications: Capabilities to be maintained by the control center(s) to communicate with the USCG and mariners within and in the vicinity of the Project area. Communications capability shall at a minimum include VHF marine radio and landline and wireless for voice and data. Monitoring: The control center(s) should maintain the capability to monitor the SFW installation and operations in real time (including night and periods of poor visibility) for determining the status of all PATONs; and detection of a survivor who has climbed to the survivor's platform, if installed, on any WTG or OSS.	Navigation and vessel traffic; Other marine uses
27	Construction, O&M, decommissioning	WTG/OSS installation	No WTG/OSS installation work shall commence at the Project site (i.e., on or under the water) without prior review by BOEM and USCG of a plan to be submitted by SFW that describes the schedule and process for erecting each WTG, including all planned mitigations to be implemented to minimize any adverse impacts on navigation while installation is ongoing. Appropriate Notice to Mariners submissions would accompany the plan.	Navigation and vessel traffic
28	Construction, O&M, decommissioning	USCG reporting	**Complaints**: On a monthly basis during installation, SFW shall provide USCG with a description of any complaints received (either written or oral) by boaters, fishermen, commercial vessel operators, or other mariners regarding impacts on navigation safety allegedly caused by construction vessels, crew transfer vessels, barges, or other equipment. Describe any remedial action taken in response to complaints received. **Correspondence**: SFW shall provide to USCG copies of any correspondence received by SFW from other federal, state, or local agencies that mention or address navigation safety issues. **Maintenance Schedule**: SFW would provide the USCG with its planned WTG maintenance schedule, forecasted out to at least one quarter. Appropriate Notice to Mariners submissions would accompany each maintenance schedule.	Navigation and vessel traffic
29	Construction, O&M, decommissioning	Public participation	To ensure sufficient opportunity for the public to receive information directly from the owners/operators of the wind energy facility, SFW would attend periodic meetings of the Southeastern Massachusetts and Rhode Island Port Safety and Security Forums to provide briefs on the status of construction and operations and on any problems or issues encountered with respect to navigation safety.	Navigation and vessel traffic
30	Construction, O&M, decommissioning	Helicopter landing platforms	If SFW's OSSs include helicopter-landing platforms, those platforms would be designed and built to accommodate up to and including USCG H60 sized rescue helicopters.	Navigation and vessel traffic; Other marine uses
31	Construction, O&M, decommissioning	Scientific survey mitigation	South Fork Wind must participate in good faith with the establishment of the Federal Survey Mitigation Program. Participation could include information sharing and engagement in scientific studies needed to understand the impact of wind energy development on: (I) marine ecosystems and the human communities that use these marine ecosystems; and (II) the following surveys: (a) NOAA Spring and Autumn Bottom trawl surveys; (b) NOAA Ecosystem Monitoring surveys; (c) NOAA North Atlantic right whale aerial surveys; (d) NOAA Aerial and shipboard marine mammal and sea turtle surveys; (e) NOAA Atlantic surfclam and ocean quahog surveys; (f) NOAA and industry-based Atlantic sea scallop surveys; and (g) Any other surveys in the region impacted by wind energy development. Specific roles, responsibilities, resources and timeframes related to these efforts will be developed through the collaborative effort between NOAA and BOEM described above.	Other marine uses
32	Construction, O&M	Environmental data sharing with federally recognized tribes	No later than ninety (90) days after COP approval, South Fork Wind must, at a minimum, contact the federally recognized tribes currently participating in government-to-government consultations with BOEM for the Project in order to solicit their interest in receiving access to the results of reports generated as a result of the Fisheries Research Monitoring Plan; reporting of all NARW sightings; injured or dead protected species reporting (turtles and NARW); NARW PAM monitoring; PSO reports (e.g., weekly pile driving reports); pile-driving schedule and changes thereto. At a minimum, South Fork Wind should offer access to the following federally recognized tribes: the Mashpee Wampanoag Tribe, the Wampanoag of Gay Head (Aquinnah); the Mashantucket Pequot Indian Tribe; the Mohegan Tribe of Indians of Connecticut; the Shinnecock Indian Nation; the Narraganset Indian Tribe; and the Delaware Tribe of Indians. South Fork Wind must provide access to non-proprietary/non-confidential business information to the federally recognized tribe no later than 30 days after the information becomes available.	Environmental Justice
33	Construction, O&M	Coordination with federally recognized tribes in local hiring	No later than six (6) months after COP approval, SFW must prepare and implement a local hiring plan to maximize South Fork Wind's direct hiring of New York residents. Components of the plan shall include coordination with unions, training facilities, schools, the Mashpee Wampanoag Tribe, and the Wampanoag Tribe of Gay Head (Aquinnah).	Environmental Justice, New York Article VII
34	Construction, Operations and Maintenance, and Decommissioning	Rhode Island Fisheries Direct Compensation Program and Coastal Community Fund	A $4.25 million direct compensation fund to be held in escrow to compensate for any claims of direct losses or impacts on Rhode Island commercial and for-hire charter fishing operations caused by the construction, operation and decommissioning of the Project. A $950,000 Coastal Community Fund to be held in escrow for support of Rhode Island companies that support Rhode Island fishing interests. Implementation agreement executed between CRMC and South Fork Wind, LLC on June 30, 2021.	Voluntary by South Fork Wind Rhode Island CZM
35	Construction, Operations and Maintenance, and Decommissioning	Massachusetts Fisheries Innovation Fund	SFW has committed to provide $2.6 million in compensatory mitigation as part of its overall Project modifications and mitigations to achieve consistency with the enforceable policies of the Massachusetts Coastal Program. This total will be comprised of an upfront payment of $2.1 million for direct compensation for potential economic loss to Massachusetts commercial and for-hire (charter) fishermen through a claims process; an upfront payment of $200,000 to establish a Coastal Community Fund to support the coexistence of the fishing and offshore wind sectors through a grant program; and up to $300,000 (the "Navigational Enhancement and Training Funding") to fund claims when made through the Navigational Enhancement and Training Program.	Voluntary by South Fork Wind Massachusetts CZM
36	Construction, O&M, decommissioning	Add conditions of COP approval	Require the following conditions of COP approval mitigate potential impacts on Falmouth, MA, Air Surveillance Radar (ASR-8) : • Notify NORAD 30 to 60 days ahead of Project completion and when the Project is complete and operational for RAM scheduling • Contribute funds ($80,000) toward execution of the RAM • Curtailment of operations for national security or defense purposes as described in the leasing agreement•	Department of Defense

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
	Mitigation measures from ESA consultation with USFWS			
37	Construction and installation, O&M, and conceptual decommissioning	Bird deterrent devices	The Lessee must install bird deterrent devices to minimize bird attraction to operating turbines and on the ESP(s) in locations where the Lessee determines are appropriate and that they can be installed safely. The Lessor must concur with the Lessee's proposed locations. The Lessee must confirm location(s) of bird deterrent devices as part of the as-built documentation submitted with the FIR.	Birds
38	O&M	Avian and bat post-construction monitoring program	• At least thirty (30) calendar days prior to the commencement of preconstruction surveys, the Lessee must finalize, obtain concurrence from DOI, and implement the Monitoring Plan described in Appendix F of the Final Environmental Impact Statement for this project ("South Fork Wind Farm Avian and Bat Post-Construction Monitoring Framework") in coordination with interested stakeholders. The Monitoring Plan must include, at a minimum: Installation of acoustic monitoring devices to monitor nocturnal birds and bats; installation of Motus receivers at up to four locations within the wind farm; refurbish up to two onshore Motus receiver stations near the SFWF (e.g., Block Island, Buzzards Bay); provide funding for up to 50 Motus tags per year will be provided to researchers working with Roseate Terns for up to three consecutive years; avian behavior point count surveys at individual WTGs. • The Lessee must submit to BOEM (renewable_reporting@boem.gov) a comprehensive report after each full year of monitoring (pre- and post-construction) within six (6) months of completion of the last survey. The report must include all data, analyses, and summaries regarding Endangered Species Act (ESA)-listed and non-ESA-listed birds and bats. DOI will use the annual monitoring reports to assess the need for, and reserves the right to require, revisions (based on subject matter expert analysis) to the Monitoring Plan and may include new technologies as they become available for use in offshore environments. Annual monitoring reports that would be used to assess the need for reasonable revisions to the monitoring plan • Post-Construction Quarterly Progress Reports: The Lessee must submit quarterly progress reports during the implementation of the Monitoring Plan to BOEM and USFWS by the 15th day of the month following the end of each quarter during the first full year that the project is operational. The progress reports must include a summary of all work performed, an explanation of overall progress, and any technical problems encountered. • Monitoring Plan Revisions: Within fifteen (15) calendar days of submitting the annual monitoring report, the Lessee must meet with BOEM and USFWS to discuss: the monitoring results; the potential need for revisions to the Monitoring Plan, including technical refinements and/or additional monitoring; and the potential need for any additional efforts to reduce impacts. If the Lessor determines after this discussion that revisions to the Monitoring Plan are necessary, the Lessor may require the Lessee to modify the Monitoring Plan. If the reported monitoring results deviate substantially from the impact analysis included in the FEIS, the Lessor may impose additional requirements on the Lessee to address these impacts. • The Lessee must store the raw data from all avian and bat surveys and monitoring activities according to accepted archiving practices. Such data must remain accessible to the Lessor and USFWS, upon request, for the duration of the lease. The Lessee must work with BOEM to ensure the data is publicly available.	Birds, bats
	Conservation Recommendations from the EFH Consultation[1]			
39	Construction and installation, O&M, conceptual decommissioning	Anchoring plan	Given the extent of complex habitats in the project areas, BOEM should require the applicant to develop an anchoring plan to ensure anchoring is avoided and minimized in complex habitats during construction and maintenance of the project. This plan should specifically delineate areas of complex habitat around each turbine and cable locations, and identify areas restricted from anchoring. Anchor chains should include mid-line buoys to minimize impacts to benthic habitats from anchor sweep where feasible. The habitat maps and inshore maps delineating eelgrass habitat adjacent to the O&M facility should be provided to all cable construction and support vessels to ensure no anchoring of vessels be done within or immediately adjacent to these complex habitats. The anchoring plan should be provided for our review and comment prior to BOEM approval.	Benthic habitat, EFH, invertebrates, and finfish
40	Construction	Turbine removal	Based on the available habitat delineations and data, we have determined that the proposed turbine locations WTG 1, WTG 5, WTG 15, WTG 16A, and WTG 17A would result in substantial adverse impacts to complex habitats. BOEM should remove these turbine locations from the proposed project and prohibit development at these locations.	Benthic habitat, EFH, invertebrates, and finfish
41	Construction	Micrositing Plan	Based on the available habitat delineations and data, we have also determined that micrositing turbine locations will be necessary to avoid and minimize substantial adverse impacts to complex habitats. We recommend that turbine locations WTG 2, WTG 4, WTG 6, WTG 8, WTG 9, WTG 10, WTG 12, WTG 13, TG 14, OSS, and the associated inter-array cables be microsited into low multibeam backscatter return areas and that restrictions on seafloor disturbance (e.g. anchoring) during construction be required to avoid impacts to higher multibeam backscatter return areas. BOEM should require a micrositing plan be developed for each of the identified turbine locations and associated cable routes. The micrositing plan should be submitted for our review and comment prior to BOEM approval.	Benthic habitat, EFH, invertebrates, and finfish
42	Construction	Scour and cable protection	BOEM should require scour and cable protection within complex habitats of the lease area use natural, rounded stone of consistent grain size to match existing conditions. Scour and cable protection placed within soft-sediment habitats should incorporate natural, rounded cobble and boulders (2.5-10 inches in diameter for cobble or >10-inch diameter for boulder). Concrete mattresses should not be permitted to be used as scour protection within hard bottom and structurally complex habitats, and any required use of concrete mattresses for cable protection should be mitigated through the addition of natural, rounded stone. Should the use of any engineered stone be necessary, it should be designed and selected to provide three-dimensional structural complexity that creates a diversity of crevice sizes. BOEM should require that the applicant provide descriptions and specifications for any proposed engineered stone for agency comment and review prior to final design selection.	Benthic habitat, EFH, invertebrates, and finfish
43	Construction	Pile-driving	BOEM should restrict pile driving and all bottom-disturbing activities within the lease area during periods of Atlantic cod spawning. Pile driving activity and bottom-tending disturbances should be prohibited during peak spawning, from November through March to avoid and minimize substantial adverse impacts to Atlantic cod EFH.	Benthic habitat, EFH, invertebrates, and finfish
44	Construction	Pile-driving	BOEM should require the applicant to use noise mitigating measures during construction, such as soft start procedures, to ensure fish have the opportunity to evacuate the area prior to pile driving activity, and the deployment of noise dampening equipment such as bubble curtains. BOEM should require the development of a plan outlining noise mitigation procedures in consultation with the resource agencies prior to any construction activities. This should include a minimum of 30 days for the resource agencies to review and provide comments. The noise mitigation plan should be filed with BOEM for approval before construction commences. The noise mitigation plan should include a process for notifying resource agencies within 24 hours if any evidence of a fish kill during construction activity is observed, and contingency plans to resolve issues.	Benthic habitat, EFH, invertebrates, and finfish

[1] The language in the Mitigation or Monitoring Measure column under this heading is taken verbatim from the National Marine Fisheries Service letter (June 7, 2021) transmitting its conservation recommendations, concluding the essential fish habitat consultation under the Magnuson-Stevens Fisheries Conservation and Management Act and the Fish and Wildlife Coordination Act.

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
45	Construction, O&M	Benthic Habitat Monitoring Plan	BOEM should require the applicant to revise the proposed Benthic Habitat Monitoring Plan to address agency concerns related to the adequacy of the proposed methods to detect changes, and to require that the plan address potential changes to macrobenthic communities across and within each habitat type in the project area, including the artificial substrates to be constructed. The plan should include monitoring of invasive species growth on constructed habitats, habitats impacted by project construction as well as expansion to the adjacent habitats. The monitoring plan should also include measures to evaluate demersal juvenile fish species response to habitat impacts as a result of the project. The applicant should consult with the resource agencies in the revision and refinement of this plan and give the resource agencies a minimum of 30 days to review and comment on the plan. The applicant should ultimately file the plan with BOEM for approval. BOEM should ensure that the applicant's filing addresses, and includes, all resource agency comments, as well as the applicant's response to those comments.	Benthic habitat, EFH, invertebrates, and finfish
46	Construction	Dredging, Nearshore time-of-year restrictions	BOEM should restrict nearshore dredging and silt-producing activities associated with the sea-to-shore cable installation and proposed O&M facility improvements that occur at or adjacent to water depths of 5 meters or less, from January 1 through May 31, of any calendar year, to protect sensitive life history stage winter flounder EFH.	Benthic habitat, EFH, invertebrates, and finfish
47	Construction	Passive Acoustic Monitoring Plan	BOEM should require passive acoustic monitoring to be conducted along a range of gradients from the proposed turbine locations before, during, and after pile driving activities. Resource agencies should be provided a draft of the acoustic monitoring plan for review and comment. The plan should also include sound verification monitoring during pile driving activities. Additional noise dampening technology should be applied should real-time monitoring indicate noise levels are not attenuated to the minimum required 10 decibels. Acoustic monitoring reports should be provided to the resource agencies.	Benthic habitat, EFH, invertebrates, and finfish
	Proposed by BOEM in the NOAA Biological Assessment as amended			
48	Construction and installation	Impact Pile-driving seasonal restriction for NARWs	No impact pile-driving activities will occur from January 1 to April 30 as described in measure 4(a) of the Proposed IHA.	Marine mammals and Sea Turtles
49	Construction and installation	Impact pile driving time restrictions	Sunrise and sunset conditions as described in measure 4(b) of the Proposed IHA.	Marine Mammals and Sea Turtles
50	Construction and installation	Pile driving visibility requirements	PSOs must have effective visual monitoring in all directions and must not commence pile-driving until all clearance zones are fully visible (i.e., are not obscured by darkness, rain, fog, etc.) for at least 30 minutes. If conditions (e.g., darkness, rain, fog, etc.) prevent the visual detection of marine mammals in the clearance zones, construction activities must not be initiated until the full extent of all clearance zones are fully visible. The lead PSO will make a determination as to when there is sufficient light to ensure effective visual monitoring can be accomplished in all directions. South Fork Wind must develop and implement measures for alternative monitoring in the event that poor visibility conditions unexpectedly arise and pile-driving cannot be stopped due to safety or operational feasibility. South Fork Wind must prepare and submit an Alternative Monitoring Plan to NMFS and BOEM for NMFS' review and approval at least 90 days prior to the planned start of pile-driving. This plan may include deploying additional observers, alternative monitoring technologies such as night vision, thermal, and infrared technologies, or use of PAM with the goal of ensuring the ability to maintain all clearance and shutdown zones for all ESA-listed species in the event of unexpected poor visibility conditions.	Marine Mammals and Sea Turtles
51	Construction and installation	Establishment of Clearance Zones and Clearance Measures for Impact Pile Driving	For ESA listed whales: as described in measure 4(c) and (d) of the Proposed IHA. For sea turtles: To ensure that impact pile-driving operations are carried out in a way that minimizes the exposure of listed sea turtles to noise that may result in injury or behavioral disturbance, PSOs will establish a 1,640-foot (500-meter) clearance zone for all pile-driving activities. Adherence to the 1,640-foot (500-meter) clearance zones must be reflected in the PSO reports. Any visual detection of sea turtles the 500-m clearance zones must trigger the required delay in pile installation. Upon a visual detection of a sea turtles entering or within the relevant clearance zone during pile-driving, South Fork Wind must not determine the area is clear to start pile driving until: 1) The lead PSO verifies that the animal(s) voluntarily left and headed away from the clearance area; or 2) 30 minutes have elapsed without re-detection of the sea turtle(s) by the lead PSO	Marine Mammals and Sea Turtles
52	Construction and installation	Establishment of Shutdown Zones for Impact Pile Driving	For ESA listed whales: as described in measure 4(e) of the Proposed IHA. For sea turtles: To ensure that impact pile-driving operations are carried out in a way that minimizes the exposure of listed sea turtles to noise that may result in injury or behavioral disturbance, PSOs will establish a 1,640-foot (500-meter) shutdown zone for all pile-driving activities. Adherence to the 1,640-foot (500-meter) shutdown zones must be reflected in the PSO reports. Any visual detection of sea turtles the 500-m shutdown zones must trigger the required shutdown in pile installation. Upon a visual detection of a sea turtles entering or within the shutdown zone during pile-driving, South Fork Wind must shut down the pile-driving hammer (unless activities must proceed for human safety or for concerns of structural failure) from when the PSO observes, until: 1) The lead PSO verifies that the animal(s) voluntarily left and headed away from the clearance area; or 2) 30 minutes have elapsed without re-detection of the sea turtle(s) by the lead PSO Additionally, if shutdown is called for but SFWF determines shutdown is not technically feasible due to human safety concerns or to maintain installation feasibility, reduced hammer energy must be implemented, when the lead engineer determines it is technically feasible to do so.	Marine Mammals and Sea Turtles
53	Construction and installation	Soft Start for impact pile driving	As described in measure 4(f) of the Proposed IHA. Also proposed to provide minimization of potential impacts to listed sea turtles and finfish.	Marine Mammals, Sea Turtles, Finfish
54	Construction and installation	Noise mitigation for impact pile driving	As described in measure 4(h) of the Proposed IHA. Also proposed to provide minimization of potential impacts to listed sea turtles and finfish.	Marine Mammals, Sea Turtles, Finfish
55	Construction and installation	Pile-driving sound source verification plan	Field verification during pile-driving to be conducted as described in measures 5(d) and (e) of the Proposed IHA. Additionally, a Sound Source Verification Plan will be submitted to the USACE, BOEM at *renewable_reporting@boem.gov*, and NMFS at *incidental.take@noaa.gov* for review and written approval by the agencies 90 days prior to the commencement of field activities for pile-driving. Sound source verification must be carried out for the first monopile to be installed. Should larger diameter piles be installed, or greater hammer size or energy used, additional field measurements must be conducted. The plan must describe how South Fork Wind will ensure that the location selected is representative of the rest of the piles of that type to be installed and, in the case that it is not, how additional sites will be selected for sound source verification or how the results from the first pile can be used to predict actual installation noise propagation for subsequent piles. The plan must describe how the effectiveness of the sound attenuation methodology will be evaluated based on the results. The plan must be sufficient to document sound propagation from the pile and distances to isopleths for potential injury and harassment. The measurements must be compared to the Level A and Level B harassment zones for marine mammals (and the injury and behavioral disturbance zones for sea turtles and Atlantic sturgeon).	Marine Mammals, Sea Turtles, Finfish Benthic habitat, EFH, invertebrates,

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
56	Construction and installation	Pile driving noise reporting and clearance zone adjustment	Before driving any additional piles following underwater noise measurements, South Fork Wind must review the initial field measurement results of at least one (1) WTG foundation of each type. The Lessee may request modification of the clearance and shutdown zones based on the field measurements of three (3) foundations but must meet or exceed minimum seasonal distances for threatened and endangered species that may be specified in the Biological Opinion. If the initial field measurements indicate that the isopleths of concern are larger than those considered in the Proposed Action, in coordination with BOEM, NMFS, and USACE, South Fork Wind must implement additional sound attenuation measures and/or enhanced clearance and/or shutdown zones before driving any additional piles. South Fork Wind must submit the initial results of the field measurements to NMFS, USACE, and BOEM (renewable_reporting@boem.gov) as soon as they are available; NMFS, USACE, and BOEM will discuss these as soon as feasible with a target for that discussion within two business days of receiving the results. BOEM and NMFS will provide direction to South Fork Wind on whether any additional modifications to the sound attenuation system or changes to the clearance and shutdown zones are required.	Marine Mammals and Sea Turtles
57	Construction and installation	Establishment of Clearance Zones and Clearance Measures for Vibratory Pile Driving	For ESA listed whales: as described in measure 4(c) and (d) of the Proposed IHA. For sea turtles: To ensure that impact pile-driving operations are carried out in a way that minimizes the exposure of listed sea turtles to noise that may result in injury or behavioral disturbance, PSOs will establish a 1,640-foot (500-meter) clearance zone for all pile-driving activities. Adherence to the 1,640-foot (500-meter) clearance zones must be reflected in the PSO reports. Any visual detection of sea turtles the 500-m clearance zones must trigger the required delay in pile installation. Upon a visual detection of a sea turtles entering or within the relevant clearance zone during pile-driving, South Fork Wind must not determine the area is clear to start pile driving until: 1) The lead PSO verifies that the animal(s) voluntarily left and headed away from the clearance area; or 2) 30 minutes have elapsed without re-detection of the sea turtle(s) by the lead PSO	Marine Mammals and Sea Turtles
58	Construction and installation	Establishment of Shutdown Zones for Vibratory Pile Driving	For ESA listed whales: as described in measure 4(e) of the Proposed IHA. For sea turtles: To ensure that impact pile-driving operations are carried out in a way that minimizes the exposure of listed sea turtles to noise that may result in injury or behavioral disturbance, PSOs will establish a 1,640-foot (500-meter) shutdown zone for all pile-driving activities. Adherence to the 1,640-foot (500-meter) shutdown zones must be reflected in the PSO reports. Any visual detection of sea turtles the 500-m shutdown zones must trigger the required shutdown in pile installation. Upon a visual detection of a sea turtles entering or within the shutdown zone during pile-driving, South Fork Wind must shut down the pile-driving hammer (unless activities must proceed for human safety or for concerns of structural failure) from when the PSO observes, until: 1) The lead PSO verifies that the animal(s) voluntarily left and headed away from the clearance area; or 2) 30 minutes have elapsed without re-detection of the sea turtle(s) by the lead PSO Additionally, if shutdown is called for but SFWF determines shutdown is not technically feasible due to human safety concerns or to maintain installation feasibility, reduced hammer energy must be implemented, when the lead engineer determines it is technically feasible to do so.	Marine Mammals and Sea Turtles
59	Construction and installation, O&M, and conceptual decommissioning	Establishment of Clearance Zones and Clearance Measures for HRG Surveys	For ESA listed whales: as described in measure 4(e) of the Proposed IHA. For sea turtles: 100 m clearance zone must be maintained for at least 30 minutes as described in the June 29, 2021 Data Collection Programmatic Consultation.	Marine Mammals and Sea Turtles
60	Construction and installation, O&M, and conceptual decommissioning	Ramp-up for HRG acoustic sources	As described in 4(g) of the Proposed IHA.	Marine Mammals
61	Construction and installation, O&M, and conceptual decommissioning	Establishment of Shutdown Zones for HRG Surveys	For ESA listed whales: as described in measure 4(e) of the Proposed IHA or the conditions specified in the Data Collection Programmatic Consultation, whichever is greater.	Marine Mammals
62	Construction and installation, O&M, and conceptual decommissioning	Vessel Strike Avoidance Measures for Marine Mammals during the term of the IHA	As described in 4(i) of the Proposed IHA.	Marine mammals

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
63	O&M, and conceptual decommissioning	Vessel Strike Avoidance Measures for Marine Mammals following the term of the IHA	• Vessel captain and crew must maintain a vigilant watch for all ESA-listed species and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any listed species. The presence of a single individual at the surface may indicate the presence of submerged animals in the vicinity; therefore, precautionary measures should always be exercised. • A PSO (or crew lookout if PSOs are not required) must be posted during all times a vessel is underway (transiting or surveying) to monitor for listed species within a 180-degree direction of the forward path of the vessel (90 degrees port to 90 degrees starboard). • Visual observers monitoring the vessel strike avoidance zone can be either PSOs or crew members (if PSOs are not required). If the trained lookout is a vessel crew member, this must be their designated role and primary responsibility while the vessel is transiting. Any designated crew lookouts must receive training on protected species identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements. All observations must be recorded per reporting requirements. • Regardless of monitoring duties, all crew members responsible for navigation duties must receive site-specific training on ESA-listed species sighting/reporting and vessel strike avoidance measures. • All vessel crew members must be briefed in the identification of ESA-listed species and marine mammals that may occur in the survey area and in regulations and best practices for avoiding vessel collisions. Reference materials must be available aboard all project vessels for identification of listed species. The expectation and process for reporting of protected species sighted during surveys must be clearly communicated and posted in highly visible locations aboard all project vessels, so that there is an expectation for reporting to the designated vessel contact (such as the lookout or the vessel captain), as well as a communication channel and process for crew members to do so. • Vessels underway must not divert their course to approach any listed species. • If an ESA-listed whale or large unidentified whale is identified within 500 m of the forward path of any vessel, the vessel operator must steer a course away from the whale at 10 knots (18.5 km/hr.) or less until the 500 m minimum separation distance has been established. Vessels may also shift to idle if feasible. • If an ESA-listed large whale is sighted within 200 m of the forward path of a vessel, the vessel operator must reduce speed and shift the engine to neutral. Engines must not be engaged until the whale has moved outside of the vessel's path and beyond 500 m. If stationary, the vessel must not engage engines until the ESA-listed large whale has moved beyond 500 m. • Regardless of vessel size, vessel operators must reduce vessel speed to 10 knots (18.5 mph) or less while operating in any Seasonal Management Area (SMA) and Dynamic Management Area (DMA) (or Slow Zone otherwise designated as a DMA). • All vessel operators must check for information regarding mandatory or voluntary ship strike avoidance (DMAs and SMAs) and daily information regarding North Atlantic right whale sighting locations. These media may include, but are not limited to: NOAA weather radio, U.S. Coast Guard NAVTEX and channel 16 broadcasts, Notices to Mariners, the Whale Alert app, or WhaleMap website. North Atlantic right whale Sighting Advisory System info can be accessed at https://whalemap.org/WhaleMap/. • The only exception to these requirements is when the safety of the vessel or crew necessitates deviation from these requirements. If any such incidents occur, they must be reported (see reporting requirements). • South Fork may file for consideration by NMFS and BOEM a request for a waiver of any of these restrictions by submitting a vessel strike risk reduction plan that details revised measures along with an analysis to demonstrate that the measure(s) will provide a level of risk reduction at least equivalent to the measure(s) being proposed for replacement. The plan must be provided to NMFS and BOEM at least 60 days prior to a request for approval and will not be implemented unless NMFS and BOEM reach consensus on approval.	Marine mammals
64	Construction and installation, O&M, and conceptual decommissioning	Vessel Strike Avoidance Measures for Sea Turtles (non HRG survey vessels)	• Training and Observers • Regardless of monitoring duties, all crew members responsible for navigation duties must receive site-specific training on ESA-listed species sighting/reporting and vessel strike avoidance measures. • All vessel crew members must be briefed in the identification of ESA-listed species of sea turtles that may occur in the survey area and in regulations and best practices for avoiding vessel collisions. Reference materials must be available aboard all project vessels for identification of listed species. The expectation and process for reporting of protected species sighted during surveys must be clearly communicated and posted in highly visible locations aboard all project vessels, so that there is an expectation for reporting to the designated vessel contact (such as the lookout or the vessel captain), as well as a communication channel and process for crew members to do so. • Visual observers monitoring the vessel strike avoidance zone can be either PSOs or crew members (if PSOs are not required). If the trained lookout is a vessel crew member, this must be their designated role and primary responsibility while the vessel is transiting. Any designated crew lookouts must receive training on protected species identification, vessel strike minimization procedures, how and when to communicate with the vessel captain, and reporting requirements. Vessel personnel must be provided an Atlantic reference guide that includes and helps identify sea turtles that may be encountered in the Project area. All observations must be recorded per reporting requirements. • Vessel captain and crew must maintain a vigilant watch for all ESA-listed species and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any listed species. • To monitor the Vessel Strike Avoidance Zone, a PSO (or crew lookout if PSOs are not required) must be posted during all times a vessel is underway (transiting or surveying) to monitor for listed species within a 180-degree direction of the forward path of the vessel (90 degrees port to 90 degrees starboard). • If a vessel is carrying a visual observer for the purposes of maintaining watch for NARWs, an additional lookout is not required and this visual observer must maintain watch for whales, giant manta rays, and sea turtles. If the trained lookout is a vessel crewmember, this must be their designated role and primary responsibility while the vessel is transiting. Any designated crew observers should be trained in the identification of sea turtles and in regulations and best practices for avoiding vessel strikes. • Vessels underway must not divert their course to approach any listed species. • If a sea turtle is sighted within 100 m of the operating vessel's forward path, the vessel operator must slow down to 4 knots (unless unsafe to do so) and may resume normal vessel operations once the vessel has passed the individual. If a sea turtle is sighted within 50 m of the forward path of the operating vessel, the vessel operator must shift to neutral when safe to do so and then proceed away from the individual at a speed of 4 knots or less until there is a separation distance of at least 100 m at which time normal vessel operations may be resumed. • Between June 1 and October 30, vessels must avoid transiting through areas of visible jellyfish aggregations or floating vegetation (e.g., sargassum lines or mats). In the event that operational safety prevents avoidance of such areas, vessels must slow to 4 knots while transiting through such areas. • The only exception to these requirements is when the safety of the vessel or crew necessitates deviation from these requirements. If any such incidents occur, they must be reported (see reporting requirements).	Sea turtles

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
65	Construction and installation	Pile driving monitoring plan and PSO requirements	A final pile-driving monitoring plan (PDM Plan) must be submitted to BOEM (at renewable_reporting@boem.gov), BSEE (at protectedspecies@bsee.gov), and NMFS for review and approval by lead agency in writing a minimum of 90 days prior to the commencement of pile-driving activities. The PDM Plan must: • Contain information on the visual and PAM components of the monitoring describing all equipment, procedures, and protocols; • The PAM system must demonstrate a near-real-time capability of detection to the full extent of the 160 dB distance from the pile-driving location; • The PAM plan must include a detection confidence that a vocalization originated from within the clearance and shutdown zones to determine that a possible NARW has been detected. Any PAM detection of a NARW within the clearance/shutdown zone surrounding a pile must be treated the same as a visual observation and trigger any required delays in pile installation. • Ensure that the full extent of the harassment distances from piles are monitored for marine mammals and sea turtles to document all potential take; • Include number of PSOs or Native American monitors, or both, that will be used, the platforms or vessels upon which they will be deployed, and contact information for the PSO providers; • Include measures for enhanced monitoring capabilities in the event that poor visibility conditions unexpectedly arise, and pile driving cannot be stopped. • Include an Alternative Monitoring Plan that provides for enhanced monitoring capabilities in the event that poor visibility conditions unexpectedly arise, and pile driving cannot be stopped. The Alternative Monitoring Plan must also include measures for deploying additional observers, using night vision goggles, or using PAM with the goal of ensuring the ability to maintain all clearance and shutdown zones in the event of unexpected poor visibility conditions. Describe a communication plan detailing the chain of command, mode of communication, and decision authority must be described. PSOs as determined by NMFS and BOEM must be used to monitor the area of the clearance and shutdown zones. Seasonal and species-specific clearance and shutdown zones must also be described in the PDM Plan including time-of-year requirements for NARWs. A copy of the approved PDM Plan must be in the possession of the lessee representative, the PSOs, impact-hammer operators, and any other relevant designees operating under the authority of the approved COP and carrying out the requirements on site.	Marine mammals, sea turtles, finfish, birds
66	Construction and installation	PSO and reporting requirements for pile driving shutdown events	Within 24 hours, SFW must report to BOEM at renewable_reporting@boem.gov all marine mammals and/or sea turtles in the exclusion zone that result in a shutdown or a power-down. In addition, the PSO provider must submit the data report (raw data collected in the field) and must include the daily form with the date, time, species, pile identification number, GPS coordinates, time and distance of the animal when sighted, time the shutdown or power-down occurred, behavior of the animal, direction of travel, time the animal left the exclusion zone, time the pile driver was restarted or powered back up, and any photographs that may have been taken.	Marine mammals and sea turtles
67	Construction and installation	Weekly and final Pile Driving Reporting Requirements	Weekly Pile-Driving Reports (Construction). Weekly PSO and PAM monitoring reports must be submitted to NMFS and DOI during the pile-driving and construction period of the wind farm installation. Weekly reports must document daily start and stop times of all pile-driving activities, daily start and stop times of associated observation periods by the PSOs, details on the deployment of PSOs, and a record of all observations of marine mammals and sea turtles. The third party PSO providers must submit the weekly monitoring reports to BOEM at renewable_reporting@boem.gov and NMFS at incidental.take@noaa.gov every Wednesday during construction for the previous week (Sunday through Saturday) of monitoring of pile-driving activity. Weekly reports can consist of raw data. Required data and reports provided to DOI may be archived, analyzed, published, and disseminated by BOEM. PSO data must be reported weekly (Sunday through Saturday) from the start of visual and/or PAM efforts during pile-driving activities, and every week thereafter until the final reporting period upon conclusion of pile-driving activity. Any editing, review, and quality assurance checks must be completed only by the PSO provider prior to submission to NMFS and DOI. The Lessee must submit to DOI at renewable_reporting@boem.gov and protectedspecies@bsee.gov a final summary report of PSO monitoring 90 days following the completion of pile driving.	Marine mammals and sea turtles

68	Construction and installation	Weekly and final Requirements Data Fields	Data fields must be reported in Excel format as weekly reports during construction. Data categories must include Project, Operations, Monitoring Effort, and Detection. Data must be generated through software applications or otherwise recorded electronically by PSOs. Applications developed to record PSO data are encouraged as long as the data fields listed below can be recorded and exported to Excel. Alternatively, BOEM has developed an Excel spreadsheet with all the necessary data fields that is available upon request. Required data fields include: <u>Project Information:</u> • Project Name • Lease Number • State Coastal Zones • PSO Contractor(s) • Vessel Name(s) • Reporting Date(s) • Visual monitoring equipment used (e.g., bionics, magnification, IR cameras, etc.) • Distance finding method used • PSO names (last, first) and training • Observation height above sea surface <u>Operations Information:</u> • Date (YYYY-MM-DD) • Hammer type used (make and model) • Greatest hammer power used for each pile • Pile identifier and pile number for the day (e.g., pile 2 of 3 for the day) • Pile diameters • Pile length • Pile locations (latitude and longitude) <u>Monitoring Effort Information</u>: • Date (YYYY-MM-DD) • Noise Source (ON=Hammer On; OFF=Hammer Off) • PSO name(s) (Last, First) • If visual, how many PSOs on watch at one time? • Time pre-exclusion visual monitoring began in UTC (HH:MM) • Time pre-exclusion monitoring ended in UTC (HH:MM) • Time pre-exclusion PAM monitoring began in UTC (HH:MM) • Time PAM monitoring ended in UTC (HH:MM) • Duration of pre-exclusion and PAM visual monitoring • Time power up/ramp up began • Time equipment full power was reached • Duration of power up/ramp up • Time pile driving began (hammer on) • Time pile-driving activity ended (hammer off) • Duration of activity • Duration of visual observation • Wind speed (knots), from direction • Swell height (meters) • Water depth (meters) • Visibility (km) • Glare severity • Latitude (decimal degrees), longitude (decimal degrees) • Compass heading of vessel (degrees) • Beaufort scale • Precipitation • Cloud coverage (%) • Did a shutdown/power-down occur? • Time shutdown was called for (UTC) • Time equipment was shutdown (UTC) • Record any habitat or prey observations • Record any marine debris sighted <u>Detection Information</u>: • Date (YYYY-MM-DD) • Sighting ID (V01, V02, or sequential sighting number for that day) (multiple sightings of same animal or group uses the same ID) • Date and time at first detection in UTC (YY-MM-DDT HH:MM) • Time at last detection in UTC (YY-MM-DDT HH:MM)	Marine mammals and sea turtles

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated

			• PSO name(s) (Last, First)
			• Effort (ON=Hammer On; OFF=Hammer Off)
			• If visual, how many PSOs on watch at one time?
			• Start time of observations
			• End time of observations
			• Duration of visual observation
			• Wind speed (knots), from direction
			• Swell height (meters)
			• Water depth (meters)
			• Visibility (km)
			• Glare severity
			• Latitude (decimal degrees), longitude (decimal degrees)
			• Compass heading of vessel (degrees)
			• Beaufort scale
			• Precipitation
			• Cloud coverage (%)
			• Sightings including common name, scientific name, or family
			• Certainty of identification
			• Number of adults
			• Number of juveniles
			• Total number of animals
			• Bearing to animal(s) when first detected (ship heading + clock face)
			• Range from vessel (reticle distance in meters)
			• Description (include features such as overall size; shape of head; color and pattern; size, shape, and position of dorsal fin; height, direction, and shape of blow, etc.)
			• Detection narrative (note behavior, especially changes in relation to survey activity and distance from source vessel)
			• Direction of travel/first approach (relative to vessel)
			• Behaviors observed: indicate behaviors and behavioral changes observed in sequential order (use behavioral codes)
			• If any bow-riding behavior observed, record total duration during detection (HH:MM)
			• Initial heading of animal(s) (degrees) Final heading of animal(s) (degrees)
			• Exclusion zone size during detection (meters)
			• Was the animal inside the exclusion zone?
			• Closest distance to vessel (reticle distance in meters)
			• Time at closest approach (UTC HH:MM)
			• Time animal entered exclusion zone (UTC HH:MM)
			• Time animal left exclusion zone (UTC HH:MM)
			• If observed/detected during ramp up/power up: first distance (reticle distance in meters), closest distance (reticle distance in meters), last distance (reticle distance in meters), behavior at final detection
			• Did a shutdown/power-down occur?
			    ○ Time shutdown was called for (UTC)
			    ○ Time equipment was shutdown (UTC)
			• Detections with PAM	

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
69	Construction and installation, O&M, and conceptual decommissioning	Injured/protected species reporting	SFW must report any potential takes, strikes, or dead/injured protected species caused by project vessels to NMFS Protected Resources Division, incidental.take@noaa.gov; to NOAA Fisheries 24-hour Stranding Hotline number (866-755-6622); to BOEM at renewable_reporting@boem.gov, and to BSEE at protectedspecies@bsee.gov as soon as practicable. In the event that an injured or dead marine mammal or sea turtle is sighted, regardless of the cause, the Lessee must report the incident to NMFS Protected Resources Division, ; to NOAA Fisheries 24-hour Stranding Hotline number (866-755-6622); to BOEM at renewable_reporting@boem.gov; and to BSEE at protectedspecies.gov as soon as practicable (for crew and vessel safety), but no later than 24 hours from the sighting. incidental.take@noaa.gov; to NOAA Fisheries 24-hour Stranding Hotline number (866-755-6622); to BOEM at renewable_reporting@boem.gov; and to BSEE at protectedspecies.gov as soon as practicable (for crew and vessel safety), but no later than 24 hours from the sighting. • A Detected Protected Species Report must include the following information: ○ Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable); ○ Species identification (if known) or description of the animal(s) involved; ○ Condition of the animal(s) (including carcass condition if the animal is dead); ○ Observed behaviors of the animal(s), if alive; ○ If available, photographs or video footage of the animal(s); and ○ General circumstances under which the animal was discovered. Staff responding to the hotline call will provide any instructions for handling or disposing of any injured or dead animals by individuals authorized to collect, possess, and transport sea turtles. • An Impacted Protected Species Report (e.g., a vessel injury or dead animal detected during a pile driving event) must include the following information: ○ Time, date, and location (latitude/longitude) of the incident; ○ Species identification (if known) or description of the animal(s) involved; ○ Lessee and vessel(s) information; ○ Vessel's speed during and leading up to the incident; ○ Vessel's course/heading and what operations were being conducted (if applicable); ○ Status of all sound sources in use (if applicable); ○ Description of avoidance measures/ requirements that were in place at the time of the strike and what additional measures were taken, if any, to avoid strike; ○ Environmental conditions (e.g., wind speed and direction, Beaufort scale, cloud cover, visibility) immediately preceding the strike; ○ Estimated size and length of animal that was struck; ○ Description of the behavior of the animal immediately preceding and following the strike; ○ Estimated fate of the animal (e.g., dead, injured but alive, injured and moving, blood or tissue observed in the water, status unknown, disappeared); and ○ To the extent practicable, photographs or video footage of the animal(s).	Benthic habitat, EFH, invertebrates, and finfish; marine mammals; sea turtles
70	Construction and installation, O&M,	Passive Acoustic Monitoring	Use PAM devices to record ambient noise and marine mammal species vocalizations in the Lease Area before, during, and immediately after construction (at least 3 years of operation) to monitor impacts. The archival recorders must have a minimum capability of detecting and storing acoustic data on vessel noise, pile-driving, WTG operation, and marine mammal vocalizations in the lease area. No later than 30 days prior to buoy deployment, the Lessee must submit to BOEM and BSEE (renewable_reporting@boem.gov and protectedspecies@bsee.gov) the PAM plan and receive written concurrence from BOEM and BSEE. Results must be provided within 90 days of buoy collection and again within 90 days of the 1-year and 2-year anniversary of collection. The underwater acoustic monitoring must follow standardized measurement and processing methods and visualization metrics developed by the Atlantic Deepwater Ecosystem Observatory Network (ADEON) for the U.S. Mid- and South Atlantic Outer Continental Shelf (see https://adeon.unh.edu/) and NMFS requirements for marine mammal detections. At least two devices must be independently deployed within the lease area or one or more buoys must be deployed in coordination with other acoustic monitoring efforts in the RI and MA Lease Areas.	Marine mammals
71	Construction and installation, O&M, and conceptual decommissioning	Periodic underwater surveys, reporting, and monofilament and other fishing gear cleanup around WTG foundations	Monitor impacts associated with charter and recreational gear lost from expected increases in fishing around WTG foundations by surveying at least 5 of the WTG foundations in the lease area annually. Surveys by remotely operated vehicles, divers, or other means will inform frequency and locations of marine debris. The results of the surveys will be reported to BOEM and BSEE (renewable_reporting@boem.gov and marinedebris@bsee.gov) in an annual report submitted by April 30 for the preceding calendar year in which the survey is performed. Reports must be submitted in Word format. Photographic and videographic materials will be provided on a drive in a lossless format such as TIFF or Motion JPEG 2000. Reports must include daily survey reports that include the survey date, contact information of the operator, location, and pile identification number, photographic and/or video documentation of the survey and debris encountered, any animals sighted, and the disposition of any located debris (i.e., removed or left in place). Required data and reports may be archived, analyzed, published, and disseminated by BOEM.	Marine mammals, sea turtles, finfish, birds

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
72	Construction and installation, O&M, and conceptual decommissioning	Marine debris awareness and elimination	"Marine trash and debris" is defined as any object or fragment of wood, metal, glass, rubber, plastic, cloth, paper or any other solid, man-made item or material that is lost or discarded in the marine environment by the Lessee or an authorized representative of the Lessee (collectively, the "Lessee") while conducting activities on the Outer Continental Shelf (OCS) in connection with a lease, grant, or approval issued by the Department of the Interior (DOI). To understand the type and amount of marine debris generated, and to minimize the risk of entanglement in and/or ingestion of marine debris by protected species, lessees must implement the following Best Management Practices ("BMPs"). 1. Training: All vessel operators, employees, and contractors performing OCS survey activities on behalf of the Lessee (collectively, "Lessee Representatives") must complete marine trash and debris awareness training annually. The training consists of two parts: (1) viewing a marine trash and debris training video or slide show (described below); and (2) receiving an explanation from management personnel that emphasizes their commitment to the requirements. The marine trash and debris training videos, training slide packs, and other marine debris related educational material may be obtained at https://www.bsee.gov/debris. The training videos, slides, and related material may be downloaded directly from the website. Lessee Representatives engaged in OCS survey activities must continue to develop and use a marine trash and debris awareness training and certification process that reasonably assures that they, as well as their respective employees, contractors, and subcontractors, are in fact trained. The training process must include the following elements: a. viewing of either a video or slide show by the personnel specified above; b. an explanation from management personnel that emphasizes their commitment to the requirements; c. attendance measures (initial and annual); and d. recordkeeping and availability of records for inspection by DOI. By January 31 of each year, the Lessee must submit to DOI an annual report signed by the Lessee that describes its marine trash and debris awareness training process and certifies that the training process has been followed for the previous calendar year. You must send the reports via email to renewable_reporting@boem.gov and to marinedebris@bsee.gov. 2. Marking: Materials, equipment, tools, containers, and other items used in OCS activities which are of such shape or properly secured to prevent loss overboard. All markings must clearly identify the owner and must be durable enough to resist the effects of the environmental conditions to which they may be exposed. 3. Recovery: Lessees must recover marine trash and debris that is lost or discarded in the marine environment while performing OCS activities when such incident is likely to: (a) cause undue harm or damage to natural resources, including their physical, atmospheric, and biological components, with particular attention to those that could result in the entanglement of or ingestion by marine protected species; or (b) significantly interfere with OCS uses (e.g., are likely to snag or damage fishing equipment, or present a hazard to navigation). Lessees must notify DOI when recovery activities are (i) not possible because conditions are unsafe; or (ii) not practicable because the marine trash and debris released is not likely to result in any of the conditions listed in (a) or (b) above. The lessee must recover the marine trash and debris lost or discarded if DOI does not agree with the reasons provided by the Lessee to be relieved from the obligation to recover the marine trash and debris. If the marine trash and debris is located within the boundaries of a potential archaeological resource/avoidance area, or a sensitive ecological/benthic resource area, the Lessee must contact DOI for approval prior to conducting any recovery efforts. Recovery of the marine trash and debris should be completed immediately, but no later than 30 days from the date in which the incident occurred. If the Lessee is not able to recover the marine trash or debris within 48 hours (See BMP (4)), the Lessee must submit a recovery plan to DOI explaining the recovery activities to recover the marine trash or debris ("Recovery Plan"). The Recovery Plan must be submitted no later than 10 calendar days from the date in which the incident occurred. Unless otherwise objected by DOI within 48 hours of the filing of the Recovery Plan, the Lessee can proceed with the activities described in the Recovery Plan. The Lessee must request and obtain approval of a time extension if recovery activities cannot be completed within 30 days from the date in which the incident occurred. The Lessee must enact steps to prevent similar incidents and must submit a description of these actions to BOEM and BSEE within 30 days from the date in which the incident occurred. 4. Reporting: The Lessee must report all marine trash and debris lost or discarded to DOI (using the email address listed on DOI's most recent incident reporting guidance). This report applies to all marine trash and debris lost or discarded, and must be made monthly, no later than the fifth day of the following month. The report must include the following: a. project identification and contact information for the lessee, operator, and/or contractor; b. the date and time of the incident; c. the lease number, OCS area and block, and coordinates of the object's location (latitude and longitude in decimal degrees); d. a detailed description of the dropped object to include dimensions (approximate length, width, height, and weight) and composition (e.g., plastic, aluminum, steel, wood, paper, hazardous substances, or defined pollutants); e. pictures, data imagery, data streams, and/or a schematic/illustration of the object, if available; f. Indication of whether the lost or discarded item could be a magnetic anomaly of greater than 50 nanotesla (nT), a seafloor target of greater than 0.5 meters (m), or a sub-bottom anomaly of greater than 0.5m when operating a magnetometer or gradiometer, side scan sonar, or sub-bottom profile in accordance with DOI's applicable guidance; g. an explanation of how the object was lost; and h. a description of immediate recovery efforts and results, including photos. In addition to the foregoing, the Lessee must submit a report within 48 hours of the incident ("48-hour Report") if the marine trash or debris could (a) cause undue harm or damage to natural resources, including their physical, atmospheric, and biological components, with particular attention to those that could result in the ingestion by or entanglement of marine protected species; or (b) significantly interfere with OCS uses (e.g., are likely to snag or damage fishing equipment, or present a hazard to navigation). The information in the 48-hour Report would be the same as that listed above, but just for the incident that triggered the 48-hour Report. The Lessee must report to DOI if the object is recovered and, as applicable, any substantial variation in the activities described in the Recovery Plan that were required during the recovery efforts. Information on unrecovered marine trash and debris must be included and addressed in the description of the site clearance activities provided in the decommissioning application required under 30 C.F.R. § 585.906. The Lessee is not required to submit a report for those months in which no marine trash and debris was lost or discarded.	Marine mammals, sea turtles, finfish, birds
73	Construction and installation, O&M, and conceptual decommissioning	Reporting of all NARW sightings	If a NARW is observed at any time by PSOs or personnel on any Project vessels, during any Project-related activity or during vessel transit, SFWF must report the sighting information to NMFS and BOEM immediately after conclusion of the detection event (the time, location, and number of animals) to BOEM at renewable_reporting@boem.gov and the NOAA Fisheries 24-hour Stranding Hotline number (866-755-6622), the USCG via channel 16, and through the WhaleAlert app (http://www.whalealert.org/).	Marine mammals
74	Construction and installation, O&M, and conceptual decommissioning	Vessel communication of threatened and endangered species sightings	Whenever multiple Project vessels are operating, any visual observations of listed species (marine mammals and sea turtles) must be communicated to a PSO and/or vessel captains associated with other Project vessels.	Marine mammals and sea turtles
75	Construction and installation, O&M, and conceptual decommissioning	Geophysical survey off-effort PSO monitoring	Measures will be required in accordance with project design criteria and associated best management practices in the June 29, 2021 Data Collection Programmatic ESA Consultation with NMFS.	Marine mammals and sea turtles
76	Construction and installation, O&M, and conceptual decommissioning	Geophysical survey vessel whale strike-avoidance and equipment shutdown protocols	Measures will be required in accordance with project design criteria and associated best management practices in the June 29, 2021Data Collection Programmatic ESA Consultation with NMFS.	Marine mammals and sea turtles

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
77	Construction and installation, O&M, and conceptual decommissioning	Geophysical survey clearance of exclusion zone and restart protocols following shutdowns	Measures will be required in accordance with project design criteria and associated best management practices in the June 29, 2021Data Collection Programmatic ESA Consultation with NMFS.	Marine mammals and sea turtles
78	Construction and installation, O&M, and conceptual decommissioning	Sea turtle avoidance and exclusion zones during geophysical surveys	Measures will be required in accordance with project design criteria and associated best management practices in the June 29, 2021 Data Collection Programmatic ESA Consultation with NMFS.	Marine mammals and sea turtles
79	Construction and installation, O&M, and conceptual decommissioning	Geophysical survey exclusion zone, power-up, and re-start procedures	Measures will be required in accordance with project design criteria and associated best management practices in the June 29, 2021 Data Collection Programmatic ESA Consultation with NMFS.	Marine mammals and sea turtles
Conditions Proposed by NMFS in the February 2021 Incidental Harassment Authorization				
80	Construction	Seasonal Restriction (Section 4(a) of the Proposed IHA)	Seasonal Restriction: Impact pile driving must not occur from January 1 through April 30	Marine Mammals
81	Construction	Impact Pile Driving Time Restrictions (Section 4(b) of the Proposed IHA)	Impact pile driving may commence only during daylight hours no earlier than one hour after (civil) sunrise. Impact pile driving may not be initiated any later than 1.5 hours before (civil) sunset. Pile driving may continue after dark only when the installation of the same pile began during daylight (1.5 hours before (civil) sunset), when clearance zones were fully visible for at least 30 minutes (as described under condition 4(c)(ix)), and must proceed for human safety or installation feasibility reasons.	Marine Mammals
82	Construction	Establishment of clearance zones for all activities (Section 4(c) of the Proposed IHA)	(i) South Fork Wind must deploy at least two PSOs on duty on the impact pile driving platform and at least two PSOs on duty on a dedicated PSO vessel at all times during impact pile driving to monitor for marine mammals. PSO requirements are described under condition 5(a). (ii) Monitoring must take place from 60 minutes prior to initiation of impact pile driving through 30 minutes post-completion of impact pile driving activity. (iii) South Fork Wind must deploy at least two PSOs on duty on the vibratory pile driving platform, or nearby construction vessel, at all times during vibratory pile driving to monitor for marine mammals. PSO requirements are described under condition 5(a). (iv) Monitoring must take place from 30 minutes prior to initiation of vibratory pile driving through 30 minutes post-completion of vibratory pile driving. (v) South Fork Wind must deploy a minimum of one PSO on duty during daytime high resolution geophysical (HRG) survey activities and two PSOs during nighttime HRG survey activities to monitor for marine mammals. PSO requirements are described under condition 5(a). (vi) Monitoring must take place 30 minutes prior to initiation of HRG acoustic sources through 30 minutes post-termination of HRG acoustic sources. (vii) For all impact pile driving, vibratory pile driving, and HRG survey activity, South Fork Wind must designate clearance and monitoring zones with radial distances as identified in Table 2. (viii) Impact pile driving, vibratory pile driving, and HRG survey activity must only commence when all clearance zones are fully visible (i.e., are not obscured by darkness, rain, fog, etc.) for at least 30 minutes as determined by the lead PSO. If conditions (e.g., darkness, rain, fog, etc.) prevent the visual detection of marine mammals in the clearance zones, construction activities must not be initiated until the full extent of all clearance zones are fully visible as determined by the lead PSO.	Marine Mammals

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
83	Construction	Clearance Measures for all pile driving and HRG surveys (Section 4(d) of the Proposed IHA)	South Fork Wind must use PSOs to establish clearance zones around the impact pile driving, vibratory pile driving, and HRG equipment (Table 2) to ensure these zones are clear of marine mammals prior to the initiation of activities. Clearance requirements are as follows: (i) If a marine mammal is observed entering or within the relevant clearance zones (Table 2) prior to the initiation of impact pile driving, vibratory pile driving, or HRG survey equipment, all activity must be delayed. (ii) Impact pile driving, vibratory pile driving, and HRG survey activity must be delayed upon observation of a North Atlantic right whale that is visually observed by PSOs at any distance from the pile or acoustic source. (iii) Impact pile driving must be delayed upon a confirmed passive acoustic monitoring (PAM) detection of a North Atlantic right whale, if the detection is confirmed to have been located within the clearance zone (Table 2). (iv) Impact pile driving, vibratory pile driving, and HRG survey activity must only commence after PSOs have confirmed all clearance zones (Table 2) are clear of marine mammals, as described in conditions 4(c)(ii)(iv)(vi). (v) Any large whale sighted by a PSO within 1,000 m of the pile or HRG acoustic source that cannot be identified to species must be treated as if it were a North Atlantic right whale. (vi) Pile driving and may commence and HRG acoustic sources may be activated when either the marine mammal(s) has voluntarily left the respective clearance zone and been visually confirmed beyond that clearance zone, or, when 30 minutes have elapsed without re-detection (for mysticetes, sperm whales, Risso's dolphins and pilot whales) or 15 minutes have elapsed without re-detection (in the case of all other marine mammals). (viii) Requirements for real-time PAM during impact pile driving are as follows: 1. Real-time PAM must begin at least 60 minutes prior to pile driving. 2. The real-time PAM system must be designed and established such that detection capability extends to 5 km from the pile driving location, for all monopile installations. 3. The real-time PAM system must be configured to ensure that the PAM operator is able to review acoustic detections within approximately 15 minutes of the original detection in order to verify whether a right whale has been detected. 4. The PAM operator responsible for determining if the acoustic detection originated from a North Atlantic right whale must be trained in identification of mysticete vocalizations. 5. If the PAM operator has at least 75 percent confidence that a vocalization originated from a right whale located within 5 km of the pile driving location, the PAM operator must determine that a right whale has been detected and appropriate associated mitigation and monitoring measures must be implemented. 6. A record of the PAM operator's review of any acoustic detections must be reported to NMFS.	Marine Mammals

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
84	Construction	Shutdown Measures for all pile driving and HRG surveys (Section 4(e) of the Proposed IHA)	(i) If a marine mammal is observed entering or within the respective clearance zones (Table 2) after pile driving has commenced or HRG acoustic sources are activated, a shutdown of impact pile driving (when practicable as described under 4(e)(v)), vibratory pile driving, and HRG acoustic sources must be implemented. (ii) Pile driving must be halted (when practicable as described under 4(e)(v)) upon visual observation of a North Atlantic right whale observed by PSOs at any distance from the pile. (iii) Pile driving must be halted (when practicable as described under 4(e)(v)) upon a confirmed PAM detection of a North Atlantic right whale within the Level A harassment exclusion zone of the pile being driven. (iv) Following shutdown, pile driving may not commence and HRG acoustic sources may not be reactivated until either the animal has voluntarily left and been visually confirmed beyond the respective clearance zone or 15 minutes have elapsed without subsequent detection for delphinids and pinnipeds, or 30 minutes have elapsed without subsequent detection for all other marine mammals. (v) In cases where impact pile driving has commenced and a shutdown is called for due to a marine mammal entering or within an exclusion zone, the lead engineer on duty must evaluate the following to determine whether shutdown is practicable: (1) Use site-specific soil data and real-time hammer log information to judge whether a stoppage would risk causing piling refusal at re- start of piling; and (2) Check that the pile penetration is deep enough to secure pile stability in the interim situation, taking into account weather statistics for the relevant season and the current weather forecast. (3) Determinations by the lead engineer on duty will be made for each pile as the installation progresses and not for the site as a whole. vi) For impact pile driving, if shutdown is called for but South Fork Wind determines shutdown is not practicable due to an imminent risk of injury or loss of life to an individual, or risk of damage to a vessel that creates risk of injury or loss of life for individuals, reduced hammer energy must be implemented, when the lead engineer determines it is practicable. (vii) After a shutdown, impact pile driving must only be initiated once all clearance zones are confirmed by PSOs to be clear of marine mammals for the minimum species-specific and activity-specific time periods 4(c)(ii)(iv)(vi) or, if required to maintain installation practicability. (viii) If a delphinid(s) from the genera *Delphinus*, *Lagenorhynchus*, *Stenella*, or *Tursiops* is visually detected approaching the HRG vessel (e.g., to bow ride) or towed HRG survey equipment, shutdown is not required. If there is uncertainty regarding identification of a marine mammal species (i.e., whether the observed marine mammal(s) belongs to one of the delphinid genera for which shutdown is waived), PSOs must use best professional judgment in making the decision to call for a shutdown. (ix) If an individual from a species for which authorization has not been granted, or a species for which authorization has been granted but the authorized take number has been met, is observed entering or within the clearance zone, impact pile driving (when practicable as described under 4(e)(v)), vibratory pile driving, and HRG survey activities must shut down immediately. Activities must not resume until the animal has been confirmed to have left the clearance zone or the observation time period, as indicated in conditions 4(ii)(iv)(vi), has elapsed with no further sightings. For in-water construction, heavy machinery activities other than pile driving, if a marine mammal comes within 10 meters of equipment, South Fork Wind must cease operations (when practicable as described under 4(e)(v)).	Marine Mammals
85	Construction	Soft Start for impact pile driving (Section 4(f) of the Proposed IHA)	(ix) South Fork Wind must implement soft start techniques for all impact pile driving, both at the beginning of a monopile installation and at any time following the cessation of impact pile driving of 30 minutes or longer. The soft start procedure must include a minimum of 20 minutes of 4-6 strikes/minute at 10-20 percent of the maximum hammer energy.	Marine Mammals
86	Construction	Ramp-up for HRG acoustic sources (Section 4(g) of the Proposed IHA)	(x) When practicable, acoustic sources must be ramped up at the start or restart of survey activities. Ramp-up must begin with the power of the smallest acoustic source at its lowest practical power output. The power must then be increased and other acoustic sources added in a way such that the source level would increase gradually.	Marine Mammals
87	Construction	Noise Mitigation for impact pile driving (Section 4(h) of the Proposed IHA)	(i) South Fork Wind must employ a noise mitigation device(s) during all impact pile driving. (ii) The noise mitigation device(s) must perform such that measured ranges to the Level B harassment threshold is consistent with those modeled assuming 10 dB attenuation, determined via sound source verification (described under condition 5(e)). (iii) If a bubble curtain is used, the following requirements apply: (1) The bubble curtain(s) must distribute air bubbles around 100 percent of the piling perimeter for the full depth of the water column. (2) The lowest bubble ring must be in contact with the seafloor for the full circumference of the ring, and the weights attached to the bottom ring must ensure 100 percent seafloor contact. (3) No parts of the ring or other objects may prevent full seafloor contact. (iv) Construction contractors must train personnel in the proper balancing of air flow to the bubblers. Construction contractors must submit an inspection/performance report for approval by South Fork Wind within 72 hours following the performance test. Corrections to the attenuation device to meet the performance standards must occur prior to impact driving.	Marine Mammals

Mitigation Number	Proposed Project Phase	Mitigation or Monitoring Measure	Description	Resource Area Mitigated
88	Construction	Vessel Strike Avoidance Measures (Section 4(i) of the Proposed IHA)	Vessel operators and crews must maintain a vigilant watch for all marine mammals and slow down, stop their vessel, or alter course, as appropriate and regardless of vessel size, to avoid striking any marine mammal. A visual observer aboard the vessel must monitor a vessel strike avoidance zone around the vessel (distances stated below). Visual observers monitoring the vessel strike avoidance zone may be third-party observers (i.e., PSOs) or crew members, but crew members responsible for these duties must be provided sufficient training to distinguish marine mammals from other phenomena and broadly to identify a marine mammal as a right whale, other whale (defined in this context as sperm whales or baleen whales other than right whales), or other marine mammal. South Fork Wind must adhere to the following measures: (i) All vessels greater than or equal to 65 ft. (19.8 m) in overall length must comply with the 10-knot speed restriction in any Seasonal Management Area (SMA) per the NOAA ship strike reduction rule (73 FR 60173; October 10, 2008). (ii) Vessels of all sizes will operate port to port at 10 knots or less between November 1 and April 30, except for vessels transiting inside Narragansett Bay or Long Island Sound. (iii) A trained, dedicated visual observer and alternative visual detection system (e.g., thermal cameras) will be stationed on all transiting vessels that intend to operate at greater than 10 knots from November 1 through April 30. The primary role of the visual observer is to alert the vessel navigation crew to the presence of marine mammals and to report transit activities and marine mammal sightings to the designated South Fork Wind information system. (iv) Vessels of all sizes will operate at 10 knots or less in any North Atlantic right whale Dynamic Management Area (DMA) (v) Outside of DMAs, SMAs, and the November 1 through April 30 time period, localized detections of North Atlantic right whales, using passive acoustics, would trigger a slow-down to 10 knots or less in the area of detection (zone) for the following 12 hours (hrs.). Each subsequent detection would trigger a 12-hr reset. A slow-down in that zone expires when there has been no further visual or acoustic detection in the past 12- hr. within the triggered zone (vi) For all vessels greater than or equal to 65 ft. (19.8 m) in overall length, vessel speeds must be reduced to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near a vessel (vii) All vessels must maintain a minimum separation distance of 500 m from North Atlantic right whales. If a whale is observed but cannot be confirmed as a species other than a right whale, the vessel operator must assume that it is a right whale and take appropriate action (viii) All vessels must maintain a minimum separation distance of 100 m from sperm whales and all other baleen whales (ix) All vessels must, to the maximum extent practicable, attempt to maintain a minimum separation distance of 50 m from all other marine mammals, with an exception made for those that approach the vessel (x) When marine mammals are sighted while a vessel is underway, the vessel must take action as necessary to avoid violating the relevant separation distance, e.g., attempt to remain parallel to the animal's course, avoid excessive speed or abrupt changes in direction until the animal has left the area. If marine mammals are sighted within the relevant separation distance, the vessel must reduce speed and shift the engine to neutral, not engaging the engines until animals are clear of the area. This does not apply to any vessel towing gear or any vessel that is navigationally constrained (xi) These requirements do not apply in any case where compliance would create an imminent and serious threat to a person or vessel or to the extent that a vessel is restricted in its ability to maneuver and, because of the restriction, cannot comply (xii) When not on active watch duty, members of the monitoring team must consult NMFS' North Atlantic right whale reporting systems for the presence of North Atlantic right whales in the project area (v) Project-specific training must be conducted for all vessel crew prior to the start of in-water construction activities. Confirmation of the training and understanding of the requirements must be documented on a training course log sheet.	Marine Mammals

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APPENDIX H

Assessment of Other Resources

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Tables

ASSESSMENT OF OTHER RESOURCES

This appendix provides an assessment of resources with negligible to minor impacts from implementation of the Proposed Action and other considered alternatives. Because these sections were originally part of Chapter 3 of the South Fork Wind Farm (SFWF) and South Fork Export Cable (SFEC) Project environment impact statement (EIS), chapter and section naming and numbering were maintained for simplicity. All abbreviations and references for these sections are provided in the main EIS and Appendix B, respectively.

3.1 ANALYSIS APPROACH (SEE SECTION IN MAIN EIS)

3.2 MITIGATION IDENTIFIED FOR ANALYSIS IN THE ENVIRONMENTAL IMPACT STATEMENT (*SEE SECTION IN MAIN EIS*)

3.3 PHYSICAL RESOURCES

3.3.1 Air Quality

3.3.1.1 Affected Environment

Air quality within a region is measured in comparison to the National Ambient Air Quality Standards (NAAQS), which are standards established by the U.S. Environmental Protection Agency (EPA) under the Clean Air Act (CAA) (42 USC 7409) for criteria pollutants. The EPA has developed these standards to protect human health and welfare (primary standards) and provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings (secondary standards). The criteria pollutants for which NAAQS have been established are carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter 10 microns or less (PM_{10}), particulate matter 2.5 microns or less ($PM_{2.5}$), nitrogen dioxide (NO_2), ozone (O_3), and lead. The EPA uses design values to designate and classify non-attainment areas. A design value is a statistic that describes pollutant levels at a given location so they can be compared to the NAAQS. Non-attainment occurs if any criteria air pollutant concentration design value exceeds its NAAQS. If a region is designated as non-attainment for a NAAQS, the CAA requires the state to develop a state implementation plan (SIP). A SIP provides for the implementation, maintenance, and enforcement of the NAAQS, and includes emission limitation and control measures to attain and maintain the NAAQS. The CAA also prohibits federal agencies from approving any activity that does not conform to a SIP, and this prohibition applies only with respect to nonattainment or maintenance areas (i.e., areas that were previously nonattainment and for which a maintenance plan is required). Conformity to a SIP means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of such standards. The activities for which the Bureau of Ocean Energy Management (BOEM) has authority are outside of any non-attainment or maintenance area and therefore not subject to the requirement to show conformity.

The EPA (2018a) reports the following:

- Rhode Island is currently in attainment for all criteria pollutants.
- The greater Connecticut area, encompassing Hartford, New London, Tolland, and Windham Counties, Connecticut, is currently in marginal non-attainment with the 2015 8-hour O_3 standard.

- The New York-Northern New Jersey-Long Island area, also known as the New York Metro Area, which encompasses Middlesex County, Connecticut, and Suffolk County, New York, is currently in serious non-attainment with the 2008 8-hour O_3 standard and moderate non-attainment with the 2015 8-hour O_3 standard. Suffolk County is also maintenance for the 2006 24-hour NAAQS for fine particulates ($PM_{2.5}$).
- Massachusetts is currently in attainment for all criteria pollutants with the exception of Dukes County, which is currently in marginal non-attainment for the 2008 8-hour O_3 standard.

Connecticut, New York, and Massachusetts have all adopted, and will continue to adopt, SIPs to mitigate the impact that regulated air pollutant emissions have on air quality.

Depending on the final Project design, Project air emissions could affect seven non-attainment areas in the analysis area: Hartford, Middlesex, New London, Tolland, and Windham Counties, Connecticut; Dukes County, Massachusetts; and Suffolk County, New York. The EPA classifies these seven counties as being in non-attainment for 2008 and/or 2015 8-hour O_3. In addition, Suffolk County is also maintenance for the 2006 24-hour NAAQS for $PM_{2.5}$. The EPA reports no other pollutants in non-attainment status in these counties (EPA 2018a).

Sheet Harbor in Novia Scotia, Canada, may be used as a backup port if needed for the marshalling of wind turbine generators (WTGs) and possibly foundation components. The use of this port would result in a minimal number of trips directly between the port of Sheet Harbor and the SFWF. The use of Sheet Harbor would be minimal as it relates to the overall Project construction, and, if used, could marginally reduce the level of U.S. port use.

A photochemical reaction between volatile organic compounds (VOCs), NO_2 or other nitrogen oxides (generically termed NO_x), and sunlight forms O_3. VOCs and NO_x are known as O_3 precursor pollutants. O_3 is considered a regional pollutant because both local and regional sources of VOCs and NO_x can contribute to its formation since they accumulate in the atmosphere until the next sunny day, when they then combine with the sunshine, creating O_3. In the northeastern United States, NO_x emissions are primarily from on-road vehicles while off-road engines, such as those on construction equipment, are the second-largest source. VOC emissions in that region are primarily from vegetation sources, and solvent use in industry is the second-largest source (EPA 2017).

Hartford County, Connecticut, includes urban areas, such as Hartford, with a high population density and a sizable industrial base. Emission sources within the boundaries of Hartford County, as well as regional sources and sources in neighboring metro areas outside of the county, affect the county's air quality. In Hartford County, NO_x emissions are primarily from on-road vehicles, with fuel combustion being the second-largest source. VOC emissions are primarily from vegetation sources, solvent use in industry, and highway vehicles. Although the EPA currently classifies Hartford County as being in moderate non-attainment for the 2008 8-hour O_3 standard and marginal non-attainment for the 2015 8-hour O_3 standard, ambient air quality monitors located in Hartford County reported a steady decrease in O_3 concentration levels from 2014 to 2019 (EPA 2020a). The design value for O_3 is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over 3 years. Hartford County reported an O_3 design value of 72.0 parts per billion (ppb) on average for the 2015 to 2017 period and 69.0 ppb on average for both the 2016 to 2018 period and the 2017 to 2019 period (EPA 2020a).

Middlesex, New London, Tolland, and Windham Counties are rural counties in Connecticut with a low population density and small industrial bases. Neighboring metro areas outside of their respective boundaries heavily affect the air quality of these counties in addition to regional sources. For this reason, changes to pollutant emissions by sources within their boundaries have little impact on the overall air quality trends. NO_x emissions in these counties are primarily from on-road vehicles, with fuel combustion for industrial purposes, electric generation, and other needs being the second-largest source. Vegetation sources and solvent use are the primary VOC emissions in these counties. Although the EPA currently classifies these counties as being in moderate non-attainment for the 2008 8-hour O_3 standard and marginal non-attainment for the 2015 8-hour O_3 standard, ambient air quality monitors in these counties reported a small decrease in O_3 levels from 2017 to 2019 (EPA 2020a). Middlesex County reported an O_3 design value of 79.0 ppb for the 2015 to 2017 time period, 78.0 ppb for the time period from 2016 to 2018, and 77.0 ppb for the 2017 to 2019 time period (EPA 2020a). New London County reported an O_3 design value of 76.0 ppb over the 2015 to 2017 time period and 75.0 ppb for both the 2016 to 2018 time period and the 2017 to 2019 time period (EPA 2020a). Tolland County reported an O_3 design value of 71.0 ppb during the 2015 to 2017, 2016 to 2018, and 2017 to 2019 time periods (EPA 2020a). Windham County reported an O_3 design value of 70.0 ppb over the 2015 to 2017 time period and 71.0 ppb for both the 2016 to 2018 and the 2017 to 2019 time periods (EPA 2020a).

Dukes County is an island community with a relatively low population density and little heavy industry. As is common in the northeastern region, non-road engines used for construction activities and on-road vehicle traffic are the main sources of NO_x in Dukes County (EPA 2017). Vegetation sources and non-road engines are the primary VOC emission sources in Dukes County. Although the EPA currently classifies Dukes County as being in marginal non-attainment for the 2008 8-hour O_3 standard, ambient air quality monitors in Dukes County reported a steady decrease in O_3 levels from 2012 to 2015 (EPA 2020a). The EPA also recently (August 2018) designated Dukes County in attainment for the more stringent 2015 8-hour O_3 standard of 70.0 ppb based on the 2014 to 2016 O_3 design value of 64.3 ppb (EPA 2018b). Recently, Dukes County reported an O_3 design value of 70.0 ppb for the 2016 to 2018 time period and 71.0 ppb for the 2017 to 2019 time period (EPA 2020a).

Suffolk County is an area with a high population density and a large industrial base. Emissions from the New York Metro Area, outside of Suffolk County, heavily affect the county's air quality. For this reason, changes to pollutant emissions by sources within Suffolk County have little impact on overall air quality trends. Suffolk County reported a decrease in O_3 concentration levels from 2017 to 2019 (EPA 2020a). The O_3 design value based on observations at the Riverhead air monitor in Suffolk County was 76.7 ppb during the 2015 to 2017 time period, 75.3 ppb for the 2016 to 2018 time period, and 72.0 ppb for the 2017 to 2019 time period (EPA 2020a). Thus, the EPA currently classifies Suffolk County as being in serious non-attainment for 8-hour O_3 according to the 2008 8-hour standard and in moderate non-attainment for the 8-hour O_3 2015 8-hour standard. Suffolk County is also maintenance for the 2006 24-hour NAAQS for $PM_{2.5}$. The EPA reports that on-road vehicles are the primary source of NO_x emissions in Suffolk County; non-road engines are the second-largest source. Vegetation sources, solvent use in industry, off-highway engines, and on-road vehicles provide the most VOC emissions in Suffolk County (EPA 2017).

Because of Project developments, the Project may affect an additional 14 non-attainment counties, depending on whether SFW uses the ports considered for temporary use to support construction and installation, O&M, and conceptual decommission. These counties are New Castle County, Delaware; Anne Arundel, Baltimore City, Baltimore, and Harford Counties, Maryland; Atlantic, Burlington, Camden, Cumberland, Gloucester, and Salem Counties, New Jersey; and Bucks, Delaware, and Philadelphia Counties, Pennsylvania. The EPA classifies these 14 counties as being in marginal non-attainment for 2015 8-hour O_3.

Table 3.3.1-1. presents the total emission inventory in tons per year (tpy) for select regulated pollutants in non-attainment counties in 2017.

Table 3.3.1-1. Non-Attainment Counties, 2017 Emission Inventory

County, State	Regulated Pollutant (tpy)					
	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
Hartford County, CT	76,982.45	11,271.45	5,052.28	2,377.24	572.78	22,725.16
Middlesex County, CT	18,096.42	2,977.49	1,374.89	668.23	194.56	9,883.81
New London County, CT	25,671.25	5,300.74	2,882.84	1,072.31	289.57	15,606.98
Tolland County, CT	13,112.87	1,674.28	7,141.35	1,726.79	93.91	8,494.21
Windham County, CT	12,693.59	1,579.87	1,595.42	648.56	93.12	10,225.28
New Castle County, DE	58,568.98	12,163.81	8,307.42	2,411.87	722.69	11,600.07
Dukes County, MA	6,395.82	989.64	407.96	135.99	13.07	2,740.63
Anne Arundel County, MD	58,154.08	11,706.23	4,871.68	2,049.25	4,232.82	16,160.91
Baltimore City, MD	29,825.98	8,043.34	3,673.32	1,466.02	467.65	7,986.32
Baltimore County, MD	71,702.20	10,661.44	12,184.54	3,207.24	1,041.34	16,919.12
Harford County, MD	26,758.39	3,505.93	4,406.28	1,522.52	115.85	9,633.75
Atlantic County, NJ	29,820.37	4,492.57	1,891.06	838.96	267.02	15,084.24
Burlington County, NJ	53,373.15	7,045.62	3,736.24	1,942.66	224.87	20,085.58
Camden County, NJ	37,006.75	6,437.99	1,870.36	995.73	158.38	9,833.72
Cumberland County, NJ	17,273.15	2,947.62	2,034.05	973.37	257.38	11,649.18
Gloucester County, NJ	30,399.73	6,260.63	2,161.41	1,311.48	599.94	10,507.34
Salem County, NJ	8,510.45	2,385.55	1,937.54	564.29	698.98	4,345.67
Suffolk County, NY	146,719.86	20,336.81	9,682.55	3,889.70	1,197.73	32,676.35
Bucks County, PA	62,743.17	8,776.02	6,632.00	2,813.06	547.58	20,807.34
Delaware County, PA	42,090.08	9,851.76	3,822.67	1,851.14	1,436.43	10,279.48
Philadelphia County, PA	61,411.40	12,908.48	6,652.45	3,148.60	508.54	17,071.79

Source: EPA (2017).

Notes: CT = Connecticut, DE = Delaware, MA = Massachusetts, MD = Maryland, NJ = New Jersey, NY = New York, PA = Pennsylvania.

Designation as a Class I area allows only very small increments of new pollution above already existing air pollution levels. Class I areas include national parks larger than 6,000 acres and wilderness areas larger than 5,000 acres that were in existence before August 1977. No federal Class I areas are located within 100 km of the Lease Area; therefore, no visibility or deposition modeling was conducted as part of this final EIS. Visibility and deposition modeling was conducted in support of the air quality permit application, however. A Q/D screening assessment[1] was provided to the both the U.S. Forest Service and the U.S. Fish and Wildlife Service (USFWS) for the nearest Class I area, the Lye Brook Wilderness Area, 167 miles away, as well as for the Brigantine Class I area, the second-closest Class I area, 196 miles away. The screening analysis confirmed that the Project is not likely to impact visibility or other air quality related values at either Class I area. The U.S. Forest Service did not request further air quality related values analyses. A screening visibility analysis was conducted for Class II vistas at Block Island and Martha’s Vineyard using the EPA VISCREEN model for operations and maintenance emissions. The results demonstrated that the Project does not exceed the operations and maintenance significance criteria at the Class II vistas; thus, further visibility analysis was not required (Jacobs 2020).

[1] Estimate of emissions in tons/year divided by distance to an affected Class I area in miles or kilometers, also known as Q/D.

Climate change is a global issue that results from the increase in greenhouse gases (GHGs) in the atmosphere. An analysis of regional climate impacts prepared by the Fourth National Climate Assessment (U.S. Global Change Research Program 2018) concludes that the rate of warming in the Northeast has markedly accelerated over the past few decades with seasonal differences in temperature decreasing in recent years as winters have warmed three times faster than summers. Higher temperatures from the increase of GHGs in the atmosphere increase the number of heat events and extreme rain events that cause coastal flooding. The higher temperatures also extend the duration of the pollen season. Analysis of past records and future projections indicates an overall increase in regional temperatures, including near the Lease Area. The most recently available data on GHG emissions in the United States indicate that annual GHG emissions in 2019 were an estimated 6,558 million metric tons of carbon dioxide equivalents (CO_2e) (EPA 2021).

Few hurricanes pass through New England, but the area is subjected to frequent nor'easters that form offshore between Georgia and New Jersey, and typically reach maximum intensity in New England. These storms are usually characterized by winds from the northeast, and can bring heavy precipitation, wind, storm surges, and rough seas. They primarily occur between September and April but can form any time of the year. Although hurricanes are relatively infrequent in New England, wave heights up to 30 feet (9 meters [m]) were recorded south of Block Island (Scripps Buoy 44097) during Hurricane Sandy in 2012 (NOAA 2012). Section 4.2.4 of the COP provides additional weather information, including wind and extreme weather events (cyclones, hurricanes).

3.3.1.2 Environmental Consequences

3.3.1.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.3.1-2 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for this final EIS. Jacobs (2021) provides detailed methodology for emission calculations presented in this final EIS.

Table 3.3.1-2. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Air Quality

Issue	Impact Indicator	Significance Criteria
Compliance with NAAQS	Emissions (tpy) from construction marine vessels, vehicles, and equipment activity within 25 nm of the center of the Lease Area	Negligible: Project emissions would not be detectable. Minor to moderate: Project emissions would be detectable but would not exceed NAAQs or de minimis thresholds. Major: Project emissions would exceed NAAQS.
GHG emissions	GHG emissions (tpy) during construction; operational GHG and O_3 precursors emissions (tpy) reductions	There are currently no significance thresholds for GHG emissions.

3.3.1.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing air quality trends from past and present activities. Attachment 2 in Appendix E provides additional information regarding past and present activities and associated air quality impacts. Future non-Project sources of air pollution include future energy development (onshore and offshore wind, tidal, liquefied natural gas, and other fossil fuels), marine mineral use, and other construction activities. Attachment 2 in Appendix E also discloses future non-offshore wind activities and associated air quality impacts. Impacts associated with future offshore wind activities are described below.

Future Activities (without the Proposed Action)

Air emissions and climate change: Under the No Action alternative, assuming no other future offshore wind projects are developed, electric generation needs would continue to be met by fossil fuel–generating technologies, resulting in air emissions. Specific impacts would depend on the type of fossil fuel used (natural gas, oil, coal), the technology and pollution control systems chosen, and site-specific issues associated with individual electric generation facilities. However, the continued use of existing fossil fuel–generation sources would result in annual emissions that could have been avoided by using non–fossil fuel energy sources. These emissions, presented in Table 3.3.1-3, were estimated using the EPA's AVoided Emissions and geneRation Tool (AVERT) for the New York region based on the design capacity of the offshore wind projects that would not be developed.

Table 3.3.1-3. Estimated Annual Avoided Emissions (tpy) for the Operation of Future Offshore Wind Projects within the Air Quality Geographic Analysis Area

Pollutant	CO_2	NO_X	SO_X	$PM_{2.5}$
Lower limit	16,506,291.00	4,845.64	2,526.22	731.97
Upper limit	21,272,422.61	6,236.17	3,244.05	942.84

Notes: Emissions are presented in tons and were obtained using the EPA's AVERT (EPA 2020b). AVERT limits the maximum input generation capacity for the New York region to 1,300 megawatts (MW), which, according to AVERT, is to limit any project from displacing more than approximately 30% of regional fossil generation in any hour. For each of the offshore wind projects within the geographic analysis area with a generation capacity greater than 1,300 MW, the avoided emissions were calculated via AVERT based on a 1,300-MW energy generation capacity. The AVERT avoided emission values were then scaled up to represent the full energy generation capacity for offshore wind projects with a generation capacity greater than 1,300 MW. For example, an offshore wind project generating 2,600 MW would have twice the avoided emissions values calculated by AVERT for a 1,300-MW offshore wind project.

The lower limit represents the sum of the avoided emissions, as calculated by AVERT, for all of the various offshore wind projects within the geographic analysis area limited to a maximum energy generation capacity of 1,300 MW per project. The upper limit represents the sum of the avoided emissions for the same offshore wind projects based on their actual energy generation capacity, scaling up the avoided emission values for the projects with an energy generation capacity greater than 1,300 MW.

Assuming the development of other future wind development and other renewable energy sources[2], these sources would decrease emissions over the long term, likely reduce the need for more traditional fossil fuel power generation in the region, and could result in improved air quality by increasing the proportion of energy generated from renewables contributing to the grid. Adjacent states have also proposed emission-reduction targets and renewable goals that overlap the operations of the Project and that are aimed at reducing air emissions and shifting energy sources from traditional fossil fuel generation to cleaner sources of energy. These plans could further reduce, but would not eliminate, air emissions.

During construction, adverse impacts from future wind development activities on air quality under the No Action alternative would be temporary and minor to moderate, depending on the extent and duration of emissions. Primary emission sources would include increased vessel and air traffic, combustion emissions from construction equipment, and fugitive emissions. Based on assumed construction schedules, offshore wind development would occur with overlapping construction schedules between 2022 to 2030. As shown in Table 3.3.1-4, construction of these projects in the geographic analysis area with sufficient details to estimate emissions would generate an estimated 42,929 tons of NO_x, 244 tons of SO_2, 1,425 tons of PM_{10}, and 2,964,561 tons of CO_2. For comparison purposes, according to the EPA's 2017 National Emissions Inventory, Suffolk County reported 8,122 tons of NO_X, 124 tons of SO_2, and 872 tons of PM_{10} from highway vehicles; 6,566 tons of NO_X, 34 tons of SO_2, and 537 tons of PM_{10} from off-highway vehicles; and 860 tons of NO_X, 421 tons of SO_2, and 146 tons of PM_{10} from electrical utilities' combustion of fuel (EPA 2017).

[2] Consisting of other offshore and onshore solar, wind, geothermal, or other types of renewable sources.

As shown in Table 3.3.1-5, the operations phase of future offshore wind projects in the geographic analysis area would have a proportionally small contribution of long-term and intermittent emissions, including 2,246 tons of NO_x, 4 tons of SO_2, 565 tons of PM_{10}, and 160,858 tons of CO_2. Similarly, future offshore wind project GHG emissions during construction would be negligible (160,858 tons of CO_2) as compared to aggregate global emissions, and these projects may beneficially contribute to a broader combination of actions to reduce future impacts from climate change over the long term.

Table 3.3.1-4. Projected Construction Emissions for Projects in the Air Quality Geographic Analysis Area from 2022 to 2030

Project	CO_2	Regulated Pollutant (tons)					
		NO_X	SO_2	CO	PM_{10}	$PM_{2.5}$	VOC
Vineyard Wind 1, part of OCS-A 0501	318,660	4,961	38	1,116	172	166	122
Sunrise, parts of OCS-A 0500 and OCS-A 0487	637,986	5,876	6	2,441	108	108	138
Revolution, OCS-A 0486	449,456	6,691	21	1,617	220	216	130
Vineyard Wind South OCS-A 0501 remainder (Park City Wind)	505,810	9,014	53	2,110	355	344	190
Remaining Massachusetts/Rhode Island Lease Area	1,052,650	16,388	127	3,686	569	547	401
Total	2,964,561	42,929	244	10,969	1,425	1,381	981

See EIS Appendix E Attachment 4 for calculation details.

Table 3.3.1-5. Projected Operations and Maintenance Emissions for Projects in the Air Quality Geographic Analysis Area from 2022 to 2030

Project	CO_2	Regulated Pollutant (tons)					
		NO_X	SO_2	CO	PM_{10}	$PM_{2.5}$	VOC
Vineyard Wind 1, part of OCS-A 0501	5,487	71	0.3	18	2	2	2
Sunrise, parts of OCS-A 0500 and OCS-A 0487	64,145	590	1	246	11	11	14
Revolution, OCS-A 0486	64,391	953	1	234	31	30	14
Vineyard Wind South OCS-A 0501 remainder (Park City Wind)	8,710	398	1	98	13	13	7
Remaining Massachusetts/ Rhode Island Lease Area	18,126	234	1	60	8	8	7
Total	160,858	2,246	4	655	65	64	43

Notes: See EIS Appendix E, Attachment 4 for calculation details.

Additional projects are planned in this area, but do not yet have emission estimates available. These include the Bay State Wind Project and the OCS-A 0500 and OCS-A 0487 remainder.

Accidental releases: Air quality impacts associated with accidental spills from other reasonably foreseeable projects could also occur; however; releases would be short term, localized, generally small volume, and would not contribute to air quality in measurable amounts (see Section 3.3.2.2.2).

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on air quality associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on air quality, primarily through construction-related air emissions.

BOEM anticipates that the impacts of ongoing activities, such as air emissions and GHGs, would be **moderate**. In addition to ongoing activities, reasonably foreseeable activities other than offshore wind may also contribute to impacts on air quality. Reasonably foreseeable activities other than offshore wind include increasing air emissions and GHGs through construction and operation of new energy generation facilities to meet future power demands. These facilities may consist of new natural-gas-fired power plants or coal-fired, oil-fired, or clean-coal-fired plants. BOEM anticipates that the impacts of reasonably foreseeable activities other than offshore wind would be **moderate**. BOEM expects the combination of ongoing activities and reasonably foreseeable activities other than offshore wind to result in **moderate** impacts on air quality, primarily driven by recent market and permitting trends indicating future electric generating units would most likely include natural-gas-fired and oil-fired dual fuel facilities, a mix of natural gas and dual fuel natural gas/oil.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts due to air quality emissions released primarily during construction and decommissioning. Other future offshore wind projects could also lead to reduced emissions from fossil-fuel power generating facilities, resulting in **minor to moderate** beneficial impacts on air quality.

3.3.1.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Table 3.3.1-6 presents a summary of the Project's estimated construction emissions. Estimated emissions would represent a small (< 0.10% to 10.0%), temporary increase in air pollutants for most counties within the geographic analysis area over 1 to 2 years. These emission totals presented in the analysis represent a worst-case construction scenario in which all construction activities would occur in a single year. Though NO_x emissions resulting from the construction of the SFWF (521.5 tons) appear to be a large portion of Dukes County's total emission inventory (989.64 tpy), Dukes County is an island with a low population density and low overall NO_x emissions. Non-attainment for this county has been attributed to drifting pollutants from other counties and not from the emissions occurring within the county. Therefore, Project construction activities would only have a minor to moderate, temporary adverse impact on Dukes County's air quality. Similarly, the NO_x emissions from Project construction (521.5 tons) appear to be a large portion of Newport County, Rhode Island's annual emission inventory (1,842.5 tpy). However, adverse impacts to Newport County's air quality would also be minor to moderate because Newport County is in attainment with the NAAQS, and construction emissions would be temporary and localized. The development of the Project could result in improved air quality conditions in the geographic analysis area once operational by reducing levels of pollutants over the No Action alternative.

Table 3.3.1-7 presents a summary of Project emissions. Estimates for the amount of selected pollutants emitted during a worst-case scenario in which all construction activities would occur in a single year are also compared to the emission inventories of the impacted counties. Offshore emissions at any port considered would exceed the de minimis threshold for NO_x in the non-attainment counties evaluated, except in Hartford, Middlesex, New London, Tolland, and Windham Counties, Connecticut, under the scenario that considers the Port of New London, Connecticut, as the base of operations for shipping activities. However, these emissions would be temporary and could be reduced by staggering construction time frames and implementation of SFW-proposed environmental protection measures (EPMs) (see Table G-1 in Appendix G). Total Project emissions would account for less than 20.0% of each affected county's total emission inventory and would be temporary in nature. The maximum impact relative to the counties' emission inventories is predicted to occur in Salem County, New Jersey, with Project NO_x emissions (428.8 tons) being equal to 18.0% of the county's total NO_x emissions (2,385.5 tpy).

Onshore emissions at any considered port would not exceed the de minimis threshold, except in Suffolk County, New York. Estimated onshore emissions that would occur in this county are calculated to be 101.3 tpy of NO_x because of the proposed interconnection facility, which is planned to be constructed in Long Island, New York. However, these estimates would be temporary and could be reduced by staggering construction time frames and implementation of SFW-proposed EPMs (Table G-1 in Appendix G). Therefore, minor to moderate, temporary adverse impacts to air quality are anticipated.

Operations and Maintenance and Conceptual Decommissioning

Table 3.3.1-8 and Table 3.3.1-9 present a summary of Project O&M emissions. Emissions from the Project O&M would be much lower than those produced during construction because there would be no direct emissions associated with wind turbine operation. There could, however, be some tailpipe emissions from onshore vehicles and minor VOC emission during routine changes of lubricating and cooling fluids and greases. The primary source of offshore emissions during operation would be vessel travel (three crew transport vessels, one floating/jack-up crane barge, and two feeder barges) to and from the Lease Area. Planned maintenance and unplanned maintenance activities are each expected to require only 1 week of work each year and should have minor, temporary adverse air quality impacts. Emissions that would impact non-attainment counties during the Project O&M would fall well below the de minimis thresholds.

Project O&M would also generate long-term, minor beneficial impacts by providing energy to the region from a renewable resource. Currently, the region in which this wind farm would serve obtains between 40% and 70% of its power through the combustion of natural gas (U.S. Energy Information Administration 2019). By replacing a portion of the air pollutant emissions generated by fossil fuel–fired power plants, significant reductions in air pollutants emissions can be achieved. A recent study of current wind turbines found that there is a net reduction in emissions within 6 months of the commencement of operations, meaning that there is a very short period of time before benefits from the Project begin to be realized (Inderscience Publishers 2014).

Table 3.3.1-6. Estimated Project Construction Air Emissions in Outer Continental Shelf Air Permit Area

	Pollutant (tpy) and Percentages by County Inventory									
	CO_2	CH_4	N_2O	CO_2e	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
OCS permit construction emissions (worst-case port – Paulsboro Marine Terminal)	33,772.0	0.2	1.6	34,253.8	80.7	521.5	17.5	16.9	3.6	11.7
Percentage of Barnstable County, MA inventory	–	–	–	–	0.2%	10.1%	0.8%	1.7%	1.5%	0.1%
Percentage of Bristol County, MA inventory	–	–	–	–	0.2%	5.9%	0.5%	0.9%	0.4%	< 0.1%
Percentage of Dukes County, MA inventory	–	–	–	–	1.3%	52.7%	4.3%	12.4%	27.5%	0.4%
Percentage of Newport County, RI inventory	–	–	–	–	0.9%	28.3%	2.9%	5.9%	4.7%	0.3%
Percentage of Washington County, RI inventory	–	–	–	–	0.6%	20.3%	1.5%	2.8%	3.5%	0.2%

Source: EPA (2017); Jacobs (2021).

Notes: MA = Massachusetts, OCS = Outer Continental Shelf, RI = Rhode Island.

Table 3.3.1-7. Estimated Annual Project Construction Air Emissions in the Geographic Analysis Area

	Pollutant (tpy) and Percentages by County Inventory									
	CO_2	CH_4	N_2O	CO_2e	CO	NO_X*	PM_{10}	$PM_{2.5}$	SO_2	VOC
Port New Bedford, MA										
Emissions within 25 nm of MA	3,767.0	0.0	0.2	3,826.6	12.3	57.0	1.9	1.8	1.3	2.4
Emissions within 25 nm of NY	19,732.0	0.0	0.4	19,851.2	76.8	218.6	7.4	7.3	21.5	27.6
Percentage of Dukes County, MA inventory	–	–	–	–	0.2%	5.8%	0.5%	1.3%	9.9%	< 0.1%
Percentage of Suffolk County, NY inventory	–	–	–	–	0.2%	2.8%	0.2%	0.5%	1.3%	0.2%
Port of Providence, RI										
Emissions within 25 nm of NY	19,732.0	0.0	0.4	19,851.2	76.8	218.6	7.4	7.3	21.5	27.6
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	1.1%	< 0.1%	0.2%	1.8%	< 0.1%
Port of New London, CT										
Emissions within 25 nm of CT	2,844.0	0.0	0.1	2,873.8	9.7	41.8	1.4	1.4	1.2	2.0
Emissions within 25 nm of NY	19,732.0	0.0	0.4	19,851.2	76.8	218.6	7.4	7.3	21.5	27.6

	Pollutant (tpy) and Percentages by County Inventory									
	CO_2	CH_4	N_2O	CO_2e	CO	NO_X*	PM_{10}	$PM_{2.5}$	SO_2	VOC
Percentage of Hartford County, CT inventory	–	–	–	–	< 0.1%	0.4%	< 0.1%	< 0.1%	0.2%	< 0.1%
Percentage of Middlesex County, CT inventory	–	–	–	–	< 0.1%	1.4%	0.1%	0.2%	0.6%	< 0.1%
Percentage of New London County, CT inventory	–	–	–	–	< 0.1%	0.8%	< 0.1%	0.1%	0.4%	< 0.1%
Percentage of Tolland County, CT inventory	–	–	–	–	< 0.1%	2.5%	< 0.1%	< 0.1%	1.3%	< 0.1%
Percentage of Windham County, CT inventory	–	–	–	–	< 0.1%	2.6%	< 0.1%	0.2%	1.3%	< 0.1%
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	1.1%	< 0.1%	0.2%	1.8%	< 0.1%
Paulsboro Marine Terminal, NJ										
Emissions within 25 nm of NJ	26,358.0	0.2	1.3	26,750.4	77.2	428.8	14.5	13.9	5.1	12.3
Emissions within 25 nm of NY	27,192.0	0.1	0.7	27,403.1	98.2	341.4	11.6	11.2	22.8	30.9
Percentage of New Castle County, DE inventory	–	–	–	–	0.2%	2.8%	0.1%	0.5%	3.2%	0.3%
Percentage of Atlantic County, NJ inventory	–	–	–	–	0.3%	9.5%	0.8%	1.7%	1.9%	< 0.1%
Percentage of Burlington County, NJ inventory	–	–	–	–	0.1%	6.1%	0.4%	0.7%	2.3%	< 0.1%
Percentage of Camden County, NJ inventory	–	–	–	–	0.2%	6.7%	0.8%	1.4%	3.2%	0.1%
Percentage of Cumberland County, NJ inventory	–	–	–	–	0.4%	14.5%	0.7%	1.4%	2.0%	0.1%
Percentage of Gloucester County, NJ inventory	–	–	–	–	0.3%	6.8%	0.7%	1.1%	0.9%	0.1%
Percentage of Salem County, NJ inventory	–	–	–	–	0.9%	18.0%	0.7%	2.5%	0.7%	0.3%
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	2.1%	0.1%	0.4%	0.4%	< 0.1%
Percentage of Bucks County, PA inventory	–	–	–	–	0.2%	3.9%	0.2%	0.4%	4.2%	0.1%
Percentage of Delaware County, PA inventory	–	–	–	–	0.2%	3.5%	0.3%	0.6%	1.6%	0.3%
Percentage of Philadelphia County, PA inventory	–	–	–	–	0.2%	2.6%	0.2%	0.4%	4.5%	0.2%
Sparrows Point, MD										
Emissions within 25 nm of MD	18,405.0	0.1	0.9	18,675.7	54.4	297.9	10.1	9.6	3.8	8.8
Emissions within 25 nm of NY	22,820.0	0.1	0.5	22,971.5	85.7	269.4	9.1	8.9	22.1	29.0
Percentage of Anne Arundel County, MD inventory	–	–	–	–	< 0.1%	2.5%	0.2%	0.5%	< 0.1%	< 0.1%
Percentage of Baltimore City, MD inventory	–	–	–	–	0.2%	3.7%	0.3%	0.7%	0.8%	0.1%

	Pollutant (tpy) and Percentages by County Inventory									
	CO_2	CH_4	N_2O	CO_2e	CO	NO_X*	PM_{10}	$PM_{2.5}$	SO_2	VOC
Percentage of Baltimore County, MD inventory	–	–	–	–	< 0.1%	2.8%	< 0.1%	0.3%	0.4%	< 0.1%
Percentage of Harford County, MD inventory	–	–	–	–	0.2%	8.5%	0.2%	0.6%	3.3%	< 0.1%
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	1.3%	< 0.1%	0.2%	1.8%	< 0.1%
Port of Norfolk, VA										
Emissions within 25 nm of NY	22,781.0	0.1	0.5	22,932.5	85.5	268.8	9.1	8.9	22.1	29.0
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	1.3%	< 0.1%	0.2%	1.8%	< 0.1%

Source: EPA (2017); Jacobs (2021).

Notes: CT = Connecticut, DE = Delaware, MA = Massachusetts, MD = Maryland, nm = nautical miles, NY = New York, PA = Pennsylvania, RI = Rhode Island, VA = Virginia.

* NO_x emissions within 25 miles of New York include onshore cable/substation construction totaling 101.3 tpy for all considered port locations.

Table 3.3.1-8. Estimated Project Air Emissions Resulting from Operations and Maintenance in Outer Continental Shelf Air Permit Area

	Pollutant (tpy) and Percentages by County Inventory									
	CO_2	CH_4	N_2O	CO_2e	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
OCS permit O&M emissions (worst-case port – Paulsboro Marine Terminal)	5,716.0	0.0	0.3	5,806.4	17.3	92.9	3.0	2.8	0.5	1.9
Percentage of Barnstable County, MA inventory	–	–	–	–	< 0.1%	1.8%	0.1%	0.3%	0.2%	< 0.1%
Percentage of Bristol County, MA inventory	–	–	–	–	< 0.1%	1.0%	< 0.1%	0.1%	< 0.1%	< 0.1%
Percentage of Dukes County, MA inventory	–	–	–	–	0.3%	9.4%	0.7%	2.1%	3.8%	< 0.1%
Percentage of Newport County, RI inventory	–	–	–	–	0.2%	5.0%	0.5%	1.0%	0.7%	< 0.1%
Percentage of Washington County, RI inventory	–	–	–	–	0.1%	3.6%	0.3%	0.5%	0.5%	< 0.1%

Source: EPA (2017); Jacobs (2021).

Notes: MA = Massachusetts, OCS = Outer Continental Shelf, RI = Rhode Island.

Table 3.3.1-9. Estimated Project Air Emissions Resulting from Operations and Maintenance in the Geographic Analysis Area

	Pollutant (tpy) and Percentages by County Inventory									
	CO_2	CH_4	N_2O	CO_2e	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
Port New Bedford, MA										
Emissions within 25 nm of MA	303.0	0.0	0.0	303.0	0.9	5.2	0.2	0.2	0.0	0.1
Emissions within 25 nm of NY	1,154.0	0.0	0.1	1,184.1	4.0	16.0	0.5	0.5	0.1	0.3
Percentage of Dukes County, MA inventory	–	–	–	–	< 0.1%	0.5%	< 0.1%	0.1%	< 0.1%	< 0.1%
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Port of Providence, RI										
Emissions within 25 nm of NY	1,154.0	0.0	0.1	1,184.1	4.0	16.0	0.5	0.5	0.1	0.3
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Port of New London, CT										
Emissions within 25 nm of CT	196.0	0.0	0.0	196.0	0.6	3.4	0.1	0.1	0.0	0.1
Emissions within 25 nm of NY	1,154.0	0.0	0.1	1,184.1	4.0	16.0	0.5	0.5	0.1	0.3
Percentage of Hartford County, CT inventory	–	–	–	–	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Percentage of Middlesex County, CT inventory	–	–	–	–	< 0.1%	0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Percentage of New London County, CT inventory	–	–	–	–	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Percentage of Tolland County, CT inventory	–	–	–	–	< 0.1%	0.2%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Percentage of Windham County, CT inventory	–	–	–	–	< 0.1%	0.2%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Paulsboro Marine Terminal, NJ										
Emissions within 25 nm of NJ	2,915.0	0.0	0.1	2,945.3	8.4	50.1	1.5	1.5	0.4	1.1
Emissions within 25 nm of NY	2,017.0	0.0	0.1	2,047.1	6.5	30.8	1.0	1.0	0.2	0.7
Percentage of New Castle County, DE inventory	–	–	–	–	< 0.1%	0.3%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Percentage of Atlantic County, NJ inventory	–	–	–	–	< 0.1%	1.1%	< 0.1%	0.2%	0.1%	< 0.1%
Percentage of Burlington County, NJ inventory	–	–	–	–	< 0.1%	0.7%	< 0.1%	< 0.1%	0.2%	< 0.1%
Percentage of Camden County, NJ inventory	–	–	–	–	< 0.1%	0.8%	< 0.1%	0.2%	0.3%	< 0.1%
Percentage of Cumberland County, NJ inventory	–	–	–	–	< 0.1%	1.7%	< 0.1%	0.2%	0.2%	< 0.1%
Percentage of Gloucester County, NJ inventory	–	–	–	–	< 0.1%	0.8%	< 0.1%	0.1%	< 0.1%	< 0.1%

	Pollutant (tpy) and Percentages by County Inventory									
	CO_2	CH_4	N_2O	CO_2e	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
Percentage of Salem County, NJ inventory	–	–	–	–	< 0.1%	2.1%	< 0.1%	0.3%	< 0.1%	< 0.1%
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	0.2%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Percentage of Bucks County, PA inventory	–	–	–	–	< 0.1%	0.4%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Percentage of Delaware County, PA inventory	–	–	–	–	< 0.1%	0.3%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Percentage of Philadelphia County, PA inventory	–	–	–	–	< 0.1%	0.2%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Sparrows Point, MD										
Emissions within 25 nm of MD	1,995.0	0.0	0.1	2,025.1	5.7	34.3	1.1	1.0	0.3	0.8
Emissions within 25 nm of NY	1,511.0	0.0	0.1	1,541.1	5.1	22.1	0.7	0.7	0.1	0.5
Percentage of Anne Arundel County, MD inventory	–	–	–	–	< 0.1%	0.3%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Percentage of Baltimore City, MD inventory	–	–	–	–	< 0.1%	0.4%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Percentage of Baltimore County, MD inventory	–	–	–	–	< 0.1%	0.3%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Percentage of Harford County, MD inventory	–	–	–	–	< 0.1%	1.0%	< 0.1%	< 0.1%	0.3%	< 0.1%
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Port of Norfolk, VA										
Emissions within 25 nm of NY	1,507.0	0.0	0.1	1,536.8	5.1	22.0	0.7	0.7	0.1	0.5
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%

Source: EPA (2017); Jacobs (2021).

Notes: CT = Connecticut, DE = Delaware, MA = Massachusetts, MD = Maryland, nm = nautical miles, NY = New York, PA = Pennsylvania, RI = Rhode Island, VA = Virginia.

BOEM obtained avoided emissions from EPA's AVERT for the New York region. The EPA's AVERT is not a long-term projection tool. It is not intended to analyze avoided emissions more than 5 years from baseline. The estimated annual and lifetime (25 years, plus up to an additional 2 years for conceptual decommissioning) emissions are based on design capacity of the Project (180 MW). In order to provide a rough estimate of the lifetime avoided emissions of the Project, the annual avoided emissions estimated by AVERT were multiplied by the life of the turbine. As presented in Table 3.3.1-10, the Project would annually displace CO_2, NO_X, and SO_2 produced by the New York electric grid and decrease the creation of air pollutant emissions in the atmosphere from traditional fossil fuel–fired power plants. It must be recognized that this is just a general upper-boundary estimate of the potential lifetime avoided emissions, and the AVERT model is unable to provide any type of certainty for the long-term avoided emissions associated with the Project.

Table 3.3.1-10. Estimated Annual and Lifetime Avoided Emissions (tons) for the Operation of the South Fork Wind Farm over a 25-year Period

Pollutant	CO_2	NO_X	SO_X	$PM_{2.5}$
Annual avoided emissions	319,080	97.39	53.20	14.28
Lifetime avoided emissions	7,977,000	2,434.75	1,329.88	356.88

Notes: Emissions are presented in tons and were obtained from AVERT (EPA 2020b).

The EPA's CO-Benefits Risk Assessment (COBRA) screening model web edition was used to estimate the health impacts of avoided emissions in the United States, and the area of Connecticut, Massachusetts, New York, and Rhode Island, combined. The model used the following inputs: New York was selected as the state where the emission changes would occur; Fuel Combustion: Electric Utility was the sector where the emission changes would occur; and the change of emissions used the annual avoided emissions for NO_X, SO_X, and $PM_{2.5}$, as noted in Table 3.3.1-10 (97.39 tons of NO_X, 53.20 tons of SO_X, and 14.28 tons of $PM_{2.5}$). The model provides estimated ranges of reduced occurrences of health events due to air pollution, such as mortality, nonfatal heart attacks, and hospitalizations. It also estimates the total health benefit, which encompasses all saved costs of the avoided health events. COBRA includes a discount rate of either 3%, to account for the interest that may be earned from government backed securities, or 7%, to account for private capital opportunity costs. The EPA recommends using both for a bounding approach. For the entire United States, COBRA estimates the total health benefit ranges to be $6,126,919 to $13,808,379 at a 3% discount rate and $5,468,112 to $12,313,726 at a 7% discount rate. COBRA estimates statistical lives saved within the entire United States to range from 0.55 to 1.25 (EPA 2020c). For Connecticut, Massachusetts, New York, and Rhode Island, combined, COBRA estimates the total health benefit ranges to be $4,228,540 to $9,525,791 at a 3% discount rate and $3,774,085 to $8,494,914 at a 7% discount rate. COBRA estimates statistical lives saved within Connecticut, Massachusetts, New York, and Rhode Island, combined, to range from 0.38 to 0.86 (EPA 2020c). This would represent a long-term, minor beneficial impact due to avoided health events.

Conceptual decommissioning activities would take approximately 1 year and would include the removal of the piles, the scour protection, and underwater cable as well as the decommissioning of the turbines. Table 3.3.1-11 presents a summary of emissions resulting from the decommissioning of the Project in the Outer Continental Shelf (OCS) Air Permit Area. Table 3.3.1-12 presents a summary of emissions resulting from the conceptual decommissioning of the Project. Decommissioning-related emissions would be temporary, would fall below the de minimis thresholds, and would therefore have a minor, temporary adverse impact on both the overall air quality of the region and non-attainment counties.

Table 3.3.1-11. Estimated Project Air Emissions Resulting from Conceptual Decommissioning in Outer Continental Shelf Air Permit Area

	Pollutant (tpy) and Percentages by County Inventory									
	CO_2	CH_4	N_2O	CO_2e	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
OCS permit decommissioning emissions (worst-case port – Paulsboro Marine Terminal)	6,382.0	0.0	0.3	6,471.4	15.8	99.1	3.3	3.2	0.7	2.3
Percentage of Barnstable County, MA inventory	–	–	–	–	< 0.1%	1.9%	0.1%	0.3%	0.3%	< 0.1%
Percentage of Bristol County, MA inventory	–	–	–	–	< 0.1%	1.1%	< 0.1%	0.2%	< 0.1%	< 0.1%
Percentage of Dukes County, MA inventory	–	–	–	–	0.2%	10.0%	0.8%	2.4%	5.4%	< 0.1%
Percentage of Newport County, RI inventory	–	–	–	–	0.2%	5.4%	0.5%	1.1%	0.9%	< 0.1%
Percentage of Washington County, RI inventory	–	–	–	–	0.1%	3.9%	0.3%	0.5%	0.7%	< 0.1%

Source: EPA (2017); Jacobs (2021).

Notes: MA = Massachusetts, RI = Rhode Island.

Table 3.3.1-12. Estimated Project Air Emissions Resulting from Conceptual Decommissioning

	Pollutant (tpy) and Percentages by County Inventory									
	CO_2	CH_4	N_2O	CO_2e	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
Port New Bedford, MA										
Emissions within 25 nm of MA	841.0	0.0	0.0	841.0	2.7	12.9	0.4	0.4	0.3	0.5
Emissions within 25 nm of NY	3,720.0	0.0	0.1	3,749.8	14.3	41.3	1.4	1.4	3.9	5.1
Percentage of Dukes County, MA inventory	–	–	–	–	< 0.1%	1.3%	< 0.1%	0.3%	2.3%	< 0.1%
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	0.2%	< 0.1%	< 0.1%	0.3%	< 0.1%
Port of Providence, RI										
Emissions within 25 nm of NY	3,720.0	0.0	0.1	3,749.8	14.3	41.3	1.4	1.4	3.9	5.1
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	0.2%	< 0.1%	< 0.1%	0.3%	< 0.1%
Port of New London, CT										
Emissions within 25 nm of CT	635.0	0.0	0.0	635.0	2.2	9.4	0.3	0.3	0.3	0.5
Emissions within 25 nm of NY	3,720.0	0.0	0.1	3,749.8	14.3	41.3	1.4	1.4	3.9	5.1
Percentage of Hartford County, CT inventory	–	–	–	–	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%	< 0.1%

	Pollutant (tpy) and Percentages by County Inventory									
	CO_2	CH_4	N_2O	CO_2e	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
Percentage of Middlesex County, CT inventory	–	–	–	–	< 0.1%	0.3%	< 0.1%	< 0.1%	0.2%	< 0.1%
Percentage of New London County, CT inventory	–	–	–	–	< 0.1%	0.2%	< 0.1%	< 0.1%	0.1%	< 0.1%
Percentage of Tolland County, CT inventory	–	–	–	–	< 0.1%	0.6%	< 0.1%	< 0.1%	0.3%	< 0.1%
Percentage of Windham County, CT inventory	–	–	–	–	< 0.1%	0.6%	< 0.1%	< 0.1%	0.3%	< 0.1%
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	0.3%	< 0.1%	< 0.1%	0.5%	< 0.1%
Paulsboro Marine Terminal, NJ										
Emissions within 25 nm of NJ	5,941.0	0.0	0.3	6,030.4	17.3	98.0	3.3	3.2	1.3	2.9
Emissions within 25 nm of NY	5,405.0	0.0	0.2	5,464.6	19.1	69.4	2.4	2.3	4.3	5.9
Percentage of New Castle County, DE inventory	–	–	–	–	< 0.1%	0.6%	< 0.1%	< 0.1%	0.6%	< 0.1%
Percentage of Atlantic County, NJ inventory	–	–	–	–	< 0.1%	2.2%	0.2%	0.4%	0.5%	< 0.1%
Percentage of Burlington County, NJ inventory	–	–	–	–	< 0.1%	1.4%	< 0.1%	0.2%	0.6%	< 0.1%
Percentage of Camden County, NJ inventory	–	–	–	–	< 0.1%	1.5%	0.2%	0.3%	0.8%	< 0.1%
Percentage of Cumberland County, NJ inventory	–	–	–	–	0.1%	3.3%	0.2%	0.3%	0.5%	< 0.1%
Percentage of Gloucester County, NJ inventory	–	–	–	–	< 0.1%	1.6%	0.2%	0.2%	0.2%	< 0.1%
Percentage of Salem County, NJ inventory	–	–	–	–	0.2%	4.1%	0.2%	0.6%	0.2%	< 0.1%
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	0.3%	< 0.1%	< 0.1%	0.4%	< 0.1%
Percentage of Bucks County, PA inventory	–	–	–	–	< 0.1%	0.8%	< 0.1%	< 0.1%	0.8%	< 0.1%
Percentage of Delaware County, PA inventory	–	–	–	–	< 0.1%	0.7%	< 0.1%	0.1%	0.3%	< 0.1%
Percentage of Philadelphia County, PA inventory	–	–	–	–	< 0.1%	0.5%	< 0.1%	< 0.1%	0.8%	< 0.1%
Sparrows Point, MD										
Emissions within 25 nm of MD	4,145.0	0.0	0.2	4,204.6	12.2	68.0	2.3	2.2	0.9	2.1
Emissions within 25 nm of NY	4,418.0	0.0	0.1	4,447.8	16.3	52.9	1.8	1.8	4.1	5.4
Percentage of Anne Arundel County, MD inventory	–	–	–	–	< 0.1%	0.6%	< 0.1%	0.1%	< 0.1%	< 0.1%
Percentage of Baltimore City, MD inventory	–	–	–	–	< 0.1%	0.8%	< 0.1%	0.2%	0.2%	< 0.1%
Percentage of Baltimore County, MD inventory	–	–	–	–	< 0.1%	0.6%	< 0.1%	< 0.1%	< 0.1%	< 0.1%
Percentage of Harford County, MD inventory	–	–	–	–	< 0.1%	1.9%	< 0.1%	0.1%	0.8%	< 0.1%
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	0.3%	< 0.1%	< 0.1%	0.3%	< 0.1%

	Pollutant (tpy) and Percentages by County Inventory									
	CO_2	CH_4	N_2O	CO_2e	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
Port of Norfolk, VA										
Emissions within 25 nm of NY	4,409.0	0.0	0.1	4,438.8	16.3	52.8	1.8	1.8	4.1	5.4
Percentage of Suffolk County, NY inventory	–	–	–	–	< 0.1%	0.3%	< 0.1%	< 0.1%	0.3%	< 0.1%

Source: EPA (2017); Jacobs (2021).

Notes: CT = Connecticut, DE = Delaware, MA = Massachusetts, MD = Maryland, nm = nautical miles, NY = New York, PA = Pennsylvania, RI = Rhode Island, VA = Virginia.

Cumulative Impacts

Air emissions and climate change: The Proposed Action would result in temporary minor and long-term minor beneficial incremental impacts to air quality through the generation of construction and installation, O&M, and conceptual decommissioning emissions. The Proposed Action's construction emissions (see Table 3.3.1-6 and Table 3.3.1-7) would increase construction emissions of regulated pollutants (NO_x, SO_2, PM_{10}, and CO_2) over the construction emissions generated by other offshore wind projects associated with the No Action alternative (see Table 3.3.1-4). Therefore, total cumulative construction-related air emissions from all of the planned wind projects, including the Proposed Action, in the OCS Air Permit Area would consist of an estimated 43,471 tons of NO_x, 248 tons of SO_2, 1,443 tons of PM_{10}, and 2,998,333 tons of CO_2. These effects would be localized and would cease when Project construction is complete. For context, the incremental construction emissions contributed by the Proposed Action within the OCS Air Permit Area would result in a 1.0% to 4.0% increase in regulated pollutants that are currently emitted due to highway vehicle emissions in Suffolk County.

Air quality impacts from O&M of the Proposed Action, provided in Table 3.3.1-8 and Table 3.3.1-9, would be combined with the air quality impacts from all other O&M activities that may occur under the No Action alternative (see Table 3.3.1-5), albeit at lower emission quantities as compared to the construction and installation period. Total cumulative operation-related air emissions from all of the planned wind projects, including the Proposed Action, in the OCS Air Permit Area would consist of an estimated 2,339 tons of NO_x, 5 tons of SO_2, 568 tons of PM_{10}, and 166,574 tons of CO_2. Compared to electrical utilities' fuel combustion emissions in Suffolk County, however, the incremental O&M emissions contributed by the Proposed Action within the OCS Air Permit Area would only result in a 1.0% to 5.0% increase in regulated pollutants. O&M emissions would incrementally add emissions in localized areas, several times per year, for the lifetime of the Project.

Air quality in the region could be improved in the long term because an additional operating wind farm would offset emissions from fossil fuel–generated energy sources. As presented in Table 3.3.1-10, the Proposed Action would avoid an estimated 234 tons of NO_x, 164 tons of SO_2, and 217,653 tons of CO_2 every year by providing energy generation that existing fossil fuel–generated energy sources would have otherwise provided (EPA 2020b). This represents up to an estimated 1.6% to 2.4% increase in avoided emissions over the No Action alternative on an annual basis.

The Proposed Action would also have an incremental contribution on existing GHG emissions. The construction and installation, O&M, and the eventual conceptual decommissioning of the Proposed Action would cause a 1% to 4% increase in CO_2 emissions over the No Action alternative within the OCS Air Permit Area. However, these contributions would be negligible compared to aggregate global emissions. In 2019, U.S. GHG emissions totaled 6,558 million metric tons of CO_2e (EPA 2021). The Proposed Action could also contribute to a long-term net decrease in GHG emissions because fossil fuel–generated energy facilities reduce operations from the increased energy generation from offshore wind projects.

Based on above findings, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in minor to moderate cumulative impacts to air quality due to air emissions, as well as a long-term minor beneficial impact to climate change due to reduced reliance on fossil fuel-generated energy sources.

Accidental releases: Accidental releases of air emissions could also occur from potential Project chemical spills. Surface evaporation of these potential chemical spills could lead to short-term, localized periods of toxic pollutant emissions. However, the potential volumes of oils, lubricants, and diesel spilled would result in very small emissions of pollutants into the atmosphere relative to construction and installation, O&M and conceptual decommissioning activities (see Section 3.3.2.2.3). BOEM estimates that the

Project would result in a negligible 2% incremental increase in total chemical usage over the No Action alternative. For this reason, the incremental additional of accidental releases from the Proposed Action would not contribute appreciably to overall impacts on air quality. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in negligible cumulative impacts to air quality due to accidental releases.

Conclusions

Project construction and installation and conceptual decommissioning would temporarily increase air emissions. Emissions from Project O&M would be much lower than those produced during construction and installation and conceptual decommissioning but could also result in limited emissions, primarily from vehicle and vessel traffic. BOEM anticipates the impacts resulting from the Proposed Action alone would range from **minor** to **moderate**. Project O&M would also generate long-term, **minor** beneficial impacts by providing energy to the region from a renewable resource and reducing health events due to air pollution. Therefore, BOEM expects the overall impact on air quality from the Proposed Action alone to be **minor** because the overall effect would be small and would recover completely without remedial or mitigating action.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **moderate** adverse and **minor beneficial**. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** adverse impacts and **minor beneficial** impacts to air quality. BOEM made this call because the overall effect would be small and the resource would recover completely from adverse impacts.

3.3.1.2.4 VESSEL TRANSIT LANE ALTERNATIVE

The Transit alternative would result in impacts on air quality from air emission and inadvertent spills due to construction and installation, O&M, and conceptual decommissioning. However, construction under this alternative could result in a decrease in Project-related emissions if SFW requires less trenching and/or vessel traffic to install the reduced number of WTGs and their associated inter-array cables. Therefore, emissions from construction and installation would be minor to moderate, temporary, and reduced through implementation of EPMs (see Table G-1 in Appendix G). Additionally, although SFW would construct fewer WTGs under this alternative, SFW could use 12-MW WTGs to meet their 130-MW power purchase agreement. Therefore, during O&M, this alternative would also result in long-term beneficial impact on air quality by providing energy to the region from a renewable resource and reducing the region’s reliance on fossil fuels and reducing health events.

Cumulative Impacts

As noted above, the Transit alternative would result in incremental impacts to air quality at quantities and durations similar to, or slightly reduced from, the Proposed Action. Therefore, the overall cumulative impacts of this alternative to air quality when combined with past, present, and reasonably foreseeable activities would be temporary, negligible to minor, and adverse during construction and installation, and long-term, minor, and beneficial during operations.

If the Transit alternative is implemented, the WTGs for other reasonably foreseeable offshore wind projects may need to be relocated or eliminated within lease areas to avoid the transit lanes. These shifts could shorten or increase vessel trips, transmission cable lengths, and installation times for other future projects, depending on what WTG changes occur. If WTG shifts require additional fossil fuel consumption for vessel and equipment activity, these effects could increase cumulative, construction-related air emissions relative to the Proposed Action. Conversely, if these shifts result in WTG reductions that reduce fuel-consuming activities, these effects could decrease cumulative, construction-related air quality impacts relative to the Proposed Action.

Conclusions

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **minor** to **moderate** due to air emissions related to construction activities. Project O&M would also generate long-term, **minor beneficial** impacts by providing energy to the region from a renewable resource and reducing health events due to air pollution.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate** and **minor beneficial**). The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor** adverse impacts and **minor beneficial** impacts to air quality. BOEM made this call because the overall effect would be small, and the resource would recover completely from adverse impacts.

3.3.1.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

The Habitat alternative under either layout option would result in impacts on air quality from air emission and inadvertent spills due to construction and installation, O&M, and conceptual decommissioning. However, construction under this alternative could result in a decrease in Project-related emissions due to less trenching and/or vessel traffic to install the reduced number of WTGs and their associated inter-array cables. Therefore, emissions from construction and installation would be minor to moderate, temporary, and reduced through implementation of EPMs (see Table G-1 in Appendix G). Additionally, SFW could use 12-MW WTGs to meet their 130-MW power purchase agreement. Therefore, during O&M, this alternative would also result in long-term beneficial impact on air quality by providing energy to the region from a renewable resource and reducing the region's reliance on fossil fuels and reducing health events.

Cumulative Impacts

As noted above, the Habitat alternative under either layout option would result in incremental impacts to air quality at quantities and durations similar to, or slightly reduced from, the Proposed Action. Therefore, the overall cumulative impacts of this alternative to air quality when combined with past, present, and reasonably foreseeable activities would be temporary, negligible to minor, and adverse during construction and installation, and long term and beneficial during operations.

Conclusions

Although the Habitat alternative under either layout option would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel and equipment use and air emissions, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **minor** to **moderate** due to air emissions related to construction activities. Project O&M would also generate long-term, **minor beneficial** impacts by providing energy to the region from a renewable resource and reducing health events due to air pollution.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate** and **minor beneficial**). The overall impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor** adverse impacts and **minor beneficial** impacts to air quality. BOEM made this call because the overall effect would be small, and the resource would recover completely from adverse impacts.

3.3.1.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives. Although the number of WTGs and their associated inter-array cables vary slightly, BOEM expects that air quality impacts would range from **minor** to **moderate** and **minor beneficial** for all action alternatives. The main driver for the adverse impact rating is air emissions related to construction activities. However, all action alternatives would result in a net decrease in overall emissions over the region compared to the installation of a traditional fossil fuel power generating station.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from **negligible** to **moderate** and **minor beneficial**. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **minor** and **minor beneficial**. BOEM made this call because the overall effect would be small, and the resource would recover completely from adverse impacts.

3.3.1.4 Mitigation

No potential additional mitigation measures for air quality are identified in Appendix G.

3.3.2 Water Quality

3.3.2.1 Affected Environment

3.3.2.1.1 ONSHORE SURFACE WATER

The onshore analysis area is located within the Georgica Pond-Frontal Atlantic Ocean subwatershed (Hydrologic Unit Code [HUC] 020302020606) and Moriches Bay-Atlantic Ocean subwatershed (HUC-020302020902). The Georgica Pond-Frontal Atlantic Ocean subwatershed falls within the western portion of the analysis area, which includes five named and 13 unnamed surface waterbodies or segments (Figure C-2 in Appendix C). The Moriches Bay-Atlantic Ocean subwatershed encompasses the entire eastern portion of the analysis area, which includes one named and seven unnamed surface waterbodies. Within these two subwatersheds, two waterbodies that fall within the analysis area are currently listed as impaired. Fairfield Pond (Class C [supports fisheries and suitable for non-contact activities]) and Georgica Pond (Class SA [saline waters; shellfishing for market purposes; primary and secondary contact recreation and fishing]) were listed as impaired in 2016 because of low dissolved oxygen (DO) from undetermined causes and pathogens from agricultural sources, respectively (New York State Department of Environmental Conservation [NYSDEC] 2016a, 2016b).

3.3.2.1.2 ONSHORE GROUNDWATER

The Long Island aquifer supplies groundwater to the onshore analysis area and is designated by the EPA as a sole source aquifer, meaning it serves as a primary drinking water resource. Special Groundwater Preserve Areas, which are critical areas identified by NYSDEC (2019a) for protection because of their roles in providing drinking water resources, recharging groundwater, or protecting groundwater, are also located in the analysis area. Groundwater is measured at approximately 40 feet below grade at the proposed interconnection facility and is relatively shallower along the two onshore South Fork Export Cable (SFEC) routes, with the depth to groundwater being approximately 4 to 5 feet around the landing sites (Beach Lane and Hither Hills).

Overall, existing groundwater quality in the analysis area appears to be good and meets NYSDEC (2018) groundwater quality standards. However, as indicated by NYSDEC (2021a), four NYSDEC Environmental Remediation Sites are mapped near the interconnection facility (NYSDEC 2021b). Sampling and analysis at the following three sites have not confirmed or revealed elevated or significant remaining contamination: NYSDEC #152156, which served as an airport hangar for the East Hampton Airport before it was abandoned in 1991; NYSDEC #152213 (the Hortonsphere site), a gas storage facility east of the proposed interconnection facility and upgradient of the onshore SFEC route from the Hither Hills landing site; and NYSDEC #152219, a former gasoline refinery facility that predates the 1930s. These sites are therefore not a concern for the onshore SFEC route. Sampling at the fourth site, NYSDEC #152250, has indicated the presence of perfluorinated compounds. Site-related compounds have been identified in soil and groundwater within and around the site.

3.3.2.1.3 OFFSHORE WATERS

Offshore waters comprise coastal waters (e.g., ports/harbors, rivers, bays, and estuaries; marine waters) located within the state territory (within 3 nm of shore) and within the federal waters. The coastal waters, including the Long Island Sound and Atlantic Ocean, are located offshore and include existing port facilities in New York, Rhode Island, Massachusetts, Connecticut, New Jersey, Maryland, and/or Virginia that could be used for the Project. Marine waters are considered temperate because of their highly seasonal variations in temperature, stratification, and productivity. Water currents in the analysis area generally flow southwest, although bottom water currents may flow northward. Currents near the shoreline flow east. Average year-round surface currents were measured at approximately 8 inches per second, with the strongest currents measured at 20 inches per second (Fugro 2021).

NOAA (2021a, 2021b, 2021c) reported increases in relative sea level trends at three tide stations along the Long Island coast, with increases over the 1947 to 2020 period ranging from approximately 2.3 millimeter (mm)/year at Kings Point, NY to 3.41 mm/year at Montauk, NY. This information was collected using NOAA Tides and Currents data (https://tidesandcurrents.noaa.gov/). Higher sea levels in addition to storm surges, which are increasing in both frequency and magnitude, have contributed to coastal erosion on Long Island that in turn have eroded Long Island’s shorelines and increased susceptibility to flooding (New York Sea Grant 2018).

Offshore water quality is characterized by temperature, salinity, DO, nutrients, chlorophyll *a*, and turbidity. These parameters, which are described in detail in COP Section 4.2.2, influence coastal and marine environments and are indicators of ecosystem health.

Water quality in the Long Island Sound has improved over the last decade and is rated as “very good” with the exception of the western-most portion, which has been experiencing water quality degradation from nutrient (nitrogen) pollution (University of Maryland 2018). Coastal waters off Rhode Island, including Narragansett Bay and nearby coastal ponds, have also experienced degraded water quality from nutrients and storm water runoff carrying contaminants (Rhode Island Division of Planning 2016). Water quality in the area generally improves north to south with distance from pollutant sources in urbanized areas. The water quality of the coastal waters ranging from Maine to North Carolina, which include the SFWF and offshore SFEC, was rated as “good” to “fair” (EPA 2012). EPA surveyed four sites within the Block Island Sound and near the Lease Area. These surveys revealed surface and bottom water DO concentrations above established levels for the “highest quality marine waters.” Chlorophyll *a* was found at slightly elevated levels, resulting in “fair” water quality conditions. Currents and storms contribute to turbidity throughout the water column from the resuspension of clay, silt, and fine-grained sand making up the sediment. Federal marine waters typically have very low concentrations of total suspended solids (TSS). Little information exists on algal and bacteria dynamics within the analysis area. However, there have been no documented reports of harmful algal blooms or waterborne pathogen outbreaks (EPA 2012). Temperature of offshore waters fluctuates seasonally. Water temperatures are highest in July and August, with surface waters at approximately 68 degrees Fahrenheit (°F) and bottom waters at 50°F, and lowest in the winter, with surface waters at approximately 39°F to 41°F. Salinity also fluctuates throughout the year with lower concentrations in the spring because of water inflows from ice melt and precipitation and higher concentrations in the fall and winter. See Section 4.2.4 of the COP for additional information regarding physical oceanographic and meteorological conditions within the Lease Area.

Contaminants could also reside within the sediment column and contribute to water quality conditions. However, 12 cores obtained within the state marine waters for the offshore SFEC and analyzed for an array of anthropogenic contaminants did not reveal contamination, and the sediment met the Class A (No Appreciable Contamination) as defined in the Sediment Quality Thresholds described in the *Technical Guidance for Screening Contaminated Sediments* (NYSDEC 1999).

3.3.2.2 Environmental Consequences

3.3.2.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.3.2-1 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for this final EIS.

Table 3.3.2-1. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Water Quality

Issue	Impact Indicator	Significance Criteria
Runoff, sedimentation, sediment movement, suspension or resuspension, changes to stratification or mixing patterns of sediments, or spills of hazardous materials	Changes to turbidity, nutrients, DO, temperature, salinity, and/or Chlorophyll *a* Introduction of new contaminants/oil or changes to sediments, or changes in flows	Negligible: Changes would be undetectable. Minor: Changes would be detectable but would not result in degradation of water quality in exceedance of water quality standards. Moderate: Changes would be detectable and would result in localized, short-term degradation of water quality in exceedance of water quality standards. Major: Changes would be detectable and would result in extensive, long-term degradation of water quality in exceedance of water quality standards.
Disturbance or seepage to groundwater resources		

3.3.2.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing water quality trends from past and present activities. Attachment 2 in Appendix E provides additional information regarding past and present activities and associated water quality impacts. Future non-Project onshore sources of water pollution include electrical transmission lines, port development and expansion, and U.S. Army Corps of Engineers

(USACE) shore development and cleanup projects. Future non-Project offshore sources of water pollution include an undersea transmission line, a gas pipeline, submarine cable projects, one tidal energy project (the Roosevelt Island Tidal Energy Project), vessel traffic, and offshore wind projects. Attachment 2 in Appendix E also discloses future non–offshore wind activities and associated water quality impacts. Impacts associated with future onshore activities and future offshore wind activities are described below.

Onshore Future Activities (without the Proposed Action)

Reasonably foreseeable onshore activities could contribute to changes in water quality from erosion and sedimentation, discharges, and dispersal of contaminants during routine spills (i.e., spills less than 10 barrels, or 420 gallons) or accidental release of contaminated or hazardous materials or debris. These activities would be expected to comply with any applicable permit requirements to implement erosion, storm water, and spill controls to minimize, reduce, or avoid impacts on water quality. Degradations to onshore water quality from future onshore activities are expected to be localized and temporary to long term, depending on the nature of the activities, although overall water quality is expected to continue to meet NYSDEC (2018) water quality standards. Onshore water quality of impaired waterbodies, including Fairfield and Georgica Ponds, would also be maintained or improved through established total maximum daily loads (NYSDEC 2016a, 2016b). Other surface and ground waterbodies would be monitored and managed to meet water quality standards and drinking water resource protections. Ongoing onshore water quality impacts from these activities are anticipated to continue regardless of the offshore wind industry. As a result, adverse impacts from future activities on onshore water quality under the No Action alternative would be temporary to long term and minor to moderate.

Some onshore future projects, such as flood risk management, storm preparedness, climate adaptation planning, and sediment management projects identified in Appendix E could result in beneficial impacts to onshore water quality through reductions in erosion, sedimentation, storm water runoff, and flooding. Improvements to onshore water quality from these future projects could be localized or widespread, depending on the nature of the activities, and long term. Ongoing benefits to onshore water quality from these activities would continue regardless of the offshore wind industry. As a result, impacts from these future activities on onshore water quality under the No Action alternative would be long term, minor, and beneficial.

Offshore Future Activities (without the Proposed Action)

<u>Accidental releases and discharges</u>: Future offshore wind activities could contribute to changes in offshore water quality from a spill or release during routine vessel or equipment use, spill at an offshore wind facility, spill during construction due to a vessel allision or collision, or the accidental discharge of trash and debris.

Based on assumed construction schedules (see Appendix E), numerous offshore wind projects could occur with overlapping construction schedules between 2022 and 2030. This final EIS estimates that up to approximately 760,000 gallons of coolants and 1.9 million gallons of oils and lubricants could be stored within WTG foundations and the offshore substation (OSS) within the water quality geographic analysis area. A total of approximately 2.3 million gallons of coolants and 10.5 million gallons of oils and lubricants could be stored within WTG foundations and the OSS across all projected offshore wind projects along the Atlantic coast. Other chemicals, including grease, paints, and sulfur hexafluoride, would also be used at the offshore wind projects. BOEM anticipates that the likelihood of a major spill of these chemicals during construction is very low (once per 1,000 years) due to vessel allisions, collisions, O&M activities, or weather events (Bejarano et al. 2013). All future offshore wind projects would be required to comply with regulatory requirements related to the prevention and control of accidental spills administered by the USCG and the Bureau of Safety and Environmental Enforcement. Oil Spill Response

Plans are required for each project and would provide for rapid spill response, clean-up, and other measures that would help to minimize potential impact on affected resources from spills. WTGs and the OSS are generally self-contained and would not generate discharge. Vessels would also have their own onboard containment measures that would further reduce the impact of an allision. A release during construction or operation would generally be localized, short term, and result in little change to water quality. In the unlikely event an allision or collision involving project vessels or components resulted in a large spill, impacts on water quality would be minorly to moderately adverse, and short term to long term, depending on the type and volume of material released and the specific conditions (e.g., depth, currents, weather conditions) at the location of the spill.

Accidental releases of trash and debris would be infrequent and negligible because operators would comply with federal and international requirements for management of shipboard trash. All vessels would also need to comply with the USCG ballast water management requirements outlined in 33 CFR 151 and 46 CFR 162; allowed vessel discharges such as bilge and ballast water would be restricted to uncontaminated or properly treated liquids.

<u>Anchoring</u>: Offshore wind activities would contribute to changes in offshore water quality from resuspension and deposition of sediments during anchoring. BOEM estimates that approximately 41 acres of seabed could be impacted by anchoring under the No Action alternative within the water quality geographic analysis area. Disturbances to the seabed during anchoring would temporarily increase suspended sediment and turbidity levels in and immediately adjacent to the anchorage area. As described in Section 3.3.2.1.3, currents and storms currently contribute to turbidity throughout the water column from the resuspension of clay, silt, and fine-grained sand making up the sediment. As a result, adverse impacts on offshore water quality under the No Action alternative would be minor and temporary.

<u>New cable emplacement/maintenance</u>: BOEM estimates that approximately 1,291 acres of seabed could be impacted by cable placement under the No Action alternative within the water quality geographic analysis area due to reasonably foreseeable offshore wind development. As described under anchoring, these activities would contribute to changes in offshore water quality from the resuspension and deposition of sediment. Sediment modeling for the Proposed Action indicates that sediment suspension and deposition would occur within an approximate 1-acre area and would settle shortly (hours to days) after their release (Vinhateiro et al. 2018). BOEM anticipates that future offshore wind projects would use dredging only when necessary and rely on other cable laying methods for reduced impacts (such as jet plow or mechanical plow) where feasible. For these reasons, sediment suspension associated with other wind projects would be localized, minor, and temporary.

<u>Port utilization</u>: Offshore wind development would use nearby ports, and could also require port expansion or modification, resulting in increased vessel traffic or increased suspension and turbidity from any in-water work. These activities could also increase the risk of accidental spills or discharge. However, these actions would be localized and port improvements would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality. As a result, adverse impacts on offshore water quality under the No Action alternative would be short to long term but minor.

<u>Presence of structures</u>: Reasonably foreseeable offshore wind projects are estimated to result in no more than 412 structures by 2030 within the water quality geographic analysis area. These structures could disturb up to 360 acres of seabed within the water quality geographic analysis area from foundation and scour protection installation and disrupt bottom current patterns leading to increased movement, suspension, and deposition of sediments. Scouring, which could lead to impacts on water quality through the formation of sediment plumes (Harris et al. 2011), would generally occur in shallow areas with tidally dominated currents. Structures may reduce wind-forced mixing of surface waters, whereas water flowing around the foundations may increase vertical mixing (Carpenter et al. 2016; Cazenave et al. 2016).

Alterations in currents and mixing would affect water quality parameters such as temperature, DO, and salinity, but would vary seasonally and regionally. WTGs and the OSS associated with reasonably foreseeable offshore wind projects would be placed in average water depths of 100 to 200 feet where current speeds are relatively low, and offshore cables would be buried where possible. Cable armoring would be used where burial is not possible, such as in hard-bottomed areas. BOEM anticipates that developers would implement best management practices to minimize seabed disturbance from foundations, scour, and cable installation. As a result, adverse impacts on offshore water quality under the No Action alternative would be localized, short term, and minor.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on water quality associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on water quality from onshore erosion and sedimentation, discharges, dispersal of contaminants during routine spills as well as offshore spills or discharge, resuspension and deposition of sediments, scouring, or changes to current patterns and mixing.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities and onshore activities would be **minor to moderate**, due to short-term erosion and sedimentation, discharges, and dispersal of contaminants during routine spills, and **minor beneficial** from shoreline improvements. As described in Attachment 2 in Appendix E, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable offshore activities other than offshore wind would be **minor** to **moderate**, due to temporary or short-term disturbance to sediments during construction activities.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts because the effects would be small and the resource would recover completely.

3.3.2.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Onshore

Construction of the onshore portion of the Project would require temporary (up to 12 months) ground-disturbing activities including surficial digging, land clearing, trenching, HDD, use of equipment and vehicles, and installation of permanent (over the life of the Project) onshore infrastructure (e.g., underground transmission/export cables, O&M facility, and interconnection facility). Fill materials would be used for installation of structures. Equipment and vehicles would require the use of fuels and oils during onshore construction. Dredging to a depth of 12.4 feet below mean lower low water would be required at the Montauk O&M facility to allow for suitable depths for navigation and berthing. Initial dredging would occur during construction, and intermittent dredging would occur throughout maintenance.

None of the onshore Project facilities or SFEC routes directly intersect any surface waterbodies. However, onshore construction activities upgradient of surface waterbodies would expose soils and sediments, resulting in potential erosion and sedimentation into onshore surface waters and changes to flows that could affect water quality. Onshore ground disturbance during construction would also require the disturbance of soils near existing remediation sites. In addition, infrastructure construction would result in the long-term increase in impervious surfaces in the onshore water quality analysis area. If disturbed or eroded soils or fill materials contain pollutants or contaminants, their direct release or indirect deposition in onshore surface waters could also lead to degradations to water quality, particularly for waterbodies with existing impairments, the causes of which could be exacerbated with additional pollutant loads. However, total maximum daily loads established for impaired waterbodies and continued water quality monitoring would help identify and manage water quality degradations, should they occur. Dredging may temporarily result in increased turbidity; however, in addition to navigation improvements, dredging material from the navigation channel would be placed in shoreline areas that have experienced erosional damages, thereby offering long-term coastal storm risk management benefits. Section 4.2.2.3 of the COP includes features that would avoid or minimize impacts on water quality, including encasement of the cable in areas where HDD is required. New impervious surfaces as a result of infrastructure would be minimal (up to 4 acres) compared to the extent of the entire analysis area. Onshore SFEC routes would also be located within public roadways and the Metropolitan Transportation Authority–owned LIRR ROW, or along roadway corridors that are characterized as impervious road surfaces or railroad beds, thereby minimizing impacts to undisturbed areas. Because overall construction activities and infrastructure would disturb more than 1 acre, discharges would be permitted through a general construction permit under the National Pollutant Discharge Elimination System program. SFW would also develop a storm water pollution prevention plan (SWPPP) as part of the permitting process that would result in implementation of erosion and sediment controls prior to and during construction. Placement of dredged material on shorelines could result in temporary turbidity but would also help with beach erosion and provide coastal storm risk protections. Therefore, any adverse impact on water quality would be temporary and minor.

Fuels and oils would be required for onshore construction equipment and vehicles and for infrastructure. Most inadvertent spills of fuels and oils used during construction would be classified as routine because of their size (i.e., spills less than 10 barrels, or 420 gallons) and rapid dispersion (BOEM 2015). Routine spills could lead to direct (spill directly into waterbody) or indirect (spill reaches waterbody through soil erosion or water runoff) degradations to water quality in surface waterbodies downgradient of the onshore route or infrastructure. As previously noted, Table G-1 in Appendix G includes EPMs to avoid or minimize potential spill impacts on water quality, comply with all general construction permit requirements, and implement runoff controls and buffers. In addition, SFW would develop and implement a spill prevention control and countermeasures (SPCC) plan and HDD inadvertent release plan to protect nearby surface waters. Although these procedures would reduce the likelihood and extent of routine spills, spills in or near surface waterbodies would contribute to detectable changes that could result in an exceedance of water quality standards. Therefore, the adverse impact on water quality would be short term and minor to moderate, depending on the severity of potential spills or releases.

There are no onshore construction activities under the Proposed Action that would require ground disturbance at depths at or near groundwater resources, and all activities would meet permit and regulatory requirements to continue protecting groundwater as drinking water resources. The use of HDD at the landing sites would negate the need for trenching in areas where shallow groundwater would intersect the trench excavation. Onshore subsurface ground-disturbing activities would not be placed at a depth that could encounter groundwater, and would therefore not result in impacts on water quality. As described for onshore surface water, potential spills would be avoided or managed through an SPCC plan and HDD inadvertent release plan and proper storage and handling procedures. Therefore, adverse impacts on groundwater quality would be short term and minor to moderate, depending on the severity of potential spills or releases.

Offshore

Construction of the offshore portion of the Project would require temporary (up to 12 months) seafloor-disturbing activities including trenching, boulder relocation, HDD, use of equipment and vessels, vessel mooring/anchoring, dredging (depending on the port selected), and installation of in-water infrastructure (turbine foundations, transmission/export cables, and electrical service platform). Equipment and vessels would require the use of fuels and oils during offshore construction. The total area of the foundation footprint and scour protection is provided in Appendix D under the maximum-case scenario.

Offshore construction activities would contribute to the movement and resuspension of sediments into the water column. This movement and resuspension would contribute to turbidity, and deposition of these sediments would directly affect water quality or indirectly affect water quality through changes in flows. If sediments contain pollutants or contaminants, their resuspension would lead to degradations of water quality. Installation activities for turbine foundations on the seafloor could disrupt bottom current patterns, resulting from or leading to increased movement, suspension, and deposition of sediments (see Section 3.4.2 Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish).

EPMs in Table G-1 in Appendix G would avoid or minimize impacts on water quality, and SFW would comply with all permit and regulatory requirements related to water quality. Vessels that support Project activities would be large enough to be subject to USCG regulations regarding waste and discharge. Foreign-flagged vessels would also have a USCG-compliant and certified ballast water management system. Any disturbance to sediment from vessel mooring/anchoring would be negligible because of the limited duration (minutes to hours) and magnitude (a total of 821 acres, limited to the immediate area where vessel mooring/anchoring would contact the seafloor) of disturbance. Modeling of the extent and timing of other offshore sediment releases concluded that sediment suspension and deposition would occur within an approximate 1-acre area and would settle shortly (hours to days) after their release (Vinhateiro et al. 2018). For these reasons, sediment suspension would be localized and temporary. Changes to water quality would be detectable but would not result in degradation of water quality that would exceed water quality standards. SFW-modeled TSS levels expected to result from offshore Project construction (Fugro 2019, 2021). Model results indicated that elevated TSS plumes could extend 330 feet and last up to 1 hour before returning to background levels. Elliott et al. (2017) monitored TSS levels during construction of the Block Island Wind Farm (BIWF). The observed TSS levels were far lower than levels predicted using the same modeling methods, dissipating to baseline levels less than 50 feet from the disturbance. Both the modeled and the observed TSS effects were short term in duration. Construction dredging activities at the Montauk O&M facility would temporarily increase TSS levels up to 100 milligrams (mg)/L (Vinhateiro et al. 2018) over the duration of activity. Existing restoration and protection initiatives established for offshore areas, including those developed as part of the Long Island Sound Study initiative (Long Island Sound Study 2019), would help identify and manage water quality degradations, should they occur. Therefore, the adverse impact on water quality would be temporary and minor.

Offshore construction equipment, vessels, and infrastructure would require fuels and oils over the construction period. As described for onshore waters, most inadvertent spills in offshore waters during construction would be classified as routine and minor, such as the release of fuels and oils from vessels or turbines, which would disperse rapidly. In addition, secondary containment measures would be implemented for all diesel tanks at WTGs. Under the Project, the highest possible spill would be the inadvertent release of fuels and oils stored at WTGs and OSS, which would contain up to 2,582 gallons of fuels and oils. Project EPMs (see Table G-1 in Appendix G), permit requirements, controls, and procedures described above to reduce the potential or extent of onshore spills would also be applied in offshore waters, thereby avoiding or minimizing impacts on water quality. Should a spill occur, response and containment procedures would limit the reach of the spill to a localized area, where changes to water quality would be detectable and would exceed water quality standards. As a result, adverse impacts on water quality would be short term, with spills generally dispersing within days (BOEM 2013), and minor to moderate, depending on the severity of the spill. The Project could also result in accidental releases of trash and debris; however, these releases would be infrequent and negligible because operators would comply with federal and international requirements for management of shipboard trash, and the extent of an accidental release would be limited to the localized area.

Operations and Maintenance and Conceptual Decommissioning

Onshore

O&M and conceptual decommissioning of the onshore portion of the Project would include the same permit requirements and erosion, storm water, and spill controls as described for onshore construction activities and would lead to the same types of minor to moderate adverse impacts on surface water and groundwater quality from erosion, sedimentation, and inadvertent spills or releases. Impacts on water quality during O&M would be less in terms of frequency and intensity than impacts during construction and conceptual decommissioning.

Offshore

O&M and conceptual decommissioning of the offshore portion of the Project would include the same permit requirements and sediment controls as described for offshore construction activities and would lead to the same types of minor adverse impacts on water quality from sediment resuspension, deposition, and minor to moderate adverse impacts on water quality from inadvertent spills. Spills would be temporarily detectable and would disperse rapidly, thereby limiting the magnitude and extent of changes to water quality.

The presence of structures during O&M could disrupt bottom current patterns leading to scour from the increased movement, suspension, and deposition of sediments. Project EPMs (see Table G-1 in Appendix G), permit requirements, controls, and procedures described above for reducing or avoiding changes to sediment would also be applied during operation. Disturbed sediments would be limited to a localized area (within approximately 1 acre) and would settle shortly (hours to days) after their release. Alterations in currents and mixing would affect water quality parameters such as temperature, DO, and salinity, but would vary seasonally and regionally. Changes to water quality would be detectable but would not result in degradation of water quality that would exceed water quality standards. Therefore, the adverse impact on water quality would be temporary and minor.

Cumulative Impacts

Onshore

The Proposed Action would result in minor to moderate incremental impacts to onshore water quality impacts on surface water and groundwater due to erosion and sedimentation, discharges, and dispersal of contaminants during routine spills (i.e., spills less than 10 barrels, or 420 gallons) or inadvertent releases. The Proposed Action would also incrementally add to other onshore habitat disturbance actions through the development of 2.4 acres for the interconnection facility and redevelopment of a small area (0.1 acre) of land at the selected O&M facility. State and local agencies would be responsible for minimizing and avoiding water quality and other impacts during construction. The Project and other reasonably foreseeable projects would be expected to comply with any applicable permit requirements to implement erosion, storm water, and spill controls to minimize, reduce, or avoid impacts on water quality. As a result, the Proposed Action when combined with past, present, and other reasonably foreseeable projects would result in short-term, and minor to moderate cumulative impacts on onshore water quality.

Offshore

Accidental releases and discharge: The Proposed Action could incrementally add accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris to conditions under the No Action alternative. BOEM estimates that the Project would result in up to 5% increase in total chemical usage over the No Action alternative within the water quality geographic analysis area. This risk would be increased primarily during construction but also during O&M and conceptual decommissioning. When the Project is combined with other offshore wind projects, up to approximately 770,000 gallons of coolants and 2.1 million gallons of oils and lubricants could cumulatively be stored within WTG foundations and the OSS within the water quality geographic analysis area. All vessels associated with the Proposed Action and other offshore wind projects would comply with the USCG requirements for the prevention and control of oil and fuel spills. Additionally, training and awareness of EPMs (see Table G-1 in Appendix G) proposed for waste management and mitigation of marine debris would be required of SFWF Project personnel. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time. For this reason, the Proposed Action, when combined with other past, present, and reasonably foreseeable projects, would result in minor to moderate and short-term or long-term impacts.

Anchoring: The Proposed Action would result in localized, temporary, minor incremental impacts to water quality through an estimated 821 acres of anchoring and mooring-related disturbance, which would temporarily increase suspended sediment and turbidity levels in and immediately adjacent to anchorage areas. The Proposed Action would add to the estimated 41 acres of seabed that could be impacted by anchoring from other reasonably foreseeable offshore wind activities. This would result in a cumulative total of 862 acres of anchoring-related disturbance for the Proposed Action plus all other future offshore wind projects. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in minor cumulative impacts to water quality.

New cable emplacement/maintenance: The Proposed Action would result in localized, short-term, minor incremental impacts to water quality through an estimated 913 acres of seafloor disturbance from SFEC and inter-array cable installation. This would result in additional turbidity effects, increasing seafloor disturbance due to cable installation over the No Action alternative. BOEM estimates a cumulative total of 2,204 acres of anchoring-related disturbance for the Proposed Action plus all other future offshore wind projects. Sediment modeling for the Proposed Action indicates that sediment suspension and deposition would occur within an approximate 1-acre area and would settle shortly (hours to days) after the release of sediment (Vinhateiro et al. 2018). Suspended sediment concentrations during activities other than dredging would be within the range of natural variability typical for the affected area. As a result, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in minor cumulative impacts to water quality.

Port utilization: Although dredging or in-water work for the Port of Montauk could be required for the Proposed Action, these actions would occur within heavily modified habitats. BOEM expect impacts to water quality due to the incremental increase in port expansion resulting from the Proposed Action to be negligible to minor. Other offshore wind development would use nearby ports, and could also require port expansion or modification. However, SFW and all other developers would comply with all permit requirements to avoid or minimize water quality impacts. Therefore, cumulative impacts associated with the Proposed Action and past, present, and reasonably foreseeable future activities would be negligible to minor.

Presence of structures: The Proposed Action would result in long-term, minor incremental impacts to water quality through the installation of 16 structures (15 WTGs and one OSS), as well as in-water dock structures. This represents a minor, 4% increase over total estimated WTG and OSS foundations under the No Action alternative within the geographic analysis area. BOEM estimates a cumulative total of 428 structures for the Proposed Action plus all other future offshore wind projects within the geographic analysis area. These additional structures could cumulatively add to other offshore impacts to water quality from turbidity due to scour and water current alteration. However, because of the limited extent of impacts and BOEM's expectation that SFW and other developers would comply with all applicable permit requirements to minimize, reduce, or avoid impacts on water quality, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in minor and long-term impacts to water quality.

Conclusions

Project construction and installation, O&M, and conceptual decommissioning would expose and disturb soils and sediments, resulting in potential erosion, sedimentation, or inadvertent release of contamination or hazardous materials or debris into onshore surface waters and changes to flows that could affect water quality. Offshore, Project construction and installation and conceptual decommissioning would contribute to increased movement, suspension, and deposition of sediments; changes to water column stratification; and mixing patterns that would affect water quality parameters. Impacts from Project O&M would be much lower than those produced during construction and installation and conceptual decommissioning but could also result in erosion, sediment resuspension, deposition, and inadvertent spills. BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible** to **moderate**. Therefore, BOEM expects the overall impact on water quality from the Proposed Action alone to be **minor** because the effect would be small and the resource would be expected to recover completely without remedial or mitigating action.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **moderate**. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** impacts to water quality. BOEM made this call as the effect would be small and the resource would be expected to recover completely.

3.3.2.2.4 VESSEL TRANSIT LANE ALTERNATIVE

The Transit alternative would not affect Project onshore activities; therefore, effects would be similar to the Proposed Action and would lead to the same types of minor to moderate adverse impacts on surface water and groundwater quality from erosion, sedimentation, and inadvertent spills.

Offshore, the Project under the Transit alternative would lead to the same types of impacts on water quality from construction and installation, O&M, and conceptual decommissioning activities as described for the Proposed Action. However, the reduced number of turbines under the Transit alternative would reduce the potential for vessel collisions or allisions with WTGs that could lead to accidental releases and result in degradations to water quality. This alternative could also result in decreased impacts to water quality during construction (due to decreased suspended sediment and turbidity) if less trenching and/or vessel traffic is needed to install a reduced number of WTGs and their associated inter-array cables. As a result, the Transit alternative would have negligible to moderate, short-term impacts on water quality related to spills, anchoring, cable emplacement and management, port expansion, structures, discharges, and sediment disturbance.

Cumulative Impacts

The Transit alternative would not affect Project onshore activities; therefore, cumulative effects would be the same as the Proposed Action and would lead to minor to moderate cumulative impacts on onshore water quality.

As noted above, the Transit alternative would result in incremental impacts to water quality at quantities and durations similar to, or slightly reduced from, the Proposed Action. Therefore, the overall cumulative impacts of this alternative to water quality when combined with past, present, and reasonably foreseeable activities would be negligible to moderate and short term, mostly as a result of construction activities. Impacts related to spills could also be long term, depending on the severity of the spill.

If the Transit alternative is implemented, the WTGs for other reasonably foreseeable offshore wind projects may need to be relocated or eliminated within lease areas to avoid the transit lanes. These shifts could shorten or increase vessel trips, transmission cable lengths, and installation times for other future projects, depending on what WTG changes occur. If WTG shifts result in changes that increase turbidity and sedimentation, alter water currents, or increase risks of inadvertent spills, these effects could increase cumulative water quality impacts relative to the Proposed Action.

Conclusions

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in potential changes to movement, suspension, and deposition of sediments; water column stratification and mixing patterns, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **moderate**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative’s incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate**). The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor**.

3.3.2.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

The Habitat alternative under either layout option would not affect Project onshore activities; therefore, all onshore effects would be the same as the Proposed Action and would lead to the same types of minor to moderate temporary adverse impacts on surface water and groundwater quality from erosion, sedimentation, and inadvertent spills.

Offshore, the Project under the Habitat alternative for either layout option would lead to the same types of impacts on water quality from construction and installation, O&M, and conceptual decommissioning as described for the Proposed Action. However, this alternative could result in decreased impacts to water quality during construction (due to decreased suspended sediment and turbidity) if less trenching and/or vessel traffic is needed to install a reduced number of WTGs and their associated inter-array cables. As a result, this alternative would have negligible to moderate, short-term impacts on water quality related to spills, anchoring, cable emplacement and management, port expansion, structures, discharges, and sediment disturbance.

Cumulative Impacts

The Habitat alternative under either layout option would not affect Project onshore activities; therefore, cumulative effects would be the same as the Proposed Action and would lead to minor to moderate cumulative impacts on onshore water quality.

As noted above, the Habitat alternative under either layout option would result in incremental impacts to water quality at quantities and durations similar to, or slightly reduced from, the Proposed Action. Therefore, the overall cumulative impacts of this alternative to water quality when combined with past, present, and reasonably foreseeable activities are anticipated to be negligible to moderate and short term, mostly as a result of construction activities. Impacts related to spills could also be long term, depending on the severity of the spill.

Conclusions

Although the Habitat alternative under either layout option would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in potential changes to movement, suspension, and deposition of sediments; water column stratification and mixing patterns, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **moderate**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate**). The overall impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor**.

3.3.2.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, BOEM expects that water quality impacts would range from **negligible** to **moderate** for all action alternatives due to potential spills and increased movement, suspension, and deposition of sediments; changes to water column stratification; and mixing patterns that would affect water quality parameters.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from **negligible** to **moderate**. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **minor**. BOEM made this call as the effect would be small, and the resource would be expected to recover completely.

3.3.2.4 Mitigation

If the USACE requires establishment of a no-work window for dredging at Montauk through their permitting process, some adverse impacts to water quality would be further reduced although still identified as negligible to moderate.

3.4 BIOLOGICAL RESOURCES

3.4.1 Bats

3.4.1.1 Affected Environment

Bat species consist of two distinct groups based on their overwintering strategy: cave-hibernating bats (cave bats) and migratory tree bats (tree bats). Bats are terrestrial species that spend almost their entire lives on or over land. On occasion, tree bats can occur offshore during spring and fall migration and under very specific conditions such as low wind and high temperatures. Recent studies, combined with historical anecdotal accounts, indicate that tree bats sporadically travel offshore during spring and fall migration, with 80% of acoustic detections occurring in August and September (Dowling et al. 2017; Hatch et al. 2013; Pelletier et al. 2013; Stantec 2016). However, unlike tree bats, the likelihood of detecting a *Myotis* species or other cave bat is substantially less in offshore areas (Pelletier et al. 2013). Regionally, both resident and migrant tree and cave bat species occur on islands within Nantucket Sound, indicating that overwater crossings do occur (MMS 2008).

Bat species that may occur in the offshore and onshore portions of the Lease Area include the long-distance migrants and the non-migrating cave-dwelling bats. Long-distance migrants include hoary bat (*Lasiurus cinereus*), eastern red bat (*Lasiurus borealis*), and silver-haired bat (*Lasionycteris noctivagans*).

Non-migratory cave-dwellers include northern long-eared bat (*Myotis septentrionalis*), little brown bat (*Myotis lucifugus*), eastern small-footed bat (*Myotis leibii*), big brown bat (*Eptesicus fuscus*), and tri-colored bat (*Perimyotis subflavus*) (Stantec 2018a). Species detected within the SFWF and offshore SFEC during surveys for the Project included silver-haired bat, hoary bat, eastern red bat, tri-colored bat, and little brown bat (Stantec 2018b). During these surveys, most bat calls were detected in August and September between 1 and 5 hours past sunset and primarily when wind speeds were < 5.0 meters per second and temperatures were ≥ 15.0 degrees Celsius, which is consistent with the migratory chronology of these species (Stantec 2018b).

Bats use a variety of terrestrial environments on Long Island for foraging and roosting during summer breeding and migration periods. The location of the interconnection facility would be in a wooded area, which would provide suitable habitat for bats. Although other onshore Project components occur in already developed areas, bats could use other types of nearby undeveloped habitats. For more information regarding onshore bat abundance, seasonal use, and behavior see Stantec 2018a.

3.4.1.1.1 SPECIAL-STATUS BAT SPECIES

The USFWS Information for Planning and Consultation (IPaC) official species list for the Project, dated September 17, 2020, includes the northern long-eared bat as one of the potentially present species in the analysis area listed under the Endangered Species Act of 1973 (ESA) (VHB Engineering, Surveying and Landscape Architecture, P.C [VHB] 2018). The northern long-eared bat is both federally and state-listed (6 NYCRR 182) as threatened (with 4(d) rule). The final (4(d) rule for the northern long-eared bat, 81 *Federal Register* 9 [January 14, 2016]), conditionally exempts from prohibition the incidental take of the northern long-eared bat within the white nose syndrome zone from energy development and operation (USFWS 2019). A detailed species account is included in the biological assessment (BA) for this Project (BOEM 2021a).

3.4.1.2 Environmental Consequences

3.4.1.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.4.1-1 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for this final EIS.

Table 3.4.1-1. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Bats

Issue	Impact Indicator	Significance Criteria
Collision/attraction	Qualitative estimate of collision	Negligible: There would be no measurable impacts.
Displacement/barrier effects/disturbance	Changes to noise levels Projected traffic patterns/volume changes	Minor: Most impacts could be avoided with EPMs; if impacts occur, the loss of one or a few individuals or temporary alteration of habitat could represent a minor impact, depending on the time of year and number of individuals involved.
Habitat loss and modification	Acres of suitable habitat removed or modified	Moderate: Impacts are unavoidable but would not result in population-level effects or threaten overall habitat function.
		Major: Impacts would result in severe, long-term habitat or population-level effects to species.

3.4.1.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing bat species and habitat trends from past and present activities. The Vineyard Wind final EIS provides a detailed discussion of existing bat resources and species and habitat trends along the east coast and is incorporated here by reference

(BOEM 2021b). Attachment 2 in Appendix E provides additional information regarding past and present activities and associated bat impacts. Future non-Project actions include onshore and offshore wind projects, municipal development projects, communications towers, port upgrades, tidal energy, and dredging/port improvement projects. Attachment 2 in Appendix E also discloses future non-offshore wind activities and associated bat impacts. Impacts associated with future onshore and future offshore wind activities are described below.

Future Activities (without the Proposed Action)

Onshore reasonably foreseeable activities could temporarily displace bats or could deter bats from using potentially suitable foraging habitat. These impacts would not be biologically significant because bats frequently switch roosts (Hann et al. 2017; Whitaker 1998). Onshore land development or port expansion activities could result in habitat loss for some bat species. However, such impacts would only represent a minor and temporary adverse impact because impacts would be limited in extent, as described further in Section 3.5.5.2.2 (No Action Alternative), and not expected to measurably impact bat population abundance or viability.

Impacts associated with future offshore wind activities are described below.

<u>Noise</u>: Construction of numerous offshore wind projects is projected between 2022 to 2030 (see Table E-3 in Appendix E). Construction noise from these projects, most notably from pile driving, would create noise and may temporarily impact some migrating bats if present during construction periods. However, these noise impacts are not expected because recent research indicates that bats may be less sensitive to temporary threshold shifts than other terrestrial mammals so no temporary or permanent hearing loss would be expected (Simmons et al. 2016). Other noise impacts (i.e., displacement from potentially suitable habitats or migration routes) could occur as a result of construction noise (Schaub et al. 2008), but the likelihood of impact is low because little use of the OCS is expected and the use would occur only during spring and fall migration. As a result, adverse impacts to bats would be short to long term and minor.

<u>Presence of structures</u>: The primary threat to bats would be from collisions with offshore WTGs. Up to 2,547 structures (WTGs and OSS) could be constructed in the geographic analysis area (see Table E-3 in Appendix E), which could impact migration patterns or pose a collision risk to individual bats. Although adverse impacts to bats resulting from fatal interactions with operating WTGs cannot be quantified, some level of mortality during operation of offshore wind facilities is assumed. Any new operating wind facility would require a thorough regulatory and environmental review to appropriately site the facility to avoid, minimize, and mitigate adverse impacts on bat species. In addition, the likelihood of an individual bat encountering the rotor swept zone (RSZ) of one or more operating WTG would be negligible. Outside of migration, bats are infrequently present offshore. Because of the proposed 1-nm (1.9-km) spacing between structures associated with future offshore wind development and the distribution of anticipated projects, individual bats migrating over the RSZ of project WTGs would also pass through projects with only slight course corrections, if any, to avoid operating WTGs. As a result, adverse impacts to bats would be short to long term and minor.

Conclusions

Under the No Action alternative, bats would continue to follow current regional trends and respond to current and future environmental and societal activities.

Although the Project would not be built as proposed under the No Action alternative, ongoing activities, future non-offshore wind development, and future offshore wind development would continue to have temporary to permanent impacts (disturbance, displacement, injury, mortality, and habitat conversion) on bats primarily through the onshore construction impacts, the presence of structures, and climate change.

BOEM anticipates that the potential impacts of ongoing activities would be **negligible**. In addition to ongoing activities, the impacts of planned actions other than offshore wind development may also contribute to impacts on bats, including increasing onshore construction (Appendix E Attachment 2), but that these impacts would be negligible. BOEM expects the combination of ongoing and planned actions other than offshore wind development to result in **negligible** impacts on bats.

Considering all the IPFs together, the overall impacts associated with future offshore wind activities in the geographic analysis area would result in **negligible** adverse impacts because of ongoing climate change, interactions with operating WTGs on the OCS, and onshore habitat loss. Future offshore wind activities are not expected to materially contribute to the IPFs discussed above. Given the infrequent and limited anticipated use of the OCS by migrating tree bats during spring and fall migration, and given that cave bats do not typically occur on the OCS, none of the IPFs associated with future offshore wind activities that occur offshore would be expected to appreciably contribute to overall impacts on bats. Some potential for temporary disturbance and permanent loss of onshore habitat may occur as a result of future offshore wind development. However, habitat removal would be minimal when compared with other past, present, and reasonably foreseeable activities, and any impacts resulting from habitat loss or disturbance would not result in individual fitness or population-level effects within the geographic analysis area.

3.4.1.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Bats are expected to seasonally occur in the SFWF and offshore SFEC while migrating, commuting, or foraging. Although these structures or vessels might attract bats (Stantec 2016), these objects would not pose a collision risk because of a bat's ability to echolocate and detect stationary structures (Stantec 2018a). Therefore, adverse impacts to bats from offshore construction would be negligible. Bats would also not be impacted by seafloor disturbances during construction because they do not interact with the subsurface environment and their occurrence over open water is infrequent. Traffic and noise during construction could result in displacement or avoidance behavior; however, this adverse increase would be short term (see Section 3.5.5.2.3, Proposed Action Alternative). Additionally, bats are only anticipated to occur occasionally in the airspace of the SFWF during migration, so adverse impacts to bats would be negligible.

The onshore SFEC would be installed within existing ROWs (primarily existing roads and railroad ROWs), and negligible adverse impacts to bats are expected because this area has been previously developed and has limited habitat for bats. Installation of the interconnection facility would remove approximately 2.4 acres of deciduous forest. Although the facility would eliminate suitable foraging and roosting habitat, the affected area represents only 0.02% of available deciduous forest habitat within 3 miles of the facility. Removal of upland wildlife habitat and the in-water work at the Montauk O&M facility site would not result in impacts because the commercially zoned area has a mixture of structures, outbuildings, and paved surfaces with no suitable roosting habitat and limited foraging habitat. Although there would be noise and traffic associated with construction of the onshore SFEC and interconnection facility, these activities would predominately occur in already developed areas with existing sources of noise and human activity, however, only negligible, temporary adverse impacts to bats are expected.

Special-Status Species

As noted above, installation of the interconnection facility would convert approximately 2.4 acres of undeveloped deciduous forest to utility use. Although the facility would eliminate suitable foraging and roosting habitat, the affected area only represents 0.02% of available deciduous forest habitat within 3 miles of the facility, which is the typical home range of the northern long-eared bat (USFWS 2014). Per the Project BA prepared for the USFWS (BOEM 2021a), construction activities would comply with 4(d) rule requirements for avoiding adverse effects on northern long-eared bat, meaning that tree removal, vegetation clearing, and other major noise-producing activities near potential bat habitat would take place during winter months when northern long-eared bats are not present, which would effectively avoid impacts to bats because there are no hibernacula present. Because northern long-eared bat summer habitat is not limited and summer habitat loss is not a range-wide threat to the species (USFWS 2014), construction of the interconnection facility would result in negligible, temporary adverse impacts to northern long-eared bats. Northern long-eared bats would not be impacted by the in-water work or by the removal of upland wildlife habitat during construction of the Montauk O&M facility, as described above.

The USFWS's correspondence on the BA, dated March 4, 2021, provides concurrence on BOEM's determination that the Project may affect, but is not likely to adversely affect, the northern long-eared bat.

Operations and Maintenance and Conceptual Decommissioning

During Project O&M, individual bats could collide with WTGs, resulting in mortality or injury. It is difficult to estimate the actual number of bats that could collide with turbines, and currently there is no way to confirm bat fatalities at offshore WTGs; however, offshore bat occurrences are infrequent and primarily seasonal (during migration), and activity declines as the distance from shore increases. Specific weather conditions may contribute to bat mortality from turbines. Mortality data from onshore wind farms indicate that bat collision mortality is expected to occur mainly on nights with calm winds during migratory periods, when relatively more bats are migrating at greater altitudes in favorable conditions (Arnett et al. 2008). Likewise, coastal and offshore acoustic studies (Stantec 2016) found that greater wind speeds and cool temperatures have an adverse effect on bat activity. However, during fall migration, bats may take advantage of favorable wind directions and may be more likely to fly during colder weather (Stantec 2016). Most offshore bat activity took place at wind speeds less than 5 meters per second. Because average wind speeds in the SFWF are between 5 and 10 meters per second, with stronger wind in the winter, bat activity can be expected to be low during WTG operation and limited to warmer periods in the summer or during fall migration, and thus, the risk of injury and/or mortality to bats would also be minor.

The lack of bat carcasses reported during large-scale, bird-related fatality events at illuminated lighthouses, lightships, and oil or research platforms indicates that bats do not appear to be as susceptible to these collision risks as some birds (Stantec 2018a). Further, aviation lighting has not been found to influence bat collision risk at onshore facilities in North America (Arnett et al. 2008). However, the WTGs may provide roosting opportunities for bats. Overall, collision-related mortality or injury could result in negligible to minor adverse impacts to bats at the SFWF, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the airspace of the SFWF.

Boat activity and noise already occur within and adjacent to the SFWF area based on existing levels of vessel traffic as described in Section 3.5.6 (Navigation and Vessel Traffic). Increases in activity and associated disturbances during SFWF maintenance activities would have a negligible impact on bats because of the limited additional vessel activity and low likelihood of bat occurrence near the SFWF. There would also be no impacts to bats during O&M of the offshore SFEC because these components are underwater, and there would be no routine maintenance at these components.

Insect prey could be drawn in by lighting at the onshore interconnection facility and thus attract foraging bats. However, the surrounding area is currently developed, and lighting-related effects would be abated using minimum intensity, motion-activation, and shielding and downward angling of light sources where practicable. Therefore, impacts would be long term but negligible.

Conceptual decommissioning of the Project would have similar impacts as construction.

Special-Status Species

Impacts from O&M of the SFWF to the listed northern long-eared bat are not expected because of their low collision risk and the rarity of their occurrence offshore (Stantec 2018b). Based on Project timing, the limited area of effect relative to available habitat, and proposed impact avoidance and minimization measures, adverse impacts of the Proposed Action on northern long-eared bat would be negligible. The USFWS's correspondence on the BA dated March 4, 2021, provides concurrence on BOEM's determination that the Project may affect, but is not likely to adversely affect, the northern long-eared bat.

Cumulative Impacts

Onshore construction and installation would incrementally add to other limited onshore bat habitat disturbance actions through the removal of 2.4 acres of deciduous forest for the interconnection facility and a small area (0.1 acre) of upland wildlife habitat at the selected O&M facility. This land disturbance could result in the loss of potentially suitable roosting and/or foraging habitat for bats. Additionally, SFW and other future land developers would adhere to USFWS northern long-eared bat conservation measures. As a result, cumulative impacts would not result in population-level effects given the limited amount of habitat removal and the presence of high-quality habitat in the vicinity. Therefore, the cumulative impact of the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in short-term and negligible to minor adverse impacts to bats.

Offshore cumulative impacts would primarily consist of the following offshore wind IPFs.

<u>Noise</u>: Pile driving and other construction noise and activity associated with the Proposed Action would incrementally add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. However, the Proposed Action's incremental contribution would be limited in duration, would be negligible, and would cease when construction ends. Therefore, the cumulative impact of the Proposed Action when combined with other past, present, and reasonably foreseeable projects would result in short to long-term negligible to minor adverse impacts to bats.

<u>Presence of structures</u>: The Proposed Action would incrementally add up to 15 additional WTGs and one OSS to the No Action alternative. Therefore, the total cumulative structures would be 2,563. Impacts to migration patterns or collision risk from these additional turbines would persist until conceptual decommissioning is complete. However, the Project's incremental impacts on bats would be negligible because 1) the use of the OCS by migrating bats would be limited, and 2) the Project would account for less than 1% of the total future structures on the OCS. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in long-term and negligible to minor cumulative adverse impacts to bats.

Conclusions

Project construction and installation and conceptual decommissioning would introduce noise, lighting, human activity, and new structures and vessels (increasing potential collision risk) to the geographic analysis area and would alter existing bat habitat. Noise, lighting, and human activity impacts from Project O&M would occur, although at lower levels than those produced during construction and installation and conceptual decommissioning. Offshore structures would also represent a long-term collision risk. BOEM anticipates the impacts resulting from the Proposed Action alone would range from temporary to long term and **negligible** to **minor**. Therefore, BOEM expects the overall impact on bats from the Proposed Action alone to be **minor** because the effect would be small and the resource would be expected to recover completely without remedial or mitigating action.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor**. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** impacts to bats. BOEM made this call as the effect would be small and the resource would be expected to recover completely.

3.4.1.2.4 VESSEL TRANSIT LANE ALTERNATIVE

The Transit alternative would not affect Project onshore activities; therefore, effects to bats would be the same as the Proposed Action: negligible, temporary, and adverse.

Offshore, the Project under the Transit alternative would lead to the same types of impacts on bat from construction and installation, O&M, and conceptual decommissioning activities as described for the Proposed Action. However, this alternative could decrease the risk of migrating bats encountering an operating WTG because SFW would reduce the number of turbines (although the decrease in risk might not be measurable). Therefore, this alternative would result in negligible to minor, short- and long-term adverse impacts on bats from Project construction and installation, O&M, and conceptual decommissioning.

Cumulative Impacts

The Transit alternative would not affect Project onshore activities; therefore, cumulative effects to bats would be the same as those described under the Proposed Action: negligible to minor, temporary, and adverse.

Offshore, the Transit alternative would incrementally add sources of noise, human activity, and collision risk at quantities and durations similar to the Proposed Action. Therefore, the overall offshore cumulative impacts of the Transit alternative on bats when combined with past, present, and reasonably foreseeable activities would be negligible to minor.

If the Transit alternative is implemented, the WTGs for other reasonably foreseeable offshore wind projects may need to be relocated or eliminated within lease areas to avoid the transit lanes. If these shifts result in WTG reductions that further decrease risks of collision, these effects could decrease cumulative bat impacts relative to the Proposed Action. Conversely, if WTG shifts result in increased human activity, noise, and habitat disturbance or species displacement due to increased vessel trips, cable length, and installation times, these effects could increase cumulative bat impacts relative to the Proposed Action.

Conclusions

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in potential collision risk, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from temporary to long term and **negligible** to **minor**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative’s incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor**). The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor**.

3.4.1.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

The Habitat alternative under either layout option would not alter Project onshore activities; therefore, effects to bats would be the same as the Proposed Action: negligible, temporary, and adverse.

Offshore, the Project under the Habitat alternative for either layout option would lead to the same types of impacts on bats from construction and installation, O&M, and conceptual decommissioning as described for the Proposed Action. However, this alternative could decrease the risk of migrating bats encountering an operating WTG because SFW would reduce the number of turbines (although the decrease in risk might not be measurable). Therefore, this alternative would result in negligible to minor, short- and long-term adverse impacts on bats from Project construction and installation, O&M, and conceptual decommissioning.

Cumulative Impacts

The Habitat alternative under either layout option would not affect Project onshore activities; therefore, cumulative effects to bats would be the same as those described under the Proposed Action: negligible to minor.

Offshore, the Habitat alternative under either layout option would incrementally add sources of noise, human activity, and collision risk at quantities and durations similar to the Proposed Action. Therefore, the overall offshore cumulative impacts on bats when combined with past, present, and reasonably foreseeable activities would be negligible to minor.

Conclusions

Although the Habitat alternative under either layout option would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in potential collision risk, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from temporary to long term and **negligible** to **minor**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor**). The overall impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor**.

3.4.1.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, BOEM expects that bat impacts would range from temporary to long term and **negligible** to **minor** for all action alternatives due to noise, lighting, human activity, and new structures and vessels (increasing potential collision risk) in the geographic analysis area, as well as altered existing bat habitat.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from **negligible** to **minor**. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **minor**. BOEM made this call as the effect would be small and the resource would be expected to recover completely.

3.4.1.4 Mitigation

If implemented, tree-clearing time-of-year restrictions would minimize the expected negligible onshore impacts on bats, if present, by limiting impacts on the time of year when both adults and young of the year are able to leave the area when tree clearing occurs. Should presence/probable absence surveys be conducted pursuant to current USFWS protocols and no northern long-eared bats are documented, this measure may not be necessary for ESA compliance relative to the species. Establishment of a post-construction monitoring program for bats would not reduce impacts, but the data gathered would be used to evaluate impacts and potentially lead to additional mitigation measures, if required (30 CFR 585.633(b)).

3.4.2 Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish (see section in main EIS)

3.4.3 Birds

3.4.3.1 Affected Environment

3.4.3.1.1 OFFSHORE

Despite the level of human development and activity present, the mid-Atlantic Coast plays an important role in the ecology of many bird species. The Atlantic Flyway is a major route for migratory birds, which are protected under the Migratory Bird Treaty Act of 1918 (MBTA). Chapter 4.2.9.3 of the Atlantic OCS EIS/EA (BOEM 2014) discusses the use of Atlantic Coast habitats by migratory birds. The official list of migratory birds protected under the MBTA, and the international treaties that the MBTA implements, is found at 50 CFR 10.13. The MBTA makes it illegal to “take” migratory birds, their eggs, feathers, or nests. Under Section 3 of Executive Order 13186, BOEM and USFWS established a memorandum of understanding (MOU) on June 4, 2009, which identifies specific areas in which cooperation between the agencies would substantially contribute to the conservation and management of migratory birds and their habitats (MMS and USFWS 2009). The purpose of the MOU is to strengthen migratory bird conservation through enhanced collaboration between the agencies. One of the underlying tenets identified in the MOU is to evaluate potential impacts to migratory birds and design or implement measures to avoid, minimize, and mitigate such impacts as appropriate (MMS and USFWS 2009:Sections C, D, E(1), F(1-3, 5), G(6)).

BOEM funds scientific studies and partners with USFWS to better understand how migratory birds use the OCS and to refine the understanding of the risks from development to migratory species (BOEM 2020). BOEM uses information from these studies, USFWS, and the scientific literature to avoid leasing areas with high concentrations of migratory birds that are most vulnerable to offshore wind development. In addition, BOEM’s stakeholder engagement during the delineation of the MA-WEA resulted in the exclusion of 14 OCS blocks that overlapped with high value sea duck habitat (BOEM 2013).

BOEM worked with USFWS to develop standard operating conditions for commercial leases and as terms and conditions of plan approval and are intended to ensure that the potential for adverse impacts on birds is minimized. The standard operating conditions have been analyzed in recent EAs and consultations for lease issuance and site assessment activities, and BOEM’s recent approval of the Virginia Offshore Wind Technology Advancement Project (BOEM 2016a). Some of the standard operating conditions originated from best management practices in the ROD for the 2007 *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf* (MMS 2007:Section 2.7). BOEM and USFWS work with the lessees to develop post-construction plans aimed at monitoring the effectiveness of measures considered necessary to minimize impacts to migratory birds with the flexibility to consider the need for modifications or additions to the measures.

The SFWF would be located in deep water (approximately 108 to 125 feet deep where fish, crustaceans, and other zooplankton are available at different depths). Bird groups expected to use deeper offshore waters within the geographic analysis area at least seasonally include loons (*Gavia* spp.), shearwaters and fulmars (Procellariidae spp.), storm-petrels (Hydrobatidae spp.), gannets (*Morus* spp.), sea ducks (Merginae spp.), jaegers (Stercorariidae spp.), gulls and terns (Laridae spp.), alcids (Alcidae spp.), and to a lesser extent, migrating shorebirds and land birds (see Table 4.3-35 in the COP). Shorebirds (except for phalaropes [*Phalaropus* spp.]) are not expected to occur offshore unless flying during migration (Stantec 2018). Many marked (e.g., tagged or banded) sea ducks have been observed up to 70 miles offshore with aggregations of birds up to 20 miles offshore. However, the SFWF would be located in areas with relatively few sea ducks that is between two Sea Duck Joint Venture key sites at Nantucket, Massachusetts, and the south shore of Long Island, New York (see Appendix A, Avian Distribution Maps, and Figures E–I in Stantec 2018). Regardless, almost 86,000 sea ducks such as the long-tailed duck (*Clangula hyemalis*) (27,000), common eider (*Somateria mollissima*) (12,500), black scoter (*Melanitta americana*) (19,400), white-winged scoter (*Melanitta deglandi*) (3,300), and surf scoter (*Melanitta perspicillata*) (23,500) are harvested each year on the Atlantic Flyaway (Roberts 2019). Sea duck mortality from hunting is expected to continue at the current rate commensurate with the current trend in hunting effort.

The offshore SFEC is primarily a pelagic environment, and bird species composition, distribution, seasonality, and resource base are expected to be similar to that described for the SFWF (see Table 4.3-35 in the COP). Species known to occur near state waters include terns, gulls, cormorants (Phalacrocoracidae spp.), and shorebirds during summer and sea ducks, bay ducks (Aythyinae spp.), fish ducks (Anatidae spp.), dabblers (*Anas* spp.), loons, grebes (Podicipedidae spp.), and alcids during migration and winter. Other more pelagic species that could occur include Cory's shearwater (*Calonectris borealis*), northern gannet (*Morus bassanus*), and black-legged kittiwake (*Rissa tridactyla*) (see Table 4.3-35 in the COP).

Within the Atlantic Flyway along the North American Atlantic Coast, much of the bird activity is concentrated along the coastline (Watts 2010). Waterbirds use a corridor between the coast and several kilometers out onto the OCS, whereas land birds tend to use a wider corridor extending from the coastline to tens of kilometers inland (Watts 2010). Although both groups may occur over land or water within the flyway and may extend considerable distances from shore, the highest diversity and density are centered on the shoreline. Robinson Wilmott and Forcey (2014) evaluated the sensitivity of bird populations to collision and/or displacement due to future wind development on the Atlantic OCS. In many cases, high collision sensitivity was driven by high occurrence on the OCS, low avoidance rates with high uncertainty, and time spent in the RSZ. Many of the bird populations addressed in Robinson Willmott and Forcey (2014) had low collision sensitivity and included passerines that spend very little time on the Atlantic OCS during migration and typically fly above the RSZ.

Bird populations in the analysis area that are more susceptible to collision with WTGs include gulls, terns, jaegers, phalaropes, cormorants, northern gannet, and scoters (*Melanitta* spp.). These populations are more susceptible because of their high occurrence in the OCS, their at-risk population status, and/or their relatively high proportion of flights in the RSZ (Stantec 2018). These species are most abundant within 1 to 2 miles of the shoreline (Northeast Regional Ocean Council 2019), as depicted in Figure C-4 in Appendix C. Populations with the lowest vulnerability to collision risk include passerines that would only cross the OCS during migration and would typically fly above the RSZ (i.e., approximately 840 feet). Many of the populations with low collision sensitivities also have large global populations, making them less sensitive to mortality impacts (Stantec 2018).

Bird populations considered most sensitive to displacement impacts include sea ducks, loons, and some alcids due to restrictions in their prey sources and high macro avoidance rates (Stantec 2018). However, these populations are most abundant within 2 miles of the shoreline (Northeast Regional Ocean Council 2019), as depicted in Figure C-5 in Appendix C, and are well outside of the Lease Area.

3.4.3.1.2 ONSHORE

The landcover types near the onshore SFEC routes and landing sites represent habitat for a variety of birds, including species commonly associated with marine shorelines, tidal and freshwater wetlands, surface waters, forests, successional habitats, agricultural fields, and developed areas. Breeding shorebirds on Long Island include American oystercatcher (*Haematopus palliatus*), piping plover (*Charadrius melodus*), and killdeer (*Charadrius vociferous*). Several species overwinter on Long Island (e.g., black-bellied plover [*Pluvialis squatarola*], sanderling [*Calidris alba*], dunlin [*C. alpina*], purple sandpiper [*C. maritima*], ruddy turnstone [*Arenaria interpres*]), and others migrate through. Species expected to occur on Long Island during migration include semipalmated plover (*Charadrius semipalmatus*), semipalmated sandpiper (*Calidris pusilla*), and short-billed dowitcher (*Limnodromus griseus*) (Stantec 2018).

Resident land bird species include corvids (Corvidae spp.), chickadees (Paridae spp.), and tufted titmouse (*Baeolophus bicolor*) (Stantec 2018). A variety of passerines and other birds migrate along the Atlantic Coast and could fly over the onshore SFEC routes and landing sites. Bird species that could breed in the area include marsh and wading birds using nearby coastal wetlands and common swallows (Hirundinidae spp.), thrushes (Turdidae spp.), warblers (Parulidae spp.), sparrows (Passerellidae spp.), and blackbirds (Icteridae spp.) using residential, backyard, and small field habitats proximal to the onshore SFEC cable routes. Winter-resident species are fewer and could include snow bunting (*Plectrophenax nivalis*) and snowy owl (*Bubo scandiacus*). Surveys for the Project detected 87 bird species (VHB 2018:Appendix D [Table A]). The Montauk O&M facility contains a small portion of upland habitat and a sandy shoal immediately northwest of the in-water work area. These areas could be opportunistically used by shorebirds, raptors, or wintering birds; however, birds would not persist here for nesting or foraging in any significant capacity because of the overall lack of habitat and a high level of human disturbance.

3.4.3.1.3 SPECIAL-STATUS SPECIES

The USFWS IPaC official species list for the Project, dated September 17, 2020, contains the following three bird species: piping plover (federally threatened and state endangered), rufa red knot (*Calidris canutus rufa*) (federally threatened), and roseate tern (*Sterna dougallii*) (federally and state endangered) (VHB 2018). BOEM has prepared a BA to address Project effects to federally listed species under the jurisdiction of the USFWS, pursuant to Section 7 of the ESA (BOEM 2021a). The BA also provides detailed accounts for each of these species.

New York Natural Heritage Program (NYNHP) records include 21 New York State–listed and protected species for the analysis area (VHB 2018:Appendix F). State-listed bird species documented or potentially present in the SFWF and portions of the offshore and onshore SFEC include the state-threated northern harrier (*Circus hudsonius*), bald eagle (*Haliaeetus leucocephalus*), least tern (*Sternula antillarum*), and common tern (*Sterna hirundo*) (Stantec 2018:Table 5). Bald eagles are federally protected by the Bald and Golden Eagle Protection Act, 16 USC 668 et seq. No bald eagle nests have been recorded near onshore Project components, and suitable bald eagle habitat on Long Island is limited (Stantec 2018).

3.4.3.2 Environmental Consequences

3.4.3.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.4.3-1 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for this final EIS.

Table 3.4.3-1. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Birds

Issue	Impact Indicator	Significance Criteria
Collision/injury/ electrocution	Qualitative estimate of species vulnerability to collision/electrocution	Negligible: There would be no measurable impacts Minor: Most impacts could be avoided with EPMs; if impacts occur, the loss of one or a few individuals or temporary alternation of habitat could represent a minor impact, depending on the time of year and number of individuals involved. Moderate: Impacts are unavoidable but would not result in population-level effects or threaten overall habitat function. Major: Impacts would result in severe, long-term habitat or population-level effects to species.
Displacement/ barrier effects	Changes to noise levels Projected traffic patterns/volume changes	
Habitat loss/ modification	Acres of habitat removal or modification	

3.4.3.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing bird species and habitat trends from past and present activities. The Vineyard Wind final EIS provides a detailed discussion of existing bird resources and species and habitat trends along the east coast and is incorporated here by reference (BOEM 2021b). Attachment 2 in Appendix E provides additional information regarding past and present activities and associated bird impacts. Future non-Project actions include offshore and onshore wind development activities, tidal energy projects, dredging and port improvement projects, onshore development projects, and communications tower replacement (see Appendix E) and future marine transportation and fisheries use and management. Attachment 2 in Appendix E discloses future non-offshore wind activities and associated bird impacts. Impacts associated with future onshore and future offshore wind activities are described below.

Future Activities (without the Proposed Action)

Onshore construction noise from other human activities could result in localized, minor, and temporary impacts to birds, including avoidance and displacement, though no population-level effects would occur. Onshore land development or port expansion activities could also result in limited loss of nesting and/or foraging habitat for some bird species. However, such minor impacts would be limited in extent, as described in Section 3.5.5.2 (Environmental Consequences), and would not measurably impact bird population abundance or viability.

Impacts associated with future offshore wind activities are described below.

Accidental releases and discharges: Offshore, future wind and non-wind activities could result in accidental releases of contaminants or trash into the water (see Section 3.3.2.2.2, No Action Alternative, for quantities and details). Blockages caused by both hard and soft plastic debris could result in mortality or adverse health effects such as decreased hematological function, dehydration, drowning, hypothermia, starvation, and weight loss (Briggs et al. 1997; Haney et al. 2017; Paruk et al. 2016).Vessel compliance with USCG regulations would minimize trash or other debris; therefore, BOEM expects accidental trash releases from offshore wind vessels to be rare. Small exposures that result in the oiling of feathers can lead to adverse effects that include changes in flight efficiencies and result in increased energy expenditure during daily and seasonal activities (Maggini et al. 2017). Based on estimated volumes of oils, lubricants, and diesel fuel needed for other offshore wind projects (see Section 3.3.2.2.2, No Action Alternative) and the low risk of spills due to implementation of safe handling, storage, and cleanup procedures, impacts from accidental spills and trash would represent a negligible impact to birds.

Noise: Table E-3 in Appendix E indicates that multiple offshore wind project construction periods are anticipated between 2022 to 2030. Construction noise from these projects—most notably pile driving, but also noise from geological and geophysical surveys, offshore construction, and vessel traffic—would create noise and may temporarily impact some bird species by displacing them and changing their behavior. Potential impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods.

Aircraft flying at low altitudes may cause birds to flush, resulting in increased energy expenditure. Disturbance to birds, if any, would be temporary and localized, with impacts dissipating once the aircraft has left the area. No individual or population-level effects to birds would be expected.

Noise transmitted through water could temporarily displace diving birds in a limited space around each pile and could cause short-term stress and behavioral changes ranging from mild annoyance to escape behavior (BOEM 2014, 2016b). Vessel noise could also disturb some individual diving birds, but they would acclimate to the noise or move away, potentially resulting in temporary displacement. Collectively, these noise sources would be temporary and localized, resulting in a minor impact to these birds.

Light: Nighttime lighting associated with offshore structures and vessels could also represent a source of bird attraction. Under the No Action alternative, up to 2,547 WTGs and OSS would have hazard and aviation lighting that would be incrementally added beginning in 2021 and continuing through 2030. Construction vessels are also a source of artificial lighting. Vessel lighting would result in temporary and minor impacts to birds; structure lighting may pose an increased collision or predation risk (Hűppop et al. 2006), though this risk would be localized in extent and minimized through the use of BOEM lighting guidelines (BOEM 2019; Kerlinger et al. 2010).

New cable emplacement/maintenance: Up to 10,131 acres of localized, temporary seabed disturbance and associated increased suspended sedimentation could occur during construction of proposed wind farm cables (see Table E-4 in Appendix E). Disturbed seafloor from construction of future offshore wind projects may affect diving birds’ foraging success or may affect some prey species (e.g., benthic assemblages); however, impacts would be temporary and localized, birds would be able to successfully forage in adjacent areas and would not be affected by increased suspended sediments. Suspended sediment concentrations during activities other than dredging would be within the range of natural variability for this location. Therefore, impacts would be minor, and no population-level effects on birds would occur. See Section 3.4.2 (Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish) for detailed information on potential effects to benthic habitat.

Presence of structures: The presence of structures can lead to impacts, both beneficial and adverse, on birds through fish aggregation and the associated increase in foraging opportunities as well as entanglement and gear loss/damage, migration disturbances, and WTG strikes and displacement. These impacts may arise from buoys, met towers, foundations, scour/cable protections, and transmission cable infrastructure.

The primary threat to birds from the presence of structures would be from collision with WTGs. As discussed above, the Atlantic Flyway is an important migratory pathway for up to 164 species of waterbirds, and a similar number of land birds, with the greatest volume of birds using the Atlantic Flyway during annual migrations between wintering and breeding grounds (Watts 2010). As discussed in BOEM (2012), 55 bird species could encounter operating WTGs on the Atlantic OCS. However, the abundance of bird species that overlap with the anticipated development of wind energy facilities on the Atlantic OCS is relatively small (see Figures C-4 and C-5 in Appendix C). Of these 55 bird species, a 47 have sufficient survey data to calculate the modeled percentage of a species population that would overlap with the anticipated offshore wind development on the OCS (Winship et al. 2018); the relative seasonal exposure is generally very low, ranging from 0.0% to 5.2% (Table 3.4.3-2). BOEM assumes that the 47 species (85%) with sufficient data to model the relative distribution and abundance are representative of the 55 species that may overlap offshore wind development on the Atlantic OCS.

Table 3.4.3-2. Percentage of Each Atlantic Seabird Population That Overlaps with Anticipated Offshore Wind Energy Development on the Outer Continental Shelf by Season

Species	Spring	Summer	Fall	Winter
Artic tern (*Sterna paradisaea*)	N/A	0.2%	N/A	N/A
Atlantic puffin (*Fratercula arctica*)	0.2%	0.1%	0.1%	0.2%
Audubon shearwater (*Puffinus lherminieri)*	0.0%	0.0%	0.0%	0.0%
Black-capped petrel (*Pterodroma hasitata)*	0.0%	0.0%	0.0%	0.0%
Black guillemot (*Cepphus grille)*	N/A	0.3%	N/A	N/A
Black-legged kittiwake (*Rissa tridactyla*)	0.7%	N/A	0.7%	0.5%
Black scoter (*Melanitta americana)*	0.2%	N/A	0.4%	0.5%
Bonaparte's gull (*Chroicocephalus philadelphia*)	0.5%	N/A	0.4%	0.3%
Brown pelican (*Pelecanus occidentalis*)	0.1%	0.0%	0.0%	0.0%
Band-rumped storm-petrel (*Oceanodroma castro*)	N/A	0.0%	N/A	N/A
Bridled tern (*Onychoprion anaethetus*)	N/A	0.1%	0.1%	N/A
Common eider (*Somateria mollissima*)	0.3%	0.1%	0.5%	0.6%
Common loon (*Gavia immer*)	3.9%	1.0%	1.3%	2.1%
Common murre (*Uria aalge*)	0.4%	N/A	N/A	1.9%
Common tern (*Sterna hirundo*)	2.1%	3.0%	0.5%	N/A
Cory's shearwater (*Calonectris borealis*)	0.1%	0.9%	0.3%	N/A
Double-crested cormorant (*Phalacrocorax auritus*)	0.7%	0.6%	0.5%	0.4%
Dovekie (*Alle alle*)	0.1%	0.1%	0.3%	0.2%
Great black-backed gull (*Larus marinus*)	1.3%	0.5%	0.7%	0.6%
Great shearwater (*Puffinus gravis*)	0.1%	0.3%	0.3%	0.1%
Great skua (*Stercorarius skua*)	N/A	N/A	0.1%	N/A
Herring gull (*Larus argentatus*)	1.0%	1.3%	0.9%	0.5%
Horned grebe (*Podiceps auritus*)	N/A	N/A	N/A	0.3%
Laughing gull (*Leucophaeus atricilla*)	1.0%	3.6%	0.9%	0.1%
Leach's storm-petrel (*Oceanodroma leucorhoa*)	0.1%	0.0%	0.0%	N/A
Least tern (*Sternula antillarum*)	N/A	0.3%	0.0%	N/A
Long-tailed duck (*Clangula hyemalis*)	0.6%	0.0%	0.4%	0.5%
Manx shearwater (*Puffinus puffinus*)	0.0%	0.5%	0.1%	N/A
Northern fulmar (*Fulmarus glacialis*)	0.1%	0.2%	0.1%	0.2%
Northern gannet (*Morus bassanus*)	1.5%	0.4%	1.4%	1.4%
Parasitic jaeger (*Stercorarius parasiticus*)	0.4%	0.5%	0.4%	N/A
Pomarine jaeger (*Stercorarius pomarinus*)	0.1%	0.3%	0.2%	N/A
Razorbill (*Alca torda*)	5.2%	0.2%	0.4%	2.1%
Ring-billed gull (*Larus delawarensis*)	0.5%	0.5%	0.9%	0.5%
Red-breasted merganser (*Mergus serrator*)	0.5%	N/A	N/A	0.7%
Red phalarope (*Phalaropus fulicarius*)	0.4%	0.4%	0.2%	N/A
Red-necked phalarope (*Phalaropus lobatus*)	0.3%	0.3%	0.2%	N/A

Species	Spring	Summer	Fall	Winter
Roseate tern (*Sterna dougallii*)	0.6%	0.0%	0.5%	N/A
Royal tern (*Thalasseus maximus*)	0.0%	0.2%	0.1%	N/A
Red-throated loon (*Gavia stellate*)	1.6%	N/A	0.5%	1.0%
Sooty shearwater (*Ardenna grisea*)	0.3%	0.4%	0.2%	N/A
Sooty tern (*Onychoprion fuscatus*)	0.0%	0.0%	N/A	N/A
South polar skua (*Stercorarius maccormicki*)	N/A	0.2%	0.1%	N/A
Surf scoter (*Melanitta perspicillata*)	1.2%	N/A	0.4%	0.5%
Thick-billed murre (*Uria lomvia*)	0.1%	N/A	N/A	0.1%
Wilson's storm-petrel (*Oceanites oceanicus*)	0.2%	0.9%	0.2%	N/A
White-winged scoter (*Melanitta deglandi*)	0.7%	N/A	0.2%	1.3%

Source: Calculated from Winship et al. (2018).
Notes: N/A = not applicable.

The primary operational impact to bird resources would be collision with the rotating turbine blades. In the contiguous United States, bird collisions with operating WTGs are a relatively rare event, with an estimated 140,000 to 328,000 (mean = 234,000) birds killed annually by 44,577 onshore turbines (Loss et al. 2013). Estimating bird (or bat) mortality at a terrestrial wind facility is a relatively simple and straightforward process that involves conducting ground searches for bodies and statistically adjusting the counts upward to account for the probability of not seeing the body and for the probability that the body was devoured by scavengers. Based on a mortality rate of 6.9 birds per turbine in the eastern United States (Loss et al. 2013), an estimated 15,575 birds could be killed annually under the No Action alternative. This represents a worst-case scenario and does not consider mitigating factors such as landscape and weather patterns, or bird species that are expected to occur, and the actual mortality rate would be expected to be much lower. First, 75% of the documented onshore mortality is composed of bird groups (small passerines, diurnal raptors, doves, pigeons, and upland game birds) that would not frequently encounter offshore WTGs in large numbers. Second, factors such as landscape features and weather patterns that influence collision risk are different on the OCS compared to onshore wind facilities. Third, empirical studies suggest that bird fatalities due to collision with offshore turbines is low. For instance, unlike the planned development on the U.S. Atlantic OCS, most of the offshore wind development in Europe is relatively close to shore, where bird densities tend to be greater in part because they are closer to some nesting colonies. In addition, the European wind energy facilities that are farther out are usually between large land masses (e.g., the North Sea), thus creating more opportunities for birds to move from the shore of one land mass to another. Given that the relative density of birds in the OCS is low, relatively few birds are likely to encounter wind turbines (see Figures C-4 and C-5 in Appendix C).

Additionally, with the proposed 1-nm (1.9-km) spacing between structures associated with future offshore wind development and the distribution of anticipated projects, only a small percentage of bird species migrating over the OCS would encounter WTGs, with most flying above or below spinning turbines; plus the spacing between turbines would also permit birds to fly through individual lease areas without changing course or only making minor course corrections to avoid operating WTGs. Any additional flight distances would be miniscule when compared with the overall migratory distances traveled by migratory birds. Therefore, impacts would be minor, and no population-level effects would be expected.

The addition of WTGs to the offshore environment could result in increased functional loss of habitat for those bird species with higher displacement sensitivity. However, substantial foraging habitat for resident birds would remain available (Section 3.4.2.2.2, No Action Alternative, estimates that less than 1% of total benthic habitat would be affected by seabed-disturbing activities). Therefore, impacts would be minor, and no population-level impacts would occur.

In the Northeast and mid-Atlantic waters, there are 2,570 seabird fatalities through interaction with commercial fishing gear each year; of those, 84% are with gillnets involving shearwaters/fulmars and loons (Hatch 2017). The addition of new WTGs could also increase risk of entanglement with fishing gear, which could lead to bird injury or mortality. Impacts from fishing gear would be localized; however, the risk of occurrence would remain as long as structures remain. WTGs and foundations could also increase pelagic productivity in local areas (English et al. 2017), and new structures may also create habitat for structure-oriented and/or hard-bottom species. This reef effect has been observed around WTGs, leading to local increases in biomass and diversity within the first year or two after construction (English et al. 2017; Causon and Gill 2018), indicating that offshore wind farms can generate beneficial long-term impacts on local ecosystems, translating to increased foraging opportunities for individuals of some marine bird species. Therefore, the presence of structures may also result in minor beneficial impacts for the duration of the Project (Dierschke et al. 2016). For details on the effects of WTGs on benthic habitat and recreational fishing, see Section 3.4.2 (Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish) and Section 3.5.1 (Commercial Fisheries and For-Hire Recreational Fishing).

Climate change: Impacts associated with climate change, including increased storm severity and frequency, ocean acidification, altered migration patterns, increased disease frequency, habitat conversion, and increased erosion and sediment deposition, could result in minor, long-term risks to birds and could lead to changes in prey abundance and distribution, changes in nesting and foraging habitat abundance and distribution, and changes to migration patterns and timing.

Conclusions

Under the No Action alternative, the resource would continue to follow the current general decreasing trends and respond to current and future environmental and societal activities.

Although the Project would not be built as proposed under the No Action alternative, ongoing activities and future offshore wind would continue to have temporary to permanent impacts (disturbance, displacement, injury, mortality, habitat degradation, habitat conversion) on birds primarily through accidental releases, anthropogenic noise, presence of structures, and climate change. Ongoing activities, especially interactions with commercial fisheries, anthropogenic light in the coastal environment, and climate change, would be minor. In addition to ongoing activities, the impacts of planned actions other than offshore wind development, including new submarine cables and pipelines, increasing onshore construction, marine minerals extraction, port expansions, and the installation of new structures on the OCS would be minor. The combination of ongoing activities and reasonably foreseeable activities other than offshore wind would result in **minor** impacts on birds in the geographic analysis area.

Considering all the IPFs together, the overall impacts associated with offshore wind activities in the geographic analysis area would result in **moderate** adverse impacts but could include **moderate beneficial** impacts because of presence of structures. Most of the offshore structures in the geographic analysis area would be attributable to the offshore wind development. Migratory birds that use the offshore wind development areas (WDAs) during all or parts of the year would either be exposed to new collision risk, or would have long-term functional habitat loss due to behavioral avoidance and displacement from WDAs on the OCS. The offshore wind development would also be responsible for most of the impacts related to new cable emplacement and pile-driving noise, but impacts on birds resulting from these IPFs would be localized and temporary and would not be biologically significant.

The No Action alternative would forgo post-construction avian monitoring for migratory birds and ESA-listed species and annual mortality reporting, the results of which could provide an understanding of the effects of offshore wind development, benefit the future management of these species, and inform planning of other offshore development; however, ongoing and future surveys and monitoring could still supply similar data.

3.4.3.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Offshore

Negligible to minor, temporary adverse impacts from bird collisions with visible structures could occur during construction, depending on the species and number of individuals involved. Birds are susceptible to collision with structures, particularly at night and/or during other periods of low visibility (e.g., rain or fog) (Stantec 2018). Brightly illuminated offshore structures such as research platforms also pose a risk to birds migrating at night when birds can become disoriented by sources of artificial light. Lighting used during construction would be limited to the minimum required for safety during construction to minimize potential impacts. Therefore, adverse impacts to birds from lighting would be negligible to minor.

Construction of the WTG foundations and the installation of the subsea cables could result in short-term habitat disturbance for foraging birds. However, adverse impacts would be negligible to minor given the localized nature of these impacts and the abundance of surrounding foraging habitat. Negligible to minor adverse impacts to birds from associated noise and vessel traffic are also expected during construction. These activities could flush birds in the path of vessels, causing temporary displacement from the area; alternatively, these activities could attract certain groups of birds. However, impacts would be temporary and similar to baseline conditions because vessel traffic already occurs in the analysis area (Stantec 2018). These impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. Potential adverse impacts to birds from contaminant discharges or releases or from improper disposal of trash or debris during construction would be avoided or minimized with adherence to federal, state, and local regulations regarding disposal of solid and liquid wastes (see Section 4.1.6 in the COP), resulting in negligible to minor, short-term adverse impacts.

Onshore

At the sea-to-shore transition, the use of HDD for SFEC installation would minimize potential construction impacts on the inter-tidal community near the selected landing site; no long-term changes in inter-tidal habitat structure or prey availability are expected. Any increase in turbidity and sedimentation would be temporary, localized, and minor, resulting in no lasting physical changes to coastal areas or beaches; see Section 3.3.2 (Water Quality) for additional discussion. No physical impacts to beach nesting areas are expected because installation for the SFEC would occur under the beach. However, noise and human activity from installation of the cofferdam, from HDD in the sea-to-shore transition, and at beach work areas could result in temporary, localized disturbance or displacement. Therefore, only negligible to minor adverse impacts to shorebirds are expected from onshore construction.

The onshore SFEC routes would be constructed within existing ROWs comprising predominantly developed land cover type (Homer et al. 2015) with limited bird use, thus minimizing possible disturbances to land birds. Approximately 2.4 acres of disturbed woodland habitat would be cleared for construction of the new interconnection facility, and a small amount of additional clearing could occur along the LIRR, resulting in negligible adverse impacts to bird habitats. During the breeding season, clearing of trees or vegetation could result in destruction of nests, adversely impacting some individuals; however, lasting impacts to local breeding populations are not anticipated.

Noise and traffic associated with construction of the onshore SFEC and the interconnection facility could also affect shorebirds, some seabirds, and land birds that use the terrestrial habitats in the immediate vicinity of construction activities. Noise- and traffic-related impacts would have temporary, minor adverse impacts on these birds because construction would occur in already developed areas where birds are habituated to these types of activities, and impacts associated with construction would be similar to existing sources of noise and traffic in the local area. At the Montauk O&M facility site, no construction activities are proposed in the small sandy shoal area immediately northwest of the dredge area, which provides only limited stopover habitat for shorebirds, raptors, or wintering birds and limited nesting substrate for shorebirds. Dredged materials used for beach renourishment would be placed outside of the shorebird breeding season. Therefore, no impacts to birds are expected from construction of the Montauk O&M facility.

Special-Status Species

Federally and state-listed bird species may be at risk of collision during construction, although risk of collision is considered low because these species are expected to infrequently occur over the SFWF (Stantec 2018). Although the loss of one or a few individuals to at-risk bird populations would represent an adverse impact, conservation measures identified during the ongoing ESA Section 7 consultation with the USFWS would minimize adverse impacts to federally listed bird species. Therefore, adverse effects from the Project would be minor.

Noise from installation of the cofferdam and from HDD in the sea-to-shore transition and activities at beach work areas could also result in temporary, localized disturbance or displacement of listed shorebirds. The plover and tern could nest, and all three species could forage or rest near the sea-to-shore transition and onshore SFEC routes. The potential for impacts to these species was considered during the Project siting process. As a result, to avoid nesting habitat and to minimize the potential for impacts, the HDD work area was set back at least 650 feet from the MHWL so that the entrance point would be in interior land areas and the exit point would be offshore beyond the intertidal zone. Additionally, construction activities are scheduled to occur outside of the tern and plover breeding periods (i.e., April 1 through August 31); red knots do not nest in the United States. Because construction work at the selected landing site would occur largely outside of the breeding period of listed species that might nest in the area, and because use of the shoreline by shorebirds at the landing sites would be minimal (Stantec 2018), adverse onshore impacts for listed species from noise and human activity would be negligible to minor. A detailed impacts analysis to federally listed birds from construction activities is in the BA (BOEM 2021a).

No federally listed land bird species are expected to nest near the interconnection facility location. Northern harriers could occur in the analysis area (eBird 2019) but are not expected to nest within the construction footprint based on land cover type; therefore, no adverse impacts are expected. Impacts to other special-status birds from construction would be similar to those described above.

The USFWS’s correspondence on the BA, dated March 4, 2021, provides concurrence on BOEM’s determination that the Project may affect, but is not likely to adversely affect, the roseate tern, piping plover, and rufa red knot.

Operations and Maintenance and Conceptual Decommissioning

Offshore

The primary impact expected for birds during O&M is collision with WTGs at the SFWF. However, the abundance of bird species with high collision sensitivity is low within the offshore portion of the Project during all seasons (see Figure C-4 in Appendix C), and that risk of collision would be reduced with implementation of EPMs listed in Table G-1 in Appendix G.

The presence and operation of the SFWF may result in displacement of waterbirds, waterfowl, seabirds, and phalaropes that use the area for foraging, resting, or nighttime roosting. And some species can be displaced several kilometers outside the Lease Area (Welcker and Nehls 2016). These long-term adverse impacts would be negligible to minor, depending on whether birds are at high risk for displacement or are able to access preferred habitat, and these impacts may change over time if birds become habituated to the presence of the WTGs. Generally, the relative abundance of bird species that are most sensitive to displacement is low within the offshore portion of the Project, including several kilometers outside the Lease Area during all seasons (see Figure C-5 in Appendix C).

The presence of WTGs may be a barrier to some migrating or commuting birds. As a result, these birds may avoid entering the wind farm and/or fly around the farm, potentially resulting in a greater expenditure of energy (Stantec 2018). The level of associated impacts resulting from barrier effects varies by species. Most bird species are expected to make minor changes to their flight trajectories when approaching WTGs, representing negligible increases in energy expenditure. Therefore, long-term, negligible adverse impacts associated with barrier effects are expected for many bird groups.

All other potential SFWF impacts (i.e., contaminant discharges or releases, traffic and noise, and trash and debris) are expected to generally be similar to offshore construction and result in negligible to minor adverse impacts with implementation of EPMs listed in Table G-1 in Appendix G.

No impacts to bird species are anticipated during the O&M phase for the offshore SFEC. The OSS could attract perching and pose an electrocution risk, which if realized would result in minor adverse impacts to birds from individual mortality or injury. Impacts to birds from conceptual decommissioning of the SFWF and offshore SFEC would be similar to those described for the construction phase.

Onshore

There would be no risk to bird species from electrocution because the onshore SFEC routes would be buried; however, the interconnection facility could pose an electrocution risk that might result in minor, long-term adverse impacts to bird species. No other impacts to bird species are anticipated during routine onshore operations. Conceptual decommissioning would have similar impacts as construction.

Special-Status Species

Federally and state-listed species are terrestrial or nearshore species that face low risk of collision during O&M. Although these species are not expected to frequent the SFWF, certain species (e.g., roseate tern) could cross the area during migration. The loss of individuals over the life of the SFWF, for a population already at risk, would represent an adverse impact; however, conservation measures identified during the ongoing ESA Section 7 consultation with the USFWS would be implemented to minimize adverse impacts to federally listed bird species. Additionally, the probability of these species' occurrence coupled with Project design and EPMs (see Table G-1 in Appendix G) would render effects as minor over the long term (BOEM 2021a). Impacts to special-status birds from O&M and conceptual decommissioning activities would be similar to those described above for other bird species.

The USFWS's correspondence on the BA, dated March 4, 2021, provides concurrence on BOEM's determination that the Project may affect, but is not likely to adversely affect, the roseate tern, piping plover, and rufa red knot.

Cumulative Impacts

Onshore construction activities would incrementally add to noise and land disturbance through the removal of 2.4 acres of deciduous forest for the interconnection facility and a small area (0.1 acre) of upland wildlife habitat at the selected O&M facility. These actions could result in localized and temporary impacts to birds, including avoidance and displacement, although no individual fitness or population-level effects would be expected. For this reason, the incremental onshore impacts of the Proposed Action would range from negligible to minor because only a small amount of habitat loss, if any, would be expected. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in short term and negligible adverse cumulative impacts to birds.

Offshore cumulative impacts would primarily consist of the following offshore wind IPFs.

Accidental releases and discharges: The Proposed Action could incrementally contribute to accidental releases of fuel, fluids, or hazardous material; sediment; and/or trash and debris. The risk would increase primarily during construction but also during O&M activities and conceptual decommissioning. The Proposed Action would contribute a low percentage to the overall spill risk from ongoing and future activities, as described in detail in Section 3.3.2.2 (Environmental Consequences). All vessels would comply with USCG requirements for the prevention and control of oil and fuel spills. Proper vessel regulations and operating procedures would minimize effects on offshore bird species resulting from the release of debris, fuel, hazardous material, or waste (BOEM 2012). Additionally, SFWF Project personnel would require training and awareness of best management practices proposed for waste management and mitigation of marine debris. These releases, if any, would occur infrequently at discrete locations and vary widely in space and time, and for this reason, BOEM expects localized and temporary negligible Project impacts on birds. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in short term and negligible cumulative impacts to birds.

Noise: It is possible that pile driving and other construction noise and activity associated with the Proposed Action would incrementally add to baseline noise and activity associated with other offshore wind projects with overlapping construction periods. Potential impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. However, the Proposed Action's incremental contribution would be limited in duration, negligible, and cease when construction ends. No individual fitness (i.e., a bird's ability to survive and reproduce) or population-level effects would be expected. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in negligible to minor cumulative impacts to birds.

Aircraft flights associated with Project O&M activities would be negligible in comparison to the No Action alternative, and aircraft strikes with birds are highly unlikely. Aircraft flights associated with other past, present, and reasonably foreseeable activities passing through the SFWF Lease Area would be expected to be minimal and infrequent. Therefore, cumulative impacts to birds from aircraft traffic associated with O&M of the Proposed Action and past, present, and reasonably foreseeable activities would be negligible.

Light: The Proposed Action would incrementally add up to 15 new WTGs with red flashing aviation hazard lighting to the offshore environment (no more than a 1% increase in in-water structures with permanent lighting over the No Action alternative); these lights could attract birds and result in increased collision risk (Hűppop et al. 2006). Additionally, marine navigation lighting would include multiple flashing yellow lights on each WTG and the OSS and would be directed out and down to the water surface. Vessel lights during construction and installation, O&M, and conceptual decommissioning would be minimal and limited to vessels transiting to and from construction areas. For these reasons, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in long term negligible to minor adverse cumulative impacts to birds, and no individual or population-level impacts would be expected.

New cable emplacement/maintenance: The Proposed Action would incrementally add 913 acres of seafloor disturbance from SFEC and inter-array cable installation to the No Action alternative, which equates to 9% of the total seafloor disturbance estimated under the No Action alternative as estimated by BOEM. This would result in localized turbidity effects that could reduce marine bird foraging success or impact marine bird prey species. However, individual birds would be expected to successfully forage in nearby areas not affected by increased sedimentation, and only non-measurable negligible impacts, if any, on individuals or populations would be expected given the localized and temporary nature of the potential impacts. Therefore, incremental Project impacts would be negligible and would not be biologically significant. For these reasons, the Proposed Action in conjunction with other past, present, and reasonably foreseeable projects would result in short-term negligible to minor cumulative impacts to birds.

Presence of structures: The Proposed Action would incrementally add up to 15 additional WTGs and one OSS to the No Action alternative. The total cumulative foundations on the OCS would be 2,563, and the Project would account for less than 1% of that total number. Adverse impacts to migration patterns or collision risk from these additional turbines would be negligible and persist until conceptual decommissioning is complete. Additionally, beneficial impacts to foraging near offshore structures would similarly be negligible and persist for the life of the Project. Therefore, cumulative impacts on birds from the presence of structures associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be long term minor adverse and long term minor beneficial.

Climate change: The types of impacts from global climate change described for the No Action alternative would occur under the Proposed Action. However, the Proposed Action could also contribute to a long-term net decrease in GHG emissions. This difference may not be measurable but would help reduce climate change impacts (although effects would still be minor).

Conclusions

Project construction and installation and conceptual decommissioning would introduce noise, lighting, human activity, debris and contaminants, and new structures and vessels (increasing potential collision risk) to the geographic analysis area, as well as alter existing bird habitat. Noise, lighting, and human activity impacts from Project O&M would occur, although at lower levels than those produced during construction and conceptual decommissioning. Offshore structures would also represent a long-term collision risk. BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible to minor**. Therefore, BOEM expects the overall impact on birds from the Proposed Action alone to be **minor** because the effect would be small and the resource would be expected to recover completely without remedial or mitigating action.

In the context with other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **temporary** to **long-term** and **negligible** to **minor** adverse, as well as **long-term** and **minor** beneficial. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** impacts to birds. BOEM made this call as the effect would be small and the resource would be expected to recover completely.

3.4.3.2.4 VESSEL TRANSIT LANE ALTERNATIVE

The Transit alternative would not affect Project onshore activities; therefore, effects would be similar to the Proposed Action: negligible to minor and temporary to long term.

No additional loss of suitable habitat for bird species with high displacement sensitivity would occur under this alternative.

Offshore, the Project under the Transit alternative would lead to the same types of impacts on birds due to construction and installation, O&M, and conceptual decommissioning activities as described for the Proposed Action. However, this alternative could decrease the risk of birds encountering an operating WTG because there would be fewer turbines (although the difference in risk might not be measurable). Therefore, this alternative could result in negligible to minor, temporary and long-term adverse impacts on birds during Project construction and installation, O&M, and conceptual decommissioning.

Cumulative Impacts

The Transit alternative would not affect Project onshore activities; therefore, cumulative effects would be the same as the Proposed Action: temporary to long-term and negligible to minor adverse, as well as long-term and minor beneficial.

Offshore, the Transit alternative would incrementally add sources of noise, human activity, and collision risk at quantities and durations similar to the Proposed Action. Potential impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. Therefore, the overall cumulative impacts of the Transit alternative on birds when combined with past, present, and reasonably foreseeable activities would result in negligible to moderate, long-term adverse cumulative impacts to birds.

If the Transit alternative is implemented, the WTGs for other reasonably foreseeable offshore wind projects could need to be relocated or eliminated within lease areas to avoid the transit lanes. If these shifts result in WTG reductions that further decrease the risks of collision, these effects could decrease cumulative impacts to birds. Conversely, if WTG shifts result in increased human activity, noise, and habitat disturbance or species displacement due to increased construction vessel trips, cable length, and installation times, these effects could increase cumulative impacts to birds.

Conclusions

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in potential collision risk, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **minor**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative’s incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor** adverse, and **minor beneficial**). The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor**.

3.4.3.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

The Habitat alternative under either layout option would not affect Project onshore activities; therefore, onshore effects to birds would be the same as the Proposed Action: negligible to minor and temporary to long term.

No loss of suitable habitat for bird species with high displacement sensitivity would occur under this alternative.

Offshore, this alternative under either layout option could decrease the risk of birds encountering an operating WTG because there would be fewer turbines (although the difference might not be measurable). Therefore, this alternative would result in negligible to minor, short- and long-term adverse impacts on birds from Project construction and installation, O&M, and conceptual decommissioning.

Cumulative Impacts

This alternative under either layout option would not affect Project onshore activities; therefore, cumulative effects to birds would be the same as those described under the Proposed Action: temporary to long-term and negligible to minor adverse, as well as long-term and minor beneficial.

Offshore, this alternative under either layout option would incrementally add sources of noise, human activity, and collision risk at quantities and durations similar to the Proposed Action. Potential impacts could be greater if avoidance and displacement of birds occur during seasonal migration periods. Therefore, the overall offshore cumulative impacts of the Habitat alternative under either layout option on birds when combined with past, present, and reasonably foreseeable activities would result in the same negligible to moderate, long-term adverse cumulative impacts to birds.

Conclusions

Although the Habitat alternative under either layout option would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in potential collision risk, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **minor**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor** adverse, and **minor beneficial**). The overall impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor**.

3.4.3.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, BOEM expects that bird impacts would range from **negligible** to **minor** for all action alternatives due to noise, lighting, human activity, debris and contaminants, and new structures and vessels (increasing potential collision risk) in the geographic analysis area as well as altered existing bird habitat.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from **negligible** to **minor** and **minor beneficial**. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **minor**. BOEM made this call as the effect would be small, and the resource would be expected to recover completely.

3.4.3.4 Mitigation

Use of ADLS and bird-deterrent devices would further reduce the expected negligible to minor long-term impacts on birds by reducing the potential for attraction to operating WTGs (see Appendix G for details). Establishment of a post-construction monitoring program for birds and annual bird mortality reporting would not reduce impacts, but the data gathered would be used to evaluate impacts and potentially lead to additional mitigation measures, if required (30 CFR 585.633(b)).

3.4.4 Marine Mammals (see section in main EIS)

3.4.5 Other Terrestrial and Coastal Habitats and Fauna

3.4.5.1 Affected Environment

3.4.5.1.1 TERRESTRIAL AND COASTAL HABITAT

The terrestrial and coastal habitats within the geographic analysis area include the area from state waters inland to the mainland, including the foreshore, backshore, dunes, and interdunal areas. Aquatic habitats are discussed in Section 3.3.2 Water Quality and 3.4.2 Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish. The habitats along the onshore SFEC routes generally include a successional shrubland community located adjacent to the various roadway ROWs and the LIRR ROW. Field surveys and desktop research for areas along the onshore SFEC routes identified habitat for a variety of terrestrial mammals, reptiles, and amphibians (VHB 2018).

The two cable landing sites consist of the marine intertidal gravel/sand beach and maritime beach communities as classified by the NYNHP Ecological Communities of New York State (ECNYS) (Edinger et al. 2014). According to the U.S. Geological Survey (USGS) National Land Cover Database (NLCD) (Homer et al. 2015), approximately 42% of the Hither Hills landing site comprises Developed land cover types, and the remaining area comprises Barren Land (23%) and Grassland/Herbaceous (35%) cover types. In contrast, the Beach Lane landing site comprises 91% Developed land cover types and the remaining 9% comprises Pasture/Hay (see Table 1, Section 2.0 in VHB [2018]).

The onshore SFEC routes would occur within roadway and LIRR ROWs, which largely comprise unvegetated habitats representative of the ECNYS Paved Road/Path and Railroad cover types (Edinger et al. 2014). Similarly, the Beach Lane cable route comprises 69% Developed land cover types, whereas the Hither Hills cable route comprises 99% Developed land cover types. Field surveys indicate that the onshore SFEC routes support significant amounts of nonnative-invasive vegetation (see Table 4.3-1 in the COP).

The interconnection facility site consists of ECNYS Paved Road/Path, Unpaved Road/Path, and Urban Structure Exterior cover types, as well as areas of Coastal Oak Hickory Forest and Successional Shrubland (Edinger et al. 2014). NLCD data indicate that the interconnection facility site comprises the Deciduous Forest land cover type. Field surveys reported that the forest and shrubland cover types at this site appear to have been subject to recent ground disturbance but do provide habitat for birds and other wildlife that are adapted to mid-successional communities (VHB 2018).

The onshore Montauk O&M facility site is located 100 feet east of the inlet that connects Lake Montauk to Block Island Sound and the Atlantic Ocean. Statewide mapping of SAV provided by NYSDEC indicates that, as recently as 2014, a small seagrass bed (approximately 0.07 acre) was located immediately north of the proposed facility site along the eastern side of the navigational channel. Seagrass beds are discussed in detail in Section 3.4.2 Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish. The small upland portion (approximately 0.1 acre) of the proposed facility site does not provide meaningful wildlife habitat. The area is zoned as commercial with a mixture of structures and outbuildings and paved surfaces. There is a small sandy shoal located immediately northwest of the in-water work area. Coastal wildlife may opportunistically transit through these upland portions but would not persist here because of the lack of habitat and high level of human disturbance (Stantec 2020).

3.4.5.1.2 TERRESTRIAL AND COASTAL FAUNA

In all, 33 herpetofauna species and 22 mammalian species could occur within the analysis area (VHB 2018:Appendix D [Tables B and C]). The following herpetofauna were observed during field surveys in and near the analysis area: eastern garter snake (*Thamnophis sirtalis*), Fowler's toad (*Bufo fowleri*), northern black racer (*Coluber c. constrictor*), green frog (*Rana clamitans*), eastern box turtle (*Terrapene carolina*), northern spring peeper (*Pseudacris crucifer*), and red-spotted newt (*Notophthalmus viridescens*). Of these, only the northern black racer was observed within the Beach Lane onshore SFEC route. The Beach Lane and Hither Hills landing sites do not represent significant habitat areas for terrestrial herpetofauna, although upland forests and mid-successional communities within the Hither Hills landing site represent potential habitat for herpetofauna adapted to dry, upland conditions. Mammals observed during field surveys near the analysis area include whitetail deer (*Odocoileus virginianus*), eastern chipmunk (*Tamias striatus*), eastern cottontail (*Sylvilagus floridanus*), eastern gray squirrel (*Sciurus carolinensis*), woodchuck (*Marmota monax*), muskrat (*Ondatra zibethicus*), red fox (*Vulpes vulpes*), and raccoon (*Procyon lotor*) (VHB 2018). None of these are federally or state-listed species.

3.4.5.1.3 SPECIAL-STATUS TERRESTRIAL AND COASTAL HABITATS AND FAUNA

No critical habitats within the analysis area were identified by USFWS IPaC. The federally listed wildlife species identified as having the potential to occur in the analysis area are discussed in their respective resource sections (e.g., bats and birds). Two federally listed plants were included on the IPaC special-status species list: sandplain gerardia (*Agalinis acuta*) (endangered) and seabeach amaranth (*Amaranthus pumilus*) (threatened) (VHB 2018). Seabeach amaranth has the potential to occur within the analysis area near the sea-to-shore transition area. Although sandplain gerardia is known to occur near the analysis area, it is unlikely to occur within the analysis area due to lack of suitable habitat (BOEM 2021).

The NYNHP provided records for 21 New York State–listed rare/protected plant, bird, mammal, and insect species in and near the analysis area (VHB 2018:Section 5.0 [Table 2]). During field surveys, four New York State–listed rare/protected plant species and one reptile species were observed: southern arrowwood (*Viburnum dentatum* var. *venosum*) (state threatened), northern blazing star (*Liatris scariosa*) (state threatened), Blue Mountain mint (*Pycnanthemum muticum*) (state threatened), serrate round-leaf boneset (*Eupatorium pubescens*) (state endangered), and eastern box turtle (state special concern species) (VHB 2018:Section 5.0 [Table 2]). Most of the rare/protected species observations (48 out of a total of 58 observations) were for occurrences of southern arrowwood located within the Hither Hills SFEC route, whereas no rare/protected species observations occurred within the Beach Lane SFEC route, within the landing sites, or at the interconnection facility site (VHB 2018:Section 5.0 [Tables 3 and 4]).

3.4.5.2 Environmental Consequences

3.4.5.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.4.5-1 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for this final EIS.

Table 3.4.5-1. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Other Terrestrial and Coastal Habitats and Fauna

Issue	Impact Indicator	Significance Criteria
Habitat loss/ modification	Acres of impacted habitat	Negligible: No measurable impacts to species or habitat would occur. Minor: Most impacts to species are avoided; if impacts occur, they may result in the loss of a few individuals. Impacts to sensitive habitats are avoided; impacts that do occur are short term or temporary in nature. Moderate: Impacts to species are unavoidable but would not result in population-level effects. Impacts to habitat may be short term, long term, or permanent and may include impacts to sensitive habitats but would not result in population-level effects to species that rely on them. Major: Impacts would affect the viability of the population and would not be fully recoverable. Impacts to habitats would result in population-level impacts to species that rely on them.
Disturbance/ displacement	Changes to noise levels Projected traffic patterns/volume changes Qualitative assessment of potential ingestion or ensnarement from trash/debris	
Collision/ Injury	Qualitative estimate of collision risk	

3.4.5.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing terrestrial and coastal habitats and fauna trends from past and present activities. Attachment 3 in Appendix E provides additional information regarding past and present activities and associated impacts to terrestrial and coastal habitats and fauna. Future non-Project actions include existing and proposed communications towers, LIRR railroad improvements, and the Fire Island Montauk Point Project (FIMP Project). Attachment 3 in Appendix E discloses future non-offshore wind activities and associated terrestrial and coastal habitats and fauna impacts. These impacts are also briefly described below.

Future Activities (without the Proposed Action)

Future projects could contribute to individual displacement, injury, mortality, and habitat loss or modification via land disturbance, noise and light, and the potential for accidental spills. Activities from these projects would be temporary, and fauna would return to disturbed areas following completion of construction. BOEM is not aware of any future offshore wind activities other than the Proposed Action that would overlap the geographic analysis area for terrestrial and coastal fauna. However, any onshore impacts associated with these future projects would be similar to the Proposed Action. As a result, adverse impacts on terrestrial and coastal habitats and fauna under the No Action alternative would be short term and negligible to minor.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on terrestrial and coastal habitats and fauna associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on terrestrial and coastal habitats and fauna, due to land disturbance, noise and light, and the potential for accidental spills.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities and onshore activities would be **negligible** to **minor**. As described in Attachment 3 in Appendix E, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable offshore activities other than offshore wind would be **minor**.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts because the effect would be small and the resource would be expected to recover completely.

3.4.5.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Noise and human activity from trenching would be temporary and localized to the cable routes. Displaced wildlife could use adjacent habitat and would repopulate these areas once construction ceases. Because construction would predominately occur in already developed areas where wildlife is habituated to human activity and noise regardless of the cable route chosen, this would be a negligible, temporary adverse impact.

Collisions between wildlife and vehicles or construction equipment would be rare because most individuals are expected to avoid construction areas. However, species with limited mobility, especially herpetofauna, could be more vulnerable to this impact, resulting in minor, temporary adverse impacts to some species.

Impacts to the terrestrial and coastal flora and fauna habitat near the two landing sites would be avoided because the sea-to-shore transition vault would be located within the roadway and because HDD technology would be used to bury the cable beneath the beach and dune. However, during construction, there could be localized adverse impacts to coastal and terrestrial habitats along the onshore SFEC routes from trenching and vegetation removal within the construction ROW or from accidental spills. For the onshore SFEC routes, HDD would be used, as feasible, to avoid or minimize impacts to sensitive areas. The cable would also be located underground in previously disturbed areas, such as roadways and the

LIRR ROW, and habitats disturbed during trench placement would be reseeded with native vegetation where practicable. Therefore, adverse impacts would be short term and negligible because disturbed habitats are expected to return to their previous condition and would not be re-disturbed.

The interconnection facility would require the clearing of approximately 2.4 acres of deciduous forest. These changes would be expected to have a minor and short-term adverse effect on terrestrial fauna because this type of forest habitat is common in the region based on NLCD land cover data (Homer et al. 2015). Construction of the interconnection facility could result in a short-term, negligible risk for invasive species primarily in newly disturbed areas. Increased sedimentation into nearby wetlands and streams during construction also could adversely impact populations of amphibians, fishes, and other fauna that rely on those wetlands and streams; however, SFW would prepare and implement a SWPPP to minimize water quality impacts. Therefore, negligible and short-term adverse impacts to aquatic habitats are expected (see also Sections 3.3.2 and 3.5.5).

At the Montauk O&M facility, no impacts to onshore wildlife are expected because of the limited upland habitat present. If eelgrass is located adjacent to in-water work, sediments may be suspended during dredging activities and deposited elsewhere, resulting in burial and/or reduced water clarity and an associated reduction in photosynthetic activity thereby reducing its habitat value for associated fish, wildlife, and invertebrate species. See Section 3.4.2.2.3 for more detailed information on potential impacts to SAV.

Special-Status Coastal Fauna Species

The only federally listed terrestrial and coastal flora and fauna species potentially affected by construction of the onshore Project components is the seabeach amaranth. The Project BA indicates that this species could be present in the analysis area but that the Project would not disturb known or potential shoreline habitats (BOEM 2021). Therefore, any adverse effects would be negligible. Impacts to state-listed species from construction of the Project would be similar to those discussed for other terrestrial and coastal fauna.

Operations and Maintenance and Conceptual Decommissioning

Regular O&M activities would not cause further habitat alteration or impact terrestrial and coastal flora and fauna. However, when cable inspection or repairs require excavation, resulting in land disturbance, negligible, short-term, and localized adverse impacts could occur to coastal and terrestrial habitats. Light resulting from structures and vessels would lead to negligible impacts, if any, on terrestrial and coastal habitats because of the distance of the SFWF from the coastline. Considering the proposed cable burial depth and shielding, the extent of the generated EMFs would be less than 50 feet from the cable(s), and the intensity of impacts on terrestrial and coastal habitats would be negligible. Impacts to coastal and terrestrial habitats from conceptual decommissioning would be similar to construction impacts.

Overall, the Proposed Action would directly result in negligible to minor amounts of terrestrial habitat loss, depending on the onshore route selected, and negligible to minor impacts on terrestrial animals through mortality and temporary displacement.

Cumulative Impacts

Onshore construction and installation would incrementally add minor habitat conversion and habitat loss to the No Action alternative, changing the composition of terrestrial faunal assemblages and possibly reducing the abundance of terrestrial fauna through the removal of 2.4 acres of deciduous forest for the interconnection facility and a small area (0.1 acre) of upland wildlife habitat at the selected O&M facility. However, impacts would be avoided at the two cable landing sites by using HDD to bring the cable ashore. Due to the small amount of affected onshore habitat, the Proposed Action when added to other past, present, and reasonably foreseeable projects would result in negligible to minor incremental adverse impacts to terrestrial and coastal habitats and fauna.

Onshore construction would also produce temporary noise and light that would lead to short term negligible incremental impacts, if any, on terrestrial and coastal fauna and habitats. The onshore elements of the Proposed Action would be located in already developed areas with existing noise and light disturbance where wildlife is habituated to human activity. Accidental spills or release of trash and debris from other non-Project sources could also occur, but would be appropriately managed through implementation of the EPMs identified in Appendix G, Table G-1. Therefore, the cumulative impact of the Proposed Action on terrestrial and coastal fauna and habitats when combined with past, present, and reasonably foreseeable projects would be localized, short-term, and negligible to minor.

Conclusions

Project construction and installation and conceptual decommissioning would introduce noise, lighting, human activity, debris, and vehicles (increasing potential collision risk) to the geographic analysis area, as well as alter existing habitat. Noise, lighting, and human activity impacts from Project O&M would occur, although at lower levels than those produced during construction and conceptual decommissioning. BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible** to **minor** and short term. Therefore, BOEM expects the overall impact on terrestrial and coastal habitats and fauna from the Proposed Action alone to be **minor** because the effect would be small and the resource would be expected to recover completely without remedial or mitigating action.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor**. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** impacts to terrestrial and coastal habitats and fauna. BOEM made this call as the effect would be small and the resource would be expected to recover completely.

3.4.5.2.4 VESSEL TRANSIT LANE ALTERNATIVE

Changes in offshore components under this alternative would not impact onshore species or habitats. Because onshore species or habitats are not affected by the number and placement of WTGs, all onshore Project components and activities, including construction and installation, O&M, and conceptual decommissioning, would be the same as the Proposed Action. Therefore, impacts of this alternative on terrestrial and coastal fauna and habitats would be the same as the Proposed Action: negligible to minor and adverse and temporary to short term.

Cumulative Impacts

For the same reasons described above, the cumulative impacts of this alternative when combined with other past, present, and reasonably foreseeable activities would be the same as the Proposed Action: negligible to minor and adverse.

Conclusions

Since reductions to the number of WTGs and their associated inter-array cables considered under this alternative would not impact onshore species or habitat, BOEM expects that the impacts resulting from the alternative alone would be the same as the Proposed Action and range from **negligible** to **minor**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative’s incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor**). The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor**.

3.4.5.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

Changes in the number of turbines and their associated inter-array cables and micrositing of turbines under the Habitat alternative for either layout option would not impact onshore species or habitats. Therefore, the impacts of this alternative on terrestrial and coastal fauna and habitats would be the same as the Proposed Action: negligible to minor and adverse, and temporary to short term.

Cumulative Impacts

For the same reasons described above, the cumulative impacts of this alternative under either layout option when combined with other past, present, and reasonably foreseeable activities would be the same as the Proposed Action: negligible to minor and adverse.

Conclusions

Since reductions to the number of WTGs and their associated inter-array cables considered under this alternative for either layout option would not impact onshore species or habitat, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **minor**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative’s incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor**). The overall impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor**.

3.4.5.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change across evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, these alterations would not impact onshore species or habitat. Therefore, BOEM expects that terrestrial and coastal fauna and habitats impacts would range from **negligible** to **minor** for all action alternatives due to individual displacement, injury, mortality, and habitat loss or modification via land disturbance, noise and light, and the potential for accidental spills.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives’ incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from **negligible** to **minor**. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **minor**. BOEM made this call as the effect would be small, and the resource would be expected to recover completely.

3.4.5.4 Mitigation

No potential additional mitigation measures for terrestrial and coastal habitats and fauna are identified in Appendix G.

3.4.6 Sea Turtles

3.4.6.1 Affected Environment

This section evaluates sea turtles within the geographic analysis area, namely, the Northeast and Southeast Shelf Large Marine Ecosystems, which captures most of the movement range within U.S. waters for most species in this group (see Figure E-7 in Appendix E). Due to the size of the geographic analysis area, however, for the purposes of the analysis in this final EIS, the focus is on sea turtles that would be likely to have regular or common occurrences in the proposed SFWF and SFEC and could be impacted by Project activities (Figure C-33 in Appendix C). Four species of sea turtles are known to occur in or near the proposed SFWF and SFEC, and all are protected species under the ESA. These species are the green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), and Kemp's ridley sea turtle (*Lepidochelys kempii*). The potential impacts of the Proposed Action to these species are assessed in Section 3.4.6.2 (Environmental Consequences). The hawksbill sea turtle (*Eretmochelys imbricata*) is also protected under the ESA but is exceedingly rare in the SFWF and SFEC (Kenney and Vigness-Raposa 2010) (see Figure C-33 in Appendix C), which primarily occurs in warmer waters to the south. The individual hawksbill sea turtles that have occasionally been documented in and near the southern New England area have been stunned by exposure to unusual cold water events and subsequently transported northward into the region by the Gulf Stream. These occurrences are not representative of normal behaviors or distribution. Similarly, although this species does occur in the larger geographic analysis area (defined in Appendix E), the Proposed Action is unlikely to contribute to any measurable cumulative effects to this species, and the hawksbill sea turtle is therefore not considered further in this final EIS.

Sea turtles primarily inhabit tropical and subtropical seas throughout the world, with several species seasonally ranging into temperate zones to forage. Sea turtles are morphologically adapted for continuous swimming, and they can remain underwater for extended periods, ranging from several minutes to several hours, depending on factors such as daily and seasonal environmental conditions and specific behavioral activities associated with dive types (Hochscheid 2014; National Science Foundation [NSF] and USGS 2011). These adaptations are important because sea turtles often travel long distances between their feeding grounds and nesting beaches (Meylan 1995). There are no nesting beaches or other designated critical habitats near the SFWF and SFEC (GARFO 2020), meaning that individuals occurring in the area are either migrating or foraging. For this reason, these individuals likely spend most of the time below the surface, although specifics are species-dependent. Underwater observations of 73 sea turtles with 2,742 minutes of video in the mid-Atlantic found that loggerhead sea turtles were within the near-surface region of the water column a median of 42% of the time (Patel et al. 2016).

The combination of sightings, strandings, tag, and bycatch data provides the best available information on sea turtle distribution. This section summarizes data from sightings and surveys of the waters around the Lease Area (Kraus et al. 2016), NMFS Sea Turtle Stranding and Salvage Network (STSSN) (NMFS STSSN 2020), recent available density estimates (Denes et al. 2020), and historic regional data (Kenney and Vigness-Raposa 2010). Denes et al. (2020) compiled estimated seasonal densities for Kemp's ridley, leatherback, and loggerhead sea turtles using data obtained from the U.S. Navy Operating Area Density Estimates and Ocean Biodiversity Information System Spatial Ecological Analysis of Megavertebrate Populations databases (Halpin et al. 2009; Navy 2007, 2012). Green sea turtle densities were not estimated because suitable data for the region are limited. Table 3.4.6-1 summarizes potential sea turtle occurrence in the southern New England coastal waters off Rhode Island and Massachusetts. Potential effects to sea turtles, which are discussed in Section 3.4.6.2 (Environmental Consequences), are based on the likelihood of occurrence.

Table 3.4.6-1. Frequency of Sea Turtle Species Occurrence in the SFWF and SFEC

Common Name	Scientific Name	DPS/ Population	ESA Status*	Frequency of Occurrence in SFWF and SFEC†	Seasonal Occurrence in SFWF and SFEC‡,§	Likelihood of Occurring in the SFWF and SFEC§,¶	Included in EIS Impact Analysis?
Green sea turtle	*Chelonia mydas*	North Atlantic	T	Rare	May to November	Possible (limits of range)	Yes
Hawksbill sea turtle	*Eretmochelys imbricata*	–	E	Hypothetical	May to November	Unlikely (no documented occurrences)	No, outside limits of range
Leatherback sea turtle	*Dermochelys coriacea*	Atlantic	E	Common	May to November	Likely	Yes
Loggerhead sea turtle	*Caretta caretta*	Northwest Atlantic	T	Common	May to November	Likely	Yes
Kemp's ridley sea turtle	*Lepidochelys kempii*	N/A	E	Regular	May to November	Likely	Yes

Source: NMFS STSSN (2020).

Notes: DPS = distinct population segment

* ESA status: E = endangered, T = threatened.

† Occurrence frequency from Kenney and Vigness-Raposa (2010). Common = more than 100 observations, regular = 10–100 observations; rare = fewer than 10 observations; hypothetical = no documented observations.

‡ Regular species occurrence from GARFO (2021). Cold stunning of hard-shelled turtles occurs annually into January.

§ Data from NEFSC and SEFSC (2018).

¶ Data from Kraus et al. (2016).

Green sea turtle: Green sea turtles are found in tropical and subtropical waters around the globe. They are most commonly observed feeding in the shallow waters of reefs, bays, inlets, lagoons, and shoals that are abundant in algae or marine grass (NMFS and USFWS 2007). Juveniles and subadults are occasionally observed in Atlantic coastal waters as far north as Massachusetts (NMFS and USFWS 1991), including the waters of Long Island Sound and Cape Cod Bay (Cetacean and Turtle Assessment Program 1982). The primary nesting beaches are located in Costa Rica, Mexico, the United States (Florida), and Cuba. According to NMFS and USFWS (2015a), nesting trends are generally increasing for this population. Based on feeding and habitat preferences, the species is less likely to occur in the RI/MA WEA. Kenney and Vigness-Raposa (2010) recorded one confirmed sighting within the RI/MA WEA in 2005. The STSSN reported one offshore and 20 inshore green sea turtle strandings between 2017 and 2019, and green sea turtles are found each year stranded on Cape Cod beaches (NMFS STSSN 2020; Wellfleet Bay Wildlife Sanctuary 2018). Five green turtle sightings were recorded off the Long Island shoreline 10 to 30 miles southwest of the WEA in aerial surveys conducted from 2010 to 2013 (NEFSC and SEFSC 2018), but none were positively identified in multi-season aerial surveys of the RI/MA WEA from October 2011 to June 2015 (Kraus et al. 2016). Because of the limited number of sightings, uncertainty regarding survey method effectiveness, and difficulties observing juveniles, it is not possible to develop precise occurrence probability or density estimates for this species, but occurrence in the SFWF and SFEC is expected to be uncommon and limited to small numbers.

Leatherback sea turtle: The leatherback sea turtle is the most globally distributed sea turtle species, ranging broadly from tropical and subtropical to temperate regions of the world's oceans (NMFS and USFWS 1992). Leatherbacks are a pelagic species, but they are commonly observed in coastal waters along the U.S. continental shelf (NMFS and USFWS 1992). The breeding population estimate (total number of adults) in the North Atlantic is 34,000 to 95,000, and, aside from the western Caribbean, nesting trends at all other Atlantic nesting sites are generally stable or increasing (NMFS and USFWS 2013; Turtle Expert Working Group 2007). Atlantic Marine Assessment Program for Protected Species surveys conducted from 2010 through 2013 routinely documented leatherbacks in New England waters, including the RI/MA WEA, during summer months (NEFSC and SEFSC 2018). Kraus et al. (2016) recorded 153 observations in monthly aerial surveys, all between May and November, with a strong peak in August. Monthly aerial surveys on the New York Bight from 2017 through 2020 documented a total of 37 leatherback sea turtles, with an additional 503 unidentified sea turtles observed (Tetra Tech and LGL Ecological Research Associates, Inc. 2020). During summer (June–August) and fall (September–November) months, leatherback density in and near the Lease Area was estimated to be 0.0063 animals per square kilometer (km^2) and 0.0087 animals per km^2, respectively, compared to densities of effectively zero for the rest of the year (Denes et al. 2020). The STSSN reported 19 offshore and 77 inshore leatherback sea turtle strandings between 2017 and 2019, the highest number among all turtle species reported (NMFS STSSN 2020). Kraus et al. (2016) data indicate that leatherbacks would be the most abundant sea turtle species, which is consistent with the other information on sea turtle occurrence in the vicinity presented here. Based on this information, leatherback sea turtles are expected to occur commonly between May and November, with the highest probability of occurrence from July through October (Sherrill-Mix et al. 2008).

Loggerhead sea turtle: Foraging loggerhead sea turtles range widely and have been observed along the entire Atlantic coast as far north as Canada (Brazner and McMillan 2008; Ceriani et al. 2014; Shoop and Kenney 1992). Regional abundance on the Northwest Atlantic, corrected for unidentified turtles in proportion to the ratio of identified turtles, estimates approximately 801,000 loggerheads (NEFSC and SEFSC 2011). The three largest nesting subpopulations responsible for most of the production in the western North Atlantic (peninsular Florida; northern United States; and Quintana Roo, Mexico) have all been declining since at least the late 1990s, thus indicating a downward trend for this population (Turtle Expert Working Group 2009). In southern New England, loggerhead sea turtles can be found seasonally, primarily during the summer and fall, but are typically absent during the winter (Kenney and Vigness-

Raposa 2010; Shoop and Kenney 1992). Atlantic Marine Assessment Program for Protected Species surveys reported loggerhead sea turtles as the most commonly sighted sea turtles on the shelf waters from New Jersey to Nova Scotia, Canada. During the December 2014 to March 2015 aerial abundance surveys, 280 individuals were recorded (Palka et al. 2017). Large concentrations were regularly observed south and east of Long Island near the RI/MA WEA (NEFSC and SEFSC 2018). Kraus et al. (2016) observed loggerhead sea turtles within the RI/MA WEA in the spring, summer, and fall, with the greatest density of observations in August and September. Denes et al. (202a) estimated the density of loggerhead sea turtles in and near the Lease Area to be 0.38 animal per km^2 during summer months (June–August) and 0.035 animals per km^2 for the rest of the year. The STSSN reported six offshore and 58 inshore loggerhead sea turtle strandings between 2017 and 2019 (NMFS STSSN 2020). In New York State waters, the New York Marine Rescue Center (NYMRC) documented 816 strandings of loggerhead sea turtles from 1980 to 2018 (NYMRC 2021). Winton et al. (2018) estimated densities of tagged turtles using data from 271 satellite tags deployed on loggerhead sea turtles between 2004 and 2016 and found that tagged loggerheads primarily occupied the continental shelf from Long Island, New York, south to Florida, but relative densities in the RI/MA WEA increased between July and September. Collectively, available information indicates that loggerhead sea turtles are expected to occur commonly as adults, subadults, and juveniles from the late spring through fall, with the highest probability of occurrence from July through September (Winton et al. 2018).

Kemp’s ridley sea turtle: Kemp’s ridley sea turtles are most commonly found in the Gulf of Mexico and along the U.S. Atlantic Coast. The species is primarily associated with habitats on the continental shelf, with preferred habitats consisting of sheltered areas along the coastline, including estuaries, lagoons, and bays (Burke et al. 1994; NMFS 2019) and nearshore waters less than 120 feet deep (Seney and Landry 2008; Shaver et al. 2005; Shaver and Rubio 2008), although they can also be found in deeper offshore waters. The population was severely decimated prior to 1985 due to intensive egg collection and fishery bycatch, with only 702 nests counted during the entire year (NMFS and USFWS 2015b). Recent models indicate a persistent reduction in survival and/or recruitment to the nesting population, suggesting that the population is not recovering (NMFS and USFWS 2015b). In 2006, there were an estimated 7,000 to 8,000 nesting females (NMFS and USFWS 2015b). A total of 20,570 nests were documented in Mexico in 2011. In the United States, 199 nests were recorded in 2011, primarily in Texas (USFWS 2015). Juvenile and subadult Kemp’s ridley sea turtles are known to travel as far north as Cape Cod Bay during summer foraging (NMFS et al. 2011). Visual sighting data are limited because this small species is difficult to observe using typical aerial survey methods (Kraus et al. 2016). In all, five observations were recorded in the RI/MA WEA during 4 years of aerial surveys, all in August and September 2012 (Kraus et al. 2016). The species has been sighted near the proposed SFWF in other survey efforts, mostly to the south and west of the RI/MA WEA (Right Whale Consortium 2019). Denes et al. (2020) estimate the density of Kemp’s ridley sea turtles near the Lease Area to be 0.009 animals per km^2 throughout the year. The STSSN reported six offshore and 69 inshore Kemp’s ridley sea turtle strandings between 2017 and 2019 (NMFS STSSN 2020), and the NYMRC has documented stranding of 620 Kemp’s ridley sea turtles within NYS waters between 1980 and 2018 (NYMRC 2021). Cold-stunned Kemp’s ridley sea turtles are often found stranded on the beaches of Cape Cod (Lui et al. 2019; Wellfleet Bay Wildlife Sanctuary 2019). Based on this information, Kemp’s ridley sea turtles could occur infrequently as juveniles and subadults from July through September, potentially occurring as late as November. The highest likelihood of occurrence is in coastal nearshore areas adjacent to Long Island where the SFEC is anticipated to make landfall. Juvenile Kemp’s ridley sea turtles have been regularly encountered off the coast of Long Island, where there are more abundant protected shallow-water habitats (NYSDEC 2019), and there was a confirmed nesting event on Long Island in 2018 (Gaworecki 2018). Occurrence in the RI/MA WEA is possible, but the likelihood of occurrence is difficult to assess from available data because this species is difficult to detect in visual surveys. On this basis, Kemp’s ridley sea turtles could occur in the SFWF and SFEC in low numbers on an annual basis throughout the life of the Project.

All sea turtle species in the geographic analysis area are subject to regional, preexisting threats, including, but not limited to, entanglement in fisheries gear, fisheries bycatch, vessel strike, nesting beach impacts, and climate change.

3.4.6.2 Environmental Consequences

3.4.6.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.4.6-2 lists the issues resulting from the Project that could impact sea turtles and the indicators and significance criteria used to assess impacts for this final EIS.

Table 3.4.6-2. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Sea Turtles

<table>
<tr><th>Issue</th><th>Impact Indicator</th><th>Significance Criteria</th></tr>
<tr><td>Underwater noise from construction/conceptual decommissioning</td><td>Extent, frequency, and duration of noise above established effects thresholds relative to species occurrence, as noted below:
Behavioral effects*
175 dB_{RMS}
Injury/harm
207 dB_{peak}[†], 232 dB_{peak} (PTS)[‡], 226 dB_{peak} (TTS)[‡]
210 dB_{SEL}[†], 204 dB_{SEL} (PTS)[‡], 189 dB_{SEL} (TTS)[‡]</td><td rowspan="9">Negligible: Impacts on sea turtles are undetectable or barely measurable, with no consequences to individuals or populations.
Minor: Impacts on sea turtles are detectable and measurable, but are low-intensity, highly localized, and temporary or short term in duration. May include impacts to or loss of individuals, but these impacts would not result in population-level effects.
Moderate: Impacts on sea turtles are detectable and measurable. These impacts could result in population-level effects, but those effects would likely be recoverable and would not affect stock or population viability.
Major: Impacts on sea turtles are significant and extensive, long term in duration, and could have population-level effects that are not recoverable, even with mitigation.</td></tr>
<tr><td>Underwater noise from operation</td><td>Extent, frequency, and duration of noise above established effects thresholds relative to species occurrence, as noted below:
Behavioral effects*
175 dB_{RMS}</td></tr>
<tr><td>In-air noise/disturbance</td><td>Biologically significant behavioral response</td></tr>
<tr><td>Vessel traffic</td><td>Qualitative estimate of potential collision risk</td></tr>
<tr><td rowspan="2">Water quality impacts</td><td>Quantitative estimate of intensity and duration of suspended sediment effects</td></tr>
<tr><td>Qualitative analysis of potential discharges (fuel spills, trash, and debris) relative to baseline</td></tr>
<tr><td>Artificial light</td><td>Intensity, frequency, and duration relative to baseline</td></tr>
<tr><td>Power transmission</td><td>Theoretical extent of detectable EMF effects</td></tr>
<tr><td>Seabed and water column disturbance/alteration</td><td>Water column volume and acres of seabed disturbance, loss, or conversion by structure presence</td></tr>
</table>

* Behavioral effect threshold for impact and vibratory pile driving defined by Navy (2017). dB_{RMS} = root mean square decibels re: 1 micropascal (µPa).

† Injury/harm effect threshold defined by Popper et al. (2014). dB_{peak} = peak dB re: 1 µPa; dB_{SEL} = cumulative sound exposure level in dB re: 1 μPa^2/second.

‡ Injury/harm effect threshold defined by Navy (2017). dB_{peak} = peak dB re: 1 µPa; dB_{SEL} = cumulative sound exposure level in dB re: 1 μPa^2/second.

3.4.6.2.2 NO ACTION ALTERNATIVE

Under the No Action alternative, BOEM would not approve the COP, and the Project construction and installation, O&M, and conceptual decommissioning activities would not occur. However, future non-Project actions, including offshore development projects, military activities, dredged material disposal, commercial fishing, marine transportation, and climate change, have the potential to alter existing conditions and trends in the geographic analysis area, as described in the Affected Environment section. Attachment 3 in Appendix E discloses future non-offshore wind activities and associated sea turtle impacts. This section provides a general description of potential impacts that could conceivably occur in the geographic analysis area, recognizing that the extent and significance of potential impacts cannot be fully quantified for projects that are in early phases and have not been fully designed. Should any or all of the future activities described in Appendix E proceed, each would be subject to independent NEPA analyses and regulatory approvals, and their environmental effects would be fully considered therein.

Future Activities (without the Proposed Action)

Accidental releases and discharges: Trash or water quality contaminants could be accidentally released as a result of increased human activity associated with future offshore wind construction activities. All species of sea turtles have been documented ingesting plastic fragments (Bugoni et al. 2001; Hoarau et al. 2014; Nelms et al. 2016) and a variety of other anthropogenic waste (Tomás et al. 2002), likely mistaking debris for potential prey items (Schyuler et al. 2014). Ingesting trash or exposure to aquatic contaminants can be lethal to sea turtles. However, turtles may also be affected sublethally in a variety of ways, which could include experiencing depressed immune system function; poor body condition; and reduced growth rates, fecundity, and reproductive success (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). Sea turtles could additionally become entangled in debris, causing lethal or injurious impacts. Entanglement in lost fishing gear is a significant cause of mortality in both juvenile and adult sea turtles and was noted as a threat to recovery for multiple ESA-listed turtles in the marine environment (NMFS and USFWS 1991, 1992; NMFS et al. 2011). Based on a recent global review, 5.5% of encountered sea turtles were found to be entangled, and 90.6% of these were dead (Duncan et al. 2017). Lost or discarded fishing gear was associated with most of these entanglements, and many experts believed that these impacts could be causing population-level impacts in some areas. Aquatic contaminant exposure could also result in mortality, and sublethal effects could impact many of the species' physiological systems during all life stages (Bembenek-Bailey et al. 2019; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Furthermore, accidental releases may indirectly impact sea turtles by impacting prey species. However, all vessels would comply with USCG regulations, and wind farm construction projects would comply with additional BOEM requirements that would avoid and minimize accidental releases of trash or other debris and aquatic contaminants. Therefore, potential accidental releases would not appreciably contribute to adverse impacts to sea turtle, and these impacts would be negligible.

EMF: Under the No Action alternative, the future development of planned wind energy projects would result in up to 7,248 miles of new submarine electrical transmission cables in the geographic analysis area for sea turtles. Each cable would generate EMF effects within the immediate proximity. The available evidence indicates that sea turtles are magnetosensitive and orient to the Earth's magnetic field for navigation. Although they may be able to detect magnetic fields as low as 0.05 milligauss (mG), they are unlikely to detect magnetic fields below 50 mG (Normandeau et al. 2011; Snoek et al. 2016). Potential EMF effects would be reduced by cable shielding and burial to an appropriate depth. New submarine cables would be installed to maintain a minimum separation of at least 330 feet from other known cables to avoid damaging existing infrastructure during installation. This separation distance would also avoid additive EMF effects from adjacent cables. Although artificial EMF effects on sea turtles are not well studied, the affected areas would be localized around unburied cable segments and limited to within 3 to 7.5 meters of the cable surface (BOEM 2019b). Deviations in migration therefore would be small and would not significantly impact energy expenditure in sea turtles. EMF effects from future non-Project activities would be negligible.

Artificial lighting: Nighttime lighting associated with offshore structures and vessels could represent a source of attraction, avoidance, or other behavioral responses in sea turtles. Although responses to light have been studied in various species and life stages of sea turtles in nesting beach environments, the effects of offshore lighting remain uncertain. Shoreline development is the predominant existing artificial lighting source in the nearshore component of the geographic analysis area, whereas vessels, mainly fishing vessels, are the predominant artificial lighting source offshore. Future wind energy development would contribute additional light sources to the offshore component of the geographic analysis area, including a short-term increase in light from vessels used during construction, and the long-term use of navigational lighting on new WTGs and OSSs. An estimated 2,547 foundations are forecasted for future wind energy construction. Each structure would have minimal yellow flashing navigational lighting as well as red flashing FAA hazard lights in accordance with BOEM's (2019a) lighting and marking guidelines. Although the potential effects of offshore lighting on juvenile and adult sea turtles is uncertain, WTG lighting is anticipated to have a negligible effect on sea turtles based on the current lack of evidence that platform lighting leads to effects on sea turtles, as shown by decades of oil and gas platform operation in the Gulf of Mexico, which can have considerably more lighting than offshore WTGs (BOEM 2019c).

<u>New cable emplacement/maintenance:</u> Future offshore wind projects could disturb up to 10,131 acres of seabed during the installation of associated undersea cables, causing an increase in suspended sediment. This disturbance would be both localized and temporary in duration. Data are not available regarding impacts of suspended sediments on adult and juvenile sea turtles, although elevated suspended sediments may cause individuals to alter normal movements and behaviors. However, these changes would be limited in extent, short term in duration, and likely too small to be detected (NOAA 2020b). Seafloor disturbance during construction of future offshore wind projects may affect foraging success for some prey species, leading to minor adverse impacts; however, given that impacts would be temporary and generally localized to the cable corridor, no population-level effects on sea turtles would be expected.

<u>Noise</u>: Under the No Action alternative, human activities would continue to generate underwater noise with the potential to affect sea turtles. Existing and future sources of anthropogenic underwater noise include commercial, government and military, research, and recreational vessel activity, and the development and operation of other wind energy projects on the OCS. Several wind energy projects could be developed between 2022 to 2030, and their construction periods could overlap, adding several new sources of underwater noise to baseline levels generated by vessel traffic. As discussed in Section 3.4.4.2.2 (No Action Alternative), some projects could be constructed concurrently or could involve concurrent construction activities (e.g., impact pile driving) at two or more locations in proximity, creating the potential for larger and/or overlapping areas of significant underwater noise effects.

Existing and potential future anthropogenic noise sources generally fall into two categories: 1) impulsive noise, defined as the instantaneous change in sound pressure over a short period of time, and 2) non-impulsive noise, which may be intermittent or remain constant and stable over a given time period. Impulsive and non-impulsive noise sources associated with offshore wind projects are discussed in the sections below.

Impulsive noise: Existing and potential future sources of impulsive underwater noise in the geographic analysis area include impact pile driving used in nearshore and offshore construction activities and geological and geophysical surveys.

Sea turtles could experience any of the following three potential exposure scenarios under the No Action alternative:

1. Concurrent exposure to noise from two or more impact hammers, operating within the same project or in adjacent projects
2. Non-concurrent exposure to noise from multiple pile-driving events within the same year
3. Exposure to two or more concurrent or non-concurrent pile-driving events over multiple years

The reader is referred to Section 3.4.4.2.2 (Future Activities) for a discussion of these concurrent noise exposure scenarios.

Offshore wind surveys typically involve high resolution geophysical (HRG) equipment, which can generate non-impulsive noise that is generally less intense than noise generated from other geological and geophysical survey methods.

None of the equipment being operated for these surveys that overlaps with the hearing range (30 Hz to 2 kHz) for sea turtles has source levels loud enough to result in PTS or TTS based on the peak or cumulative exposure criteria (Table 3.4.6-2). Therefore, physical effects are extremely unlikely to occur. Sea turtles would exhibit a behavioral response when exposed to received levels of 175 dB re 1 µPa (rms), and some HRG is within their hearing range (below 2 kHz). For boomers and bubble guns, the distance to this threshold is 40 meters, and is 90 meters for sparkers. Thus, a sea turtle would need to be within 90 meters of the source to be exposed to potentially disturbing levels of noise. We expect that sea turtles would react to this exposure by swimming away from the sound source; this would limit exposure to a short time period—just the few seconds it would take an individual to swim away to avoid the noise. The risk of exposure to potentially disturbing levels of noise is reduced by the use of PSOs to monitor for sea turtles. At the start of a survey, equipment cannot be turned on until the clearance zone is clear for at least 30 minutes. This condition is expected to reduce the potential for sea turtles to be exposed to noise that may be disturbing. However, even in the event that a sea turtle is submerged and not seen by the PSO, in the worst case, we expect that sea turtles would avoid the area ensonified by the survey equipment that they can perceive. Because the area where increased underwater noise would be experienced is transient and increased underwater noise would only be experienced in a particular area for only seconds, we expect any effects to behavior to be minor and limited to a temporary disruption of normal behaviors, temporary avoidance of the ensonified area, and minor additional energy expenditure spent while swimming away from the noisy area. If foraging or migrations are disrupted, we expect that they would quickly resume once the survey vessel has left the area. No sea turtles would be displaced from a particular area for more than a few minutes. While the movements of individual sea turtles would be affected by the sound associated with the survey, these effects would be temporary (seconds to minutes) and localized (avoiding an area no larger than 90 meters), and there would be only a minor and temporary impact on foraging, migrating, or resting sea turtles. Effects to individual sea turtles from brief exposure to potentially disturbing levels of noise are expected to be minor and limited to a brief startle, a short increase in swimming speed, and/or short displacement, and would be so small that they cannot be meaningfully measured, detected, or evaluated; therefore, effects are negligible.

BOEM has concluded that disturbance of sea turtles from underwater noise generated by site characterization and site assessment activities would likely result in temporary displacement and other behavioral or non-biologically significant physiological consequences (i.e., no injury or mortality would occur) and impacts on sea turtles would be negligible.

Impulsive underwater noise from impact pile driving during planned offshore wind development, due to the anticipated frequency and spatial extent of effects, represents the highest likelihood for exposure of individual sea turtles to adverse impacts from noise. Although these potential impacts are acknowledged, their potential significance is unclear because sea turtle sensitivity and behavioral responses to underwater noise are a subject of ongoing study (see Section 3.4.6.2.3 for further details). Potential behavioral impacts may include altered submergence patterns, short-term disturbance, startle response (diving or swimming away), and short-term displacement of feeding/migrating and a temporary stress response, if present within the ensonified area (NSF and USGS 2011; Samuel et al. 2005). The accumulated stress and energetic costs of avoiding repeated exposure to pile-driving noise over a season or a life stage could have long-term impacts on survival and fitness (Navy 2018). Conversely, sea turtles could become habituated to repeated noise exposure over time and not suffer long-term consequences (O’Hara and Wilcox 1990;). This type of noise habituation has been demonstrated even when the repeated exposures were separated by several days (Bartol and Bartol 2011; Navy 2018).

Sea turtles that are close to impact pile driving could experience a temporary or permanent loss of hearing sensitivity. In theory, reduced hearing sensitivity could limit the ability to detect predators and prey or find potential mates, reducing the survival and fitness of affected individuals. However, the role and importance of hearing in these biological functions for sea turtles remain poorly understood (Lavender et al. 2014).

Assuming that mitigation measures described in Appendix G, Table G-2 would likely be required in all offshore wind development projects, impacts to sea turtles from construction-related noise would likely be limited to minimal or moderate short-term impacts on a small number of individuals. Short-term impacts on individuals would not be significant at the population level and would therefore be minor overall.

Non-impulsive noise: Non-impulsive underwater noise sources in the geographic analysis area include baseline noise levels from commercial, military and government, research, and recreational vessel traffic; aircraft; and offshore development activities. The planned development of other wind energy facilities would contribute additional new sources of intermittent non-impulsive underwater noise, including helicopters and fixed-wing aircraft, construction and O&M vessels, and vibratory pile driving during construction. Operational noise from WTGs would constitute a low-level, non-impulsive underwater noise source throughout the life of a given project.

Helicopters and fixed-wing aircraft may be used during initial site surveys, protected species monitoring prior to and during construction, and facility monitoring. Sea turtle responses to aircraft noise and disturbance is not well documented. Bevan et al. (2018) observed no evident behavioral responses from sea turtles exposed to drones flown directly overhead at altitudes ranging from 60 to 100 feet. Helicopters and aircraft would operate at altitudes of 1,000 feet or more except when helicopters are landing or departing from service vessels. NOAA (2020b) determined that noise and disturbance effects on sea turtles from aircraft used for construction and O&M of the Vineyard Wind offshore wind facility would be insignificant. Based on this information, cumulative effects on sea turtles from aircraft used for wind energy development on the OCS would be expected to be negligible.

Vibratory pile driving used during submarine cable and port facility construction is the most intensive source of intermittent, non-impulsive underwater noise expected to result from planned offshore wind energy development. As discussed in Section 3.4.6.2.3 (Proposed Action Alternative), the typical noise levels generated by vibratory pile driving used for facility development and port improvements are below thresholds associated with potential hearing injury in sea turtles. Vibratory pile-driving noise can exceed levels associated with behavioral disturbance in sea turtles but only within a short distance (i.e., less than 200 feet) from the source. Given this low exposure probability to vibratory pile-driving noise and the fact that vibratory pile-driving activities would be limited in extent, short term in duration, and widely separated, vibratory pile-driving noise effects on sea turtles would be negligible.

Construction and operational vessels are the most broadly distributed source of intermittent non-impulsive noise associated with offshore wind projects. Sea turtle exposure to underwater vessel noise would incrementally increase as a result of planned offshore wind projects, especially during construction periods (Jacobs 2021). Applying vessel activity estimates developed by BOEM based on their 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019b), vessel activity could peak in 2024, with as many as 379 vessels involved in the construction of reasonably foreseeable projects (see Section 3.4.4.2.2 [No Action Alternative] for details). However, this increase must be considered relative to the baseline level of vessel traffic. Sea turtles have hearing abilities limited to low frequencies and, as discussed in Section 3.4.6.2.3 (Proposed Action Alternative), no injury or behavioral effects from vessel noise are anticipated for the Proposed Action. Although sea turtles could become habituated to repeated noise exposure over time (Hazel et al. 2007), vessel noise effects for other wind farm development projects are expected to be broadly similar to noise levels from existing vessel traffic in the region. Nonetheless, periodic localized, intermittent, and short-term behavioral impacts on sea turtles could occur. Based on sea turtle responses to other types of disturbance (e.g., Bevan et al. 2018), turtle behavior is expected to return to normal when vessel noise dissipates. Given limited turtle sensitivity to underwater noise produced by vessels, the short-term nature of any behavioral responses, and the patchy distribution of sea turtles in the geographic analysis area, the effects of vessel noise from future activities on sea turtles would be negligible.

No significant effects on sea turtles are anticipated from non-impulsive noise resulting from WTG operation. Tougaard et al. (2020) summarized available monitoring data on wind farm operational noise, including both older generation geared turbine designs and quieter, modern direct drive systems such as those proposed for the SFWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 root mean square decibels ($dB_{RMS)}$), occasionally reaching as high as 128 dB_{RMS} in the 10-hertz (Hz) to 8-kilohertz (kHz) range. More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (10 MW) current generation direct-drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. However, the maximum anticipated noise levels produced by operational WTGs are below recommended thresholds for sea turtle injury and behavioral effects. Sea turtles also appear to habituate to repetitive underwater noise not accompanied by an overt threat (Bartol and Bartol 2011; Hazel et al. 2007; Navy 2018). This suggests that even if WTGs generate noise detectable to sea turtles in the immediate proximity, the exposed individuals are not expected to experience measurable adverse effects. The effects of operational noise from future wind farm development on sea turtles would be negligible.

<u>Port utilization</u>: Any port expansions could increase the total amount of disturbed benthic habitat (see Section 3.5.5.2.2, No Action Alternative) and result in impacts on some sea turtle prey species. However, given that port expansions would likely occur in subprime areas for foraging due to regulatory protections in place, and the disturbance would be relatively small in comparison to the overall sea turtle foraging areas in the geographic analysis area, port expansions are not expected to impact sea turtles. Dredging for port facility improvement could lead to additional impacts on turtles from incidental entrainment, impingement, or capture. Dredging impacts on sea turtles are relatively rare, with most observed injury and mortality events in the United States associated with hopper dredging in and around core habitat areas in the southern portion of the geographic analysis area and along the Gulf Coast (Michel et al. 2013; USACE 2020). Ongoing maintenance dredging of these facilities may incrementally increase related risks to individual turtles over the lifetime of the facilities; however, typical mitigation measures such as timing restrictions should minimize this potential. Given the available information, the risk of injury or mortality of individual sea turtles resulting from dredging associated with the projects considered here is low and population-level effects are unlikely to occur. Therefore, associated effects of port expansions on sea turtles would be minor. Potential vessel traffic impacts associated with port use are described under the Vessel traffic section below.

<u>Presence of structures</u>: The addition of up to 2,547 new offshore foundations in the geographic analysis area could increase sea turtle prey availability by creating new hard-bottom habitat, increasing pelagic productivity in local areas, or promoting fish aggregations at foundations (Bailey et al. 2014 cited in English et al. 2017). Section 3.4.2 (Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish) discusses reef creation and altered water flow in detail. The significance of this reef effect is unknown but is not expected to result in biologically significant impacts to sea turtles given the broad geographic range of species during their annual foraging migrations.

The presence of structures could also indirectly concentrate recreational fishing around foundations, which could indirectly increase the potential for sea turtle entanglement in both lines and nets (Gall and Thompson 2015; Nelms et al. 2016; Shigenaka et al. 2010).Entanglement in both lines and nets could lead to injury and mortality due to abrasions, loss of limbs, and increased drag, leading to reduced foraging efficiency and ability to avoid predators (Berreiros and Raykov 2014; Gregory 2009; Vegter et al. 2014). Between 2016 and 2018, 186 sea turtles were documented as hooked or entangled with recreational fishing gear (BOEM 2021c). Due to the high number of foundations in a geographic analysis area, it is likely that recreational and for-hire fisheries would avoid overcrowding structures by dispersing effort across many WTG foundations. However, the risk of entanglement and hooking or ingestion of marine debris could slightly increase, since both fishers and turtles may be attracted to the same areas.

If structures result in vessel displacement or gear shifts, the potential impact to sea turtles is uncertain. Increased risk would not be expected by vessel displacement due to the patchy distribution of sea turtles. However, it could result in a potential increase in the number of vertical lines in the water column if there is no commensurate reduction in fixed gear types to mobile gear. In such circumstances of a greater shift of mobile gear to fixed gear, there would be a potential increase in the number of vertical lines, resulting in an increased risk of sea turtle interactions with fishing gear. Therefore, associated effects of structures on sea turtles would be minor.

Vessel traffic: Vessel strike is an increasing concern for sea turtles. The percentage of loggerhead sea turtles stranded with injuries consistent with vessel strikes increased from approximately 10% in the 1980s to 20.5% in 2004, although an unknown number may have been struck postmortem (NMFS and USFWS 2007). Sea turtles are expected to be most susceptible to vessel collision in shelf waters, where they forage. Furthermore, they cannot reliably avoid being struck by vessels exceeding 2 knots (Hazel et al. 2007); typical vessel speeds in the geographic analysis area may exceed 10 knots. Up to 379 vessels associated with offshore wind development may be operating in the geographic analysis area during the peak construction period in 2024. Additional fishing vessels may also be present in the vicinity due to the expected increase in fish biomass around the WTG structures. Increased vessel traffic could result in sea turtle injury or mortality; however, the proportional increase in vessel traffic from baseline would be minimal (refer to Section 3.5.6 [Navigation and Vessel Traffic] and Appendix E). As described in Section 3.4.6.1, all sea turtle populations likely to be impacted by the Project are stable or increasing. Therefore, despite the potential for individual fatalities, no population-level impacts on sea turtles are expected based on occurrence and potential exposure. Assuming other offshore wind projects employ the same minimizing measures included in the Project, impacts would be further reduced and would be minor.

Climate change: Global climate change is an ongoing potential risk to sea turtles, although the associated impact mechanisms are complex, not fully understood, and difficult to predict with certainty, especially considering potential interactions with other IPFs. Possible impacts to sea turtles due to climate change include increased storm severity and frequency; increased erosion and sediment deposition; disease frequency; ocean acidification; and altered habitat, prey availability, ecology, and migration patterns (Hawkes et al. 2009). The potential implications of these and other related environmental changes for sea turtles, and the ways in which they are likely to interact with the effects of regional offshore wind development, are complex and uncertain. Evidence already shows a northward shift in the distribution of certain species based on water temperature (McMahon and Hays 2006), and future warming could result in a higher interaction between sea turtles and offshore wind farms, potentially magnifying the impacts and benefits described above. Over time, climate change, in combination with coastal and offshore development, would alter existing habitats, potentially rendering some areas unsuitable for certain species and more suitable for others. As described in Section 3.4.6.1, all sea turtle populations likely to be impacted by the Project are stable or increasing. Therefore, potential climate change impacts would be minor.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts associated with the Project to sea turtles would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on sea turtles, primarily through construction-related lighting, noise, habitat alternation, collision risk, and artificial reef effect.

Based on the current science, BOEM anticipates that the impacts of ongoing activities, especially vessel traffic, commercial and recreational fisheries gear interaction, and climate change, would be **minor**. In addition to ongoing activities, reasonably foreseeable activities other than offshore wind development, include increasing vessel traffic, new submarine cables and pipelines, channel-deepening activities, and the installation of new towers, buoys, and piers. BOEM anticipates that the impacts of reasonably foreseeable activities other than offshore wind would be **minor**. BOEM expects that the combination of ongoing activities and reasonably foreseeable activities other than offshore wind development to result in **minor** impacts on sea turtles, driven primarily by increasing vessel traffic and commercial and recreational fisheries gear interactions.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts due to the presence of structures and pile-driving noise.

The No Action alternative would forgo any monitoring that SFW has committed to voluntarily perform, the result of which could provide an understanding of the effects of offshore wind development, benefit future management of sea turtles, and inform planning of other offshore developments. However, other ongoing and future surveys could provide similar data.

3.4.6.2.3 PROPOSED ACTION ALTERNATIVE

Table 3.4.6-3 summarizes potential short-term and long-term benthic habitat disturbance by Project components (CH2M HILL 2018).

Table 3.4.6-3. Short-Term and Long-Term Benthic Habitat Disturbance by Project Component

Project Component	Short-Term Disturbance (Acres)	Long-Term Disturbance (Acres)
SFWF	814.8*	126.8
SFEC	618.7	179.3
O&M facility	0.9	0.007
Total	**1,731.2**	**306.1**

Construction and Installation

Construction impacts to sea turtles could occur from accidental releases and discharges, artificial lighting, seabed disturbance, entrainment and impingement, underwater and airborne noise, vessel traffic (strikes and noise), and water quality degradation. Unless noted otherwise, construction-related impacts would be temporary to short term. The potential for these impacts to occur are discussed in detail in the following sections.

Accidental releases and discharges: During construction of the SFWF, there could be a short-term risk of sanitary and other waste fluids or fuels and other petrochemicals accidentally entering the water. If sea turtles were to be exposed to an oil spill or a discharge of waste material, studies indicate that respiration, skin, some aspects of blood chemistry and composition, and salt gland function could be significantly impacted in exposed individuals (Vargo et al. 1986). Any non-routine spills or accidental releases that could result in negligible and short-term impacts to surface water resources would be avoided or minimized through the implementation of the Project SPCC plan and other EPMs (see Table G-1 in Appendix G). Impacts on sea turtles from accidental spills or releases of pollutants are considered negligible because of the low probability of the risk and EPM implementation.

Trash and debris that enter the water represent a risk factor to sea turtles because the turtles could ingest or become entangled in debris, causing lethal or injurious impacts. Pollution (e.g., plastic) is often mistaken for food such as jellyfish and ingested, which can block intestinal tracts, causing injury or mortality. See Section 3.4.6.2.2 for additional debris and entanglement analysis. Personnel working offshore would receive training on sea turtle and marine debris awareness (see COP Table 4.7-2). Impacts on sea turtles from accidental deposits of trash or debris associated with SFW are considered minor because implementation of proposed EPMs (see Table G-1 in Appendix G) would lower the probability of such risk.

Artificial lighting: Lights would be required on vessels and heavy equipment during construction. Most scientific studies on lighting effects on sea turtles were conducted at nesting sites, which do not occur in the SFWF and SFEC. Gless et al. (2008) reported that previous studies showed that loggerhead turtles were attracted to lights from longline fishing vessels. Gless et al. (2008) conducted a laboratory study to see if juvenile leatherbacks responded to lights in the same way as loggerheads. Their study showed that leatherbacks either failed to orient or oriented at an angle away from the lights and concluded that there is no convincing evidence that marine turtles are attracted to vessel lights. Limpus (2006) indicates that navigation/anchor lights on top of vessel masts are not impactful but that bright deck lights should be shielded if possible to reduce impacts to sea turtles. Project EPMs (see Table G-1 in Appendix G) include construction vessel light shielding and operational restrictions to limit light use to required periods and minimize artificial lighting effects on the environment. Considering the EPMs and the fact that construction vessel activity is unlikely to measurably alter baseline vessel light levels, construction lighting effects on sea turtles would be negligible.

Seabed disturbance: Sea turtles near the Project would likely be foraging, and prey items could include benthic species. Seabed disturbance would be associated with seabed preparation, foundation installation, vessel anchoring, and cable installation during Project construction. This disturbance would be short term; however, some benthic habitat conversion would also occur as described in in Section 3.4.2.2 (Environmental Consequences). As discussed in Section 3.4.2.1 (Affected Environment), the affected seabed is composed primarily of unconsolidated sand and gravel deposits subject to regular disturbance from currents. Project construction and installation would temporarily affect a small percentage (i.e., 0.9%) of the available foraging habitat in the Lease Area until pre-construction species assemblages are recolonized and recovered. Benthic communities that inhabit dynamic bed environments typically recover rapidly from construction-related disturbance, usually within 1 year (Dernie et al. 2003; UKBERR 2008). The affected area is also subject to periodic bed disturbance by commercial fishing (CH2M HILL 2018), indicating that construction-related bed disturbance is unexpected to measurably alter environmental baseline conditions. Because impacts to foraging habitat are mostly temporary and localized, the impact of Project activities associated with seabed disturbance on sea turtles would be negligible.

Port utilization: Construction of the Montauk O&M facility, if selected as the final site, poses a theoretical risk to sea turtles from dredge entrainment and impingement, similar to those described in Section 3.4.6.2.2 (No Action Alternative). However, the likelihood of sea turtle exposure to construction-related dredging impacts is minimal. The USACE monitors incidental take of sea turtles associated with navigation channel dredging projects. There is only one recorded incident of an individual sea turtle being injured or killed in the available data record for 34 federal dredging projects conducted in the New York and New England districts between 1994 and 2012 (USACE 2020). Current permitting restrictions limit the timing of dredging activities in Lake Montauk Harbor to the period from September 30 through January 15 (USACE 2019). Most sea turtles occurring in the vicinity would have migrated south to overwintering habitats and would not be present when dredging occurs. Additionally, capture, impingement, or entrainment of sea turtles is not expected during dredging activities in Lake Montauk Harbor due to the type of equipment (i.e., clamshell dredge). Therefore, dredging-related risks to sea turtles from Project construction are negligible.

Noise: A short-term increase in underwater noise is the most likely construction-related factor that could impact sea turtles if they are present in the area during the time of SFWF and offshore SFEC construction. The noise associated with offshore Project construction and installation generally falls into two categories: impulsive noise, defined as the instantaneous change in sound pressure over a short period of time; and intermittent non-impulsive noise, which generates constant high-intensity noise over a limited time period.

Table 3.4.6-4 summarizes thresholds for underwater noise effects and the maximum distances to injurious and behavioral effects from both impulsive and intermittent non-impulsive construction-related underwater noise levels (Denes et al. 2021). The distances shown for a difficult installation scenario represent a worst case, as most installations are expected to require only 2 hours and would produce comparatively smaller areas of cumulative effect. These effects are described in greater detail below.

Table 3.4.6-4. Distances to Effect Thresholds for Elevated Underwater Noise

Noise Source	Injurious Effects		Behavioral Effects
	Distance to 207 dB_{peak} Threshold (feet)	Distance to 210 dB_{SEL} Threshold (feet)	Distance to 175 dB_{RMS} Threshold (feet)
Monopile foundation installation (impulsive)	115	725	1,716
Temporary cofferdam installation, vibratory sheet pile (intermittent non-impulsive noise)	0	0	175
Vibratory sheet pile driving for O&M facility upgrades (intermittent non-impulsive noise)	0	0	175
Dynamically positioned construction vessels (intermittent non-impulsive noise)	0	0	0

Source: Denes et al. (2021). Monopile foundation values reflect the maximum possible effect area from a difficult installation of an 11-meter-diameter pile with 10 dB broadband attenuation.

Popper et al. (2014) reviewed available data and suggested the threshold levels of 207 dB_{PEAK} and 210 dB_{SEL} for injurious (i.e., hearing loss) underwater noise for sea turtles. These recommended criteria are for mortality and potential mortal injury. NMFS has considered injury onset for PTS beginning at 232 dB_{PEAK} and 204 dB_{SEL} and TTS beginning at 226 dB_{PEAK} and 189 dB_{SEL} (Navy 2017). Denes et al. (2021) modeled the extent of injurious effects from impulsive underwater noise using only the Popper et al. (2014) thresholds. Note that use of these thresholds could result in predictions of mortality or mortal injury when the actual expected response would be auditory injury; therefore, the predicted responses of sea turtles to pile-driving noise based on the Popper et al. (2014) thresholds would result in overestimates of the severity of effects. NMFS has considered behavioral response beginning at 175 dB_{RMS} (Navy 2017). These thresholds apply to juvenile, subadult, and adult life stages.

Little is known about the role of sound perception in the sea turtle's typical activities. Although sea turtles have relatively unspecialized ears relative to other vertebrate species, their auditory organs appear to be specifically adapted to underwater hearing (Dow Piniak et al. 2012). Studies indicate that hearing in sea turtles is confined to lower frequencies, below 1,600 Hz, with the range of highest sensitivity between 100 and 700 Hz (Dow Piniak et al. 2012), with some variation between species (Bartol and Ketten 2006; Dow Piniak et al. 2012; Martin et al. 2012; Piniak et al. 2016). In captive enclosures and during NSF-funded at-sea seismic monitoring programs, sea turtles generally respond to seismic survey sound with behavioral changes such as startling, increasing swimming speed, and swimming away from and/or locally avoiding the source (McCauley et al. 2000; NSF and USGS 2011). Sea turtles migrating through the area when pile driving occurs are expected to adjust their course to avoid the area where noise is elevated above 175 dB re 1uPa RMS. Depending on how close the individual is to the pile being driven, this could involve swimming up to 1.04 miles (1.67 km). Such behavioral alterations could cause turtles to cease foraging or expend additional effort and energy avoiding the area. Presumably, turtles could continue foraging activities outside the area of elevated noise levels as adjacent habitat provides similar foraging opportunities. The turtle may experience physiological stress during this avoidance behavior, but this stressed state would be anticipated to dissipate over time once the sea turtle is outside the ensonified area. There have been no documented sea turtle mortalities associated with pile driving. Either a temporary or permanent reduction in hearing sensitivity could be harmful for sea turtles, but the potential significance is unclear because the role that hearing plays in sea turtle survival (e.g., for predator avoidance, prey capture, and navigation) is poorly understood (NSF and USGS 2011). The use of observers, exclusion and monitoring zones, and pile-driving soft start measures (see Table G-1 in Appendix G) would minimize the risk of sea turtle exposure to elevated underwater noise levels.

Sea turtles may be displaced from the area during pile driving, may incur an energetic cost to swimming away, may experience stress, and may experience some reduced foraging rates that day due to engaging in avoidance rather than foraging behavior. Because these effects would only last during the duration of the pile (an average of 120 minutes), these effects are expected to last a short time, and sea turtles would return to normal behavior once outside of the harassment area or when pile driving stops (BOEM 2021a).

Impulsive noise: Impact pile driving during construction is the loudest potential impulsive underwater noise source associated with the Project and would produce the most extensive effects. As discussed in Section 3.4.6.2.2, the potential significance of impulsive underwater noise is unclear because sea turtle sensitivity and behavioral responses to underwater noise are a subject of ongoing study. Potential behavioral impacts may include altered submergence patterns, short-term disturbance, startle response (diving or swimming away), and short-term displacement of feeding/migrating and a temporary stress response, if present within the ensonified area (NSF and USGS 2011; Samuel et al. 2005). The accumulated stress and energetic costs of avoiding repeated exposure to pile-driving noise over a season or a life stage could have long-term impacts on survival and fitness (Navy 2018). Conversely, sea turtles could become habituated to repeated noise exposure over time and not suffer long-term consequences (O'Hara and Wilcox 1990). This type of noise habituation has been demonstrated even when the repeated exposures were separated by several days (Bartol and Bartol 2011; Navy 2018).

Sea turtles that are close to impact pile driving could experience a temporary or permanent loss of hearing sensitivity. In theory, reduced hearing sensitivity could limit the ability to detect predators and prey or find potential mates, reducing the survival and fitness of affected individuals. However, the role and importance of hearing in these biological functions for sea turtles remain poorly understood (Lavender et al. 2014). Based on the combination of minimization measures mentioned above (e.g., sound reduction technology, soft starts, PSOs) and the low numbers of sea turtles expected in the SFWF and SFEC, impacts to sea turtles from impact pile driving are expected to be minor.

Intermittent Non-Impulsive Noise: Vibratory pile driving would be used to install cofferdams for SFEC sea-to-shore transitions and for the construction of upgrades to the Montauk O&M. Similar to the effects of the impulsive impact hammer, only minor impacts to sea turtles from vibratory pile driving are expected because of the combination of minimization measures used and the low densities of sea turtles in the SFWF and SFEC. Noise from vibratory pile driving at the Montauk O&M would be constrained within the embayment of Lake Montauk by human-made jetties and natural geography.

As shown in Table 3.4.6-4, vibratory pile-driving noise would not exceed recommended sea turtle injury thresholds and would only exceed behavioral thresholds within 175 feet of the source. Given the limited spatial extent of these potential effects, sea turtles are more likely to respond to disturbance from construction vessels staging on-site before pile driving begins. This suggests that the potential for exposure to vibratory pile-driving noise is limited at best, with vessel noise and disturbance being the more likely source of potential behavioral effects.

HRG surveys use a combination of sonar-based methods to map shallow geophysical features. The equipment is towed behind a moving survey vessel attached by an umbilical cable. HRG equipment operating are frequencies at or below 2,000 Hz (typically sub-bottom profilers) may be audible to sea turtles. Equipment such as echosounders and side-scan sonars operate at higher frequencies and have no effect on sea turtles. The equipment only operates when the vessel is moving along a survey transect, meaning that the ensonified area is intermittent and constantly moving. BOEM (2021) evaluated potential underwater noise effects on sea turtles from HRG surveys and concluded there is no possibility of PTS in sea turtles from HRG sound sources. Some HRG survey noise sources would exceed the behavioral effects threshold up to 300 feet from the source, depending on the type of equipment used, but given the limited extent of potential noise effects and the EPMs used in this Project (e.g., soft-start measures, shutdown procedures, protected species monitoring protocols, use of qualified and NOAA-approved PSOs, and noise attenuation systems), adverse impacts to sea turtles are unlikely to occur. BOEM (2021) concluded that planned HRG survey activities across the entire mid-Atlantic OCS are unlikely to cause PTS injury to sea turtles. While low-level behavioral exposures could occur, these would be limited in extent and short term in duration. Therefore, underwater noise impacts from HRG surveys are expected to be minor.

The relatively low frequency range of turtle hearing (100–1,200 Hz) (Ketten and Bartol 2006; Lavender et al. 2014) overlaps the broad frequency spectrum of intermittent non-impulsive noise produced by vessels (10–1,000 Hz). Sea turtles could respond to vessel approach and/or noise with a startle response and a temporary stress response (NSF and USGS 2011). However, Hazel et al. (2007) suggested that turtles could habituate to vessel sounds in marine areas that experience regular vessel traffic. This could reduce the behavioral impacts of vessel noise but may increase the potential for vessel collision (refer to subsection on vessel traffic below). Underwater noise generated by construction vessels would not exceed injury thresholds for turtles, as noise levels produced by vessels in general are below levels that could cause potential auditory threshold shifts. Behavioral responses to vessels have been reported but are thought to be more associated with visual cues, as opposed to auditory cues (Hazel et al. 2007), although both senses likely play a role in avoidance. A conservative assumption is that construction and support vessels could elicit behavioral changes in individual sea turtles near the vessels. It is assumed that these behavioral changes would be limited to evasive maneuvers such as diving, changes in swimming direction, or changes in swimming speed to distance themselves from vessels. Overall, impacts to sea turtles from vessel noise would be negligible.

Fixed-wing aircraft may be used during construction for marine mammal monitoring, and helicopters may be used for crew transport to and from construction vessels. Monitoring aircraft would operate at an altitude of 1,000 feet consistent with established guidance (BOEM 2021). Noise levels generated by helicopters and propeller-driven aircraft at this altitude range from 65to 85 dBA (Behr and Reindel 2008; Brown and Sutherland 1980). Noise from crew transport helicopters would increase during approach and departure from vessel landing pads. Currently, no published studies describe the impacts of aircraft overflights on sea turtles, although anecdotal reports indicate that sea turtles respond to aircraft by diving (BOEM 2017). While helicopter traffic may cause some short-term and temporary non-biologically significant behavioral reactions, including startle responses (diving or swimming away), altered submergence patterns, and a temporary stress response (BOEM 2017; NSF and USGS 2011; Samuel et al. 2005), these brief responses would be expected to dissipate once the aircraft has left the area. The potential effects of aircraft noise and disturbance on sea turtles are therefore expected to be negligible.

Vessel traffic: Changes in vessel traffic resulting from the Proposed Action are a potential source of adverse effects on sea turtles. Propeller and collision injuries from boats and ships are common in sea turtles and an identified source of mortality (Hazel et al. 2007; Shimada et al. 2017). Hazel et al. (2007) also reported that individuals may become habituated to repeated exposures over time that were not accompanied by an overt threat. Project construction vessels could collide with sea turtles, posing a short-term increase in the risk of injury or death to individual sea turtles. However, as stated in Section 3.5.6 (Navigation and Vessel Traffic), the MARIPARS study area (an area encompassing the wind energy leases off Massachusetts and Rhode Island) supports high volumes of vessel traffic (13,000 to 46,900 annual vessel transits), and the Proposed Action would be expected to result in only a small incremental increase in vessel traffic, with a peak during Project construction. Based on information provided by SFW, Project construction would require an estimated total of 50 vessel trips between the Port of New London, Connecticut, and the SFWF over the 2-year construction period, with an estimated maximum of six trips in any given month from U.S. ports outside of the RI/MA WEA. Port traffic within the RI/MA WEA would add an additional 127 one-way trips during WTG installation and 146 one-way trips during cable installation to the SFWF. Depending on the contractor selected, up to eight construction vessels could travel to the Lease Area from unspecified ports in Europe or elsewhere in the world.

Fishing vessels may be displaced during construction of WTGs and installation of the SFEC. Up to 300 fishing vessels use the SFWF annually (see Section 3.5.1 [Commercial Fisheries and For-Hire Recreation]) and might decide to avoid the SFWF once it is fully constructed. Potential for displacement of fishing vessels during SFWF operations is discussed further in Section 3.4.6.2.3 (Operations and Maintenance and Conceptual Decommissioning). The increased collision risk in some areas is anticipated to be commensurate with the decreased risk within the SFWF, so changes in collision risk from relocated commercial and for-hire fishing vessels during construction of the SFWF would not be measurable from baseline. Relocation of fishing vessels during construction and installation would be considered negligible to sea turtles.

Sea turtles are likely to be most susceptible to vessel collision in coastal foraging areas crossed by construction vessels traveling between the SFWF and offshore SFEC and area ports. Hazel et al. (2007) indicated that sea turtles may not be able to avoid being struck by vessels at speeds exceeding 2 knots, and collision risk increases with increasing vessel speed. Habituation to noise may also increase the risk of vessel collision. However, avoidance behaviors observed suggest that a turtle’s ability to detect an approaching vessel is more dependent on vision than sound, although both may play a role in eliciting behavioral responses. Construction vessel speeds could periodically exceed 10 knots during transits to and from area ports, posing an incremental increase in collision risk relative to baseline levels of vessel traffic. During construction, vessels generally either remain stationary when installing the monopiles and WTG/OSS equipment or move slowly (i.e., at less than 10 knots) when traveling between foundation locations. Cable-laying vessels move very slowly, on the order of 1 mile per day. Project EPMs include the implementation of NOAA guidelines (COP Table 4.7-2) to minimize turtle risk by reducing vessel speed and maintaining a separation distance from sighted individuals. Nevertheless, collisions with individual turtles may occur, resulting in mortalities. As described in Section 3.4.6.1, all sea turtle populations likely to be impacted by the Project are stable or increasing. Because the abundance of sea turtles is anticipated to be generally low with patchy distribution, and the proportional increase in vessel traffic also low, the number of sea turtles injured or killed by vessel strikes as a result of Project construction would be low and would not result in significant effects at the population level. Therefore, the potential effects of construction vessel collisions on sea turtles would be minor.

Water quality degradation: Construction of the SFWF and offshore SFEC is expected to result in elevated levels of suspended sediment in the immediate proximity of bed-disturbing activities like pile driving, placement of scour protection, and trenching and burial of the SFEC and inter-array cable, as discussed in Section 3.3.2.2.3, Proposed Action Alternative. Vinhateiro et al. (2018) modeled anticipated TSS levels and the time required to dissipate those levels to ambient conditions. Within the SFWF, they predicted that TSS concentrations greater than 10 mg/liter (L) would not extend more than 10 feet (3 m) from the disturbance source based on the coarser sediment conditions present in the SFWF and SFEC. TSS levels along the SFEC would remain below 30 mg/L within 330 feet (100 m) of the cable route. These effects would be short term because TSS levels are predicted to return to normal within 1.4 hours of activity completion (Vinhateiro et al. 2018). TSS levels associated with dredging for the construction of the Montauk O&M facility is anticipated to reach up to 100 mg/L (Vinhateiro et al. 2018). This work would take approximately 2 days and suspended sediments would return to background levels after two tide cycles due to the course composition of the sediment.

Direct, physical effects from TSS exposure are unlikely because sea turtles breathe air and do not share the physiological sensitivities of susceptible organisms like fish and invertebrates. Turtles could alter their behavior in response to elevated suspended sediment levels (e.g., moving away from an affected area). They could also experience behavioral stressors (e.g., reduced ability to forage and avoid predators). However, turtles are highly mobile and can avoid short-term suspended sediment impacts that are limited in severity and range. Given the limited extent of potential suspended sediment impacts expected to result from the Project and low sea turtle sensitivity to this stressor, effects to sea turtles from elevated suspended sediment levels would be negligible. Many sea turtle species routinely inhabit nearshore and estuarine environments with periodically high natural turbidity levels; therefore, short-term exposure to elevated suspended sediment is unlikely to measurably inhibit foraging (Michel et al. 2013 as cited in Johnson 2018). Because of the relatively small area impacted by habitat disturbance and resettled sediment, impacts on prey and foraging success for sea turtles would also be negligible.

Operations and Maintenance and Conceptual Decommissioning

<u>Accidental releases and discharges</u>: The SFWF would undergo maintenance as needed, which would necessitate vessels and other equipment at the facility for the life of the Project. This presents an opportunity for accidental discharge or spills of fuels and/or fluids during maintenance activities. Spill response EPMs (see Table G-1 in Appendix G) employed during construction would be implemented during maintenance activities. These EPMs are expected to avoid or minimize water quality impacts from accidental spills or releases of pollutants during O&M activities. Impacts on sea turtles from accidental spills or releases of pollutants are considered minor because of the low probability of the risk and EPMs (refer to Section 3.3.2 [Water Quality] for additional details).

<u>EMF and heat</u>: The Project would generate EMF along the length of the inter-array cables and offshore SFEC for the life of the Project until conceptual decommissioning. These effects would be most intense at locations where the SFEC cannot be buried and is laid on the bed surface covered by a stone or concrete armoring blanket. Approximately 2.97 miles of the SFEC cable and 2.1 miles of the inter-array cable could be unburied and would require surface armoring. Exponent Engineering, P.C. (2018) modeled anticipated EMF levels generated by the SFEC and inter-array cable. It estimated induced magnetic field levels ranging from 13.7 to 76.6 mG on the bed surface above the buried and exposed SFEC cable and 9.1 to 65.3 mG above the inter-array cable. Induced field strength would effectively decrease to 0 mG within 25 feet of each cable. By comparison, the earth's natural magnetic field is more than five times the maximum potential EMF effect from the Project (see Figure F-7 in Appendix F).

BOEM has conducted literature reviews and analyses of potential EMF effects from offshore renewable energy projects (CSA Ocean Sciences Inc. 2021; Inspire Environmental 2019; Normandeau et al. 2011). These and other available reviews and studies (Gill et al. 2005; Kilfoyle et al. 2018) suggest that most marine species cannot sense very low-intensity electric or magnetic fields at the typical alternating-current power transmission frequencies associated with offshore renewable energy projects. Normandeau et al. (2011) indicate that sea turtles are magnetosensitive and orient to the earth's magnetic field for navigation, but they are unlikely to detect magnetic fields below 50 mG. The majority of SFEC and inter-array cables would be buried 6 feet below the bed surface, reducing the magnetic field in the water column below levels detectable to turtles. The transmission cables could produce magnetic field effects above the 50-mG threshold at selected locations where full burial is not possible; these areas would be localized and limited in extent. Magnetic field strength at these locations would decrease rapidly with distance from the cable and drop to 0 mG within 25 feet. Peak magnetic field strength is below the theoretical 50 mG detection limit along the majority of cable length, only exceeding this threshold above the short-cable segments laid on the bed surface. Those EMF effects would dissipate below the 50 mG threshold within 1 to 2 feet of the cable surface. This indicates that turtles would only be able to detect induced magnetic fields within 1 to 2 feet of cable segments lying on the bed surface. These cable segments would be relatively short (less than 100 feet) and widely dispersed. Exponent Engineering, P.C. (2018) concluded that the shielding provided by burial and the grounded metallic sheaths around the cables would effectively eliminate any induced electrical field effects detectable to turtles. Given the limited extent of measurable magnetic field levels and limited potential for mobile species like sea turtles to encounter field levels above detectable thresholds, the effects of Project-related EMF exposure on sea turtles would be negligible.

Heat from the buried SFEC and inter-array cables could affect some benthic organisms that represent forage for turtles, but little is known about the potential change to substrate temperatures that transmission cables might have on the benthos (Taormina et al. 2018). Benthic effects are not expected to impact leatherback turtles as benthic prey are not typically included in their diet. Effects to algal cover (green sea turtle forage) and crustaceans, gastropods, crabs, and bivalves (loggerhead sea turtle forage) could conceivably affect sea turtle foraging opportunities. However, because cables would be buried to a depth of 6 feet and/or covered with concrete protection, changes in temperature of the substrate at the surface of the seabed is not anticipated to increase markedly. The potential effects of cable heat to the availability of turtle forage would be negligible.

<u>Artificial lighting</u>: The SFWF would include a variety of operational lighting, including navigational lighting for mariners, obstruction lighting for aviators, and vessel/work lighting for maintenance and operations. Orr et al. (2013) indicate that lights on wind generators flash intermittently for navigation or safety purposes and do not present a continuous light source. Limpus (2006) suggests that intermittent flashing lights with a very short “on” pulse and long “off” interval are non-disruptive to marine turtle behavior, irrespective of the color. Limpus (2006) also indicates that navigation/anchor lights on top of vessel masts are unlikely to adversely affect sea turtles but that bright deck lights should be shielded if possible to reduce impacts to sea turtles.

Sea turtles’ typical behavior of remaining predominantly submerged would additionally limit the exposure of individuals to operational lighting. Operational lighting would be limited to the minimum required by regulation and for safety (see Table G-1 in Appendix G), further minimizing the potential for exposure. Based on the available information, it is expected that the impact of operational lighting on sea turtles would be negligible.

<u>Seabed disturbance and alteration</u>: Inspire Environmental (2020) characterized site-specific benthic habitat conditions by combining photographic surveys with extensive side scan sonar and backscatter data collected by Fugro (2019, 2021) to support the EFH analysis. Inspire Environmental (2020) identified four benthic habitat types: 1) glacial moraine, 2) coarse sediment, 3) sand and muddy sand, and 4) mud and sandy mud. For the purposes of analysis, these four habitat types are consolidated into three groups: 1) complex habitat, 2) potentially complex habitat, and 3) non-complex habitat. These habitats may support benthic fauna that provide potential prey items for sea turtles. Refer to Section 3.4.2 (Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish) for a detailed discussion on benthic habitat.

The WTG and OSS foundations, exposed portions of the offshore SFEC, and associated scour protection would result in a long-term conversion of existing complex and non-complex bottom habitat to new, stable, hard surfaces. Once construction is complete, these surfaces would be available for colonization by sessile organisms and would draw species that are typically attracted to hard-bottom habitat (Causon and Gill 2018; Langhamer 2012). Refer to Section 3.4.2 (Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish) for a detailed discussion of potential reef effects and food web dynamics. Over time, this reef effect would increase the amount of forage and shelter available for sea turtles, but this effect would be limited to low use areas within the SFWF. Overall, in the context of the SFWF and SFEC and available habitat, the seabed biotic community alterations would have a negligible effect on sea turtles.

Intermittent Non-Impulsive Noise: Operational WTGs are capable of producing underwater sound levels on the order of 110 to 125 dB_{RMS}, occasionally reaching as high as 128 dB_{RMS}, in the 10-Hz to 8-kHz range (Tougaard et al. 2020). More recently, Stober and Thomsen (2021) used monitoring data and modeling to estimate operational noise from larger (> 10 MW) current generation direct-drive WTGs and concluded that these designs could generate higher operational noise levels than those reported in earlier research. This suggests that operational noise effects on sea turtles could be more intense and extensive than those considered herein, but the findings have not been validated. The Project would generate operational noise throughout the life of the facility. As noted previously, sea turtle hearing is largely within the frequency range (< 1,200 Hz) for operational wind turbines; therefore, it is possible that wind turbine noise could be heard by sea turtles, although behavioral responses are unlikely based on the established threshold.

Little is known currently about how sea turtles use hearing in their natural environment (Lavender et al. 2014); therefore, it is difficult to interpret the potential effects of long-term, non-impulsive noise generated by the WTGs. O'Hara and Wilcox (1990) reported that loggerheads avoid sources of low-frequency sound in the 25- to 1,000-Hz range. The sound levels produced during operation are less than the behavioral and injurious thresholds defined by NMFS for sea turtles. However, potential responses to underwater noise generated by WTG operation could include avoidance of the noise source. Operational noise levels would not cause injury to sea turtles but could alter the behavior of individuals close to the structure. Localized behavioral effects would be negligible.

While sea turtles would likely be able to detect SFW survey vessels in the vicinity, this would not necessarily translate to biologically significant effects. For example, Hazel et al. (2007) concluded that sea turtles appear to be relatively insensitive to vessel noise, relying on their vision to detect approaching vessels. Sea turtles may respond to vessel approach and/or noise with a startle response (diving or swimming away) and a temporary stress response (NSF and USGS 2011). In contrast, Samuel et al. (2005) indicated that vessel noise can affect sea turtle behavior, especially their submergence patterns. BOEM anticipates that the potential effects of noise from survey vessels would elicit brief responses to the passing vessel that would dissipate once the vessel or the turtle left the area. For these reasons, BOEM anticipates that sea turtle exposure to SFW monitoring vessel noise would be minimal, and responses if any, would be temporary and biologically insignificant, with individuals returning to normal behaviors once the vessel has passed.

Project decommissioning would require the use of construction vessels of similar number and class as used during construction. Underwater noise and disturbance levels generated during conceptual decommissioning would be similar to those described above for construction, with the exception that pile driving would not be required. The monopiles would be cut below the bed surface for removal using a cable saw or abrasive waterjet. Noise levels produced by this type of cutting equipment are generally indistinguishable from engine noise generated by the associated construction vessel (Pangerc et al. 2016). Therefore, this decommissioning equipment would not contribute to additional noise effects above and beyond those already considered for construction vessel noise. The effects of Project decommissioning on sea turtles would therefore range from negligible to minor.

Port utilization: Maintenance dredging of the Montauk O&M facility poses a theoretical risk to sea turtles from entrainment and impingement. As discussed for Project construction, the likelihood of sea turtle exposure to maintenance dredging is negligible based on monitoring data from other federal dredging projects in the region and anticipated permitting restrictions (USACE 2019). Moreover, the O&M facility location is periodically dredged to maintain access and navigation so ongoing maintenance dredging would not appreciably change existing conditions in the affected environment. Therefore, the effects of O&M facility maintenance dredging on sea turtles would be negligible.

<u>Presence of structures</u>: The WTG foundations constitute potential obstacles in the water column for the life of the Project until conceptual decommissioning and have the potential to alter local hydrodynamics and productivity. Given that sea turtles are highly mobile and the structures are only 36 feet in diameter and would be separated by approximately 1 mile, the structural alterations of the water column are unlikely to pose a direct barrier to foraging, migration, or other behaviors of sea turtles. However, the presence of WTG structures could indirectly affect sea turtles by potentially altering prey distribution or promoting fish aggregations and thus concentrating fishing vessels at the foundations. This range of potential impacts is discussed in the following paragraphs.

Human-made structures, especially tall, vertical structures like WTG and OSS foundations, alter local water flow at a fine scale and could result in localized impacts on sea turtle prey distribution and abundance. These localized effects typically dissipate within a relatively short distance from the structure (Miles et al. 2017); effects would likely dissipate within 300 to 400 feet of each monopile foundation. However, there is potential for regional impacts to wind wave energy, mixing regimes, and upwelling (van Berkel et al. 2020), and these changes in water flow caused by the presence of the WTG structures could influence sea turtle prey distribution at a broader spatial scale. Recent modeling of hydrodynamic effects suggests that surface currents could be affected by the presence of multiple wind farms, potentially impacting the distribution of larvae (Johnson et al., 2021). The distribution of fish, invertebrates, and other marine organisms on the OCS is determined by the seasonal mixing of warm surface and cold bottom waters, which determines the primary productivity of the system (Chen et al. 2018; Lentz 2017; Matte and Waldhauer 1984). While there is a high degree of uncertainty, the presence of WTG structures could affect conditions in ways that alter these dynamics, potentially increasing primary productivity in the vicinity of the structures by disrupting vertical stratification and bringing nutrient-rich waters to the surface (Carpenter et al. 2016; Schultze et al. 2020). However, this increase in primary productivity may not translate to a beneficial increase in sea turtle prey abundance if the increased productivity is consumed by filter feeders, such as mussels, that colonize the surface of the structures (Slavik et al. 2019). Considering the largely localized nature of potential effects to primary production surrounding WTGs (van Berkel et al. 2020), the likelihood of broader benefits for sea turtles is minimal.

The ultimate effects of offshore structure development on ocean productivity, sea turtle prey species, and, therefore, sea turtles, are difficult to predict with certainty and are expected to vary by location, season, and year, depending on broader ecosystem dynamics. The presence of new, hard surfaces could increase the abundance of associated organisms such as mussels and crustaceans on and around the structures, providing a prey resource for loggerhead sea turtles. Increased primary and secondary productivity in proximity to structures could also increase the abundance of jellyfish, a prey species for leatherback sea turtles (English et al. 2017; NMFS and USFWS 1992). Additionally, hard-bottom (scour control and rock mattresses used to bury required offshore export cables) and vertical structures (i.e., WTG and OSS foundations) in a soft-bottom habitat can create artificial reefs; thus inducing the “reef effect” associated with higher densities and biomass of fish and decapod crustaceans (Causon and Gill 2018; Taormina et al. 2018). Section 3.4.2 (Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish) discusses reef creation in detail. Recent studies have found increased biomass for benthic fish and invertebrates, and possibly for pelagic fish, sea turtles, and birds, around offshore wind facilities (Pezy et al. 2018; Raoux et al. 2017; Wang et al. 2019), translating to potential increased foraging opportunities for sea turtle species. However, an increase in biomass could result in limited benefits to higher trophic levels, depending on species composition and prey preferences (Pezy et al. 2018).

Increased fish biomass around the structures could also attract commercial and recreational fishing activity, creating an elevated risk of injury or death from gear entanglement and ingestion of debris (Berreiros and Raykov 2014; Gregory 2009; Vegter et al. 2014). As noted above, lost/discarded fishing gear was associated with a majority of sea turtle entanglements in a global review (Duncan et al. 2017). However, through implementation of EPMs related to management of debris surrounding the WTGs (see Table G-1 in Appendix G), the increase in entanglement risk is expected to be minimal.

The presence of structures could result in multiple types of impacts, with potentially opposing outcomes for sea turtles. Higher potential for interaction between sea turtles and vessels or fishing gear, either due to displacement of sea turtles outside of the Lease Area or due to concentration of fishing vessels around WTGs could occur, particularly during construction phases. During operations, the presence of structures may indirectly concentrate recreational fishing around foundations, which could indirectly increase the potential for sea turtle ingestion of or entanglement in lines, nets, and other lost or discarded fishing gear (Nelms et al. 2016; Gall and Thompson 2015; Shigenaka et al. 2010). However, the addition of structures could benefit sea turtles by locally increasing pelagic productivity and prey availability for sea turtles. Displacement of sea turtles because of the presence of the structures is unlikely due to the small size of the SFWF and the small number of turtles in the area. The overall impact to sea turtles is not expected to be biologically significant due to the patchy distribution of sea turtles within the SFWF and SFEC. Potential long-term, intermittent impacts would persist until conceptual decommissioning is complete and structures are removed. These impacts would be negligible to minor.

Survey fisheries gear (trawl surveys, gillnet and ventless trap and pot gear, and the anchoring lines and buoys used to secure PAM equipment) could also pose an entanglement risk to sea turtles. In addition to mortality, gear entanglement can restrict blood flow to extremities and result in tissue necrosis and death from infection. Individuals that survive may lose limbs or limb function, decreasing their ability to avoid predators and vessel strikes (NMFS 2016). Proposed beam trawls would be limited to 20 minutes, indicating that this activity poses a negligible risk of mortality, but incidentally captured individuals would suffer stress and potential injury. In the unlikely event that a sea turtle is captured, BOEM anticipates that the exposed individuals would resume normal behaviors upon release and would not suffer any biologically significant effects.

While there is a theoretical risk of sea turtle entanglement, particularly for leatherbacks, in trap and pot gear, BOEM considers the likelihood to be discountable given the limited, patchy distribution of sea turtles, the small number of vertical lines used in the surveys, and the limited duration of each survey event. Likewise, based on the small number of receivers deployed (10 in total), and their broad distribution (minimum separation of 1 or more nm), impacts from acoustic telemetry receivers would also be discountable. PAM systems will use the best available technology to reduce any potential risks of entanglement. PAM system deployment would avoid and minimize impacts on ESA-listed species, as detailed in BOEM's BA on data collection activities (BOEM 2021b). Conversely, gillnet sampling could result in adverse effects on a small number of ESA-listed sea turtles (see BOEM 2021b for details).

<u>Vessel traffic</u>: SFW has estimated that Project O&M would involve up to seven vessel trips per month, or between 2,500 and 2,600 vessel trips over the lifetime of the Project. The majority of vessel trips (2,500) would originate from the Montauk O&M facility, with rare vessel trips (< one per month) originating from New London, Connecticut, or unspecified ports in Europe on an as-needed basis. The negligible increase in vessel traffic due to unplanned maintenance is not expected to lead to a large increase in risk of collision with sea turtles due to the low number of vessel transits and the low density of sea turtles in the SFWF and SFEC.

Fishing vessels may be displaced during operation of WTGs. Up to 300 fishing vessels (see Section 3.5.1 [Commercial Fisheries and For-Hire Recreation]) could choose not to operate within the SFWF annually during operation, assuming all fishing vessels avoid the Lease Area. This would lead to a reduced potential for turtle collisions within the SFWF, but the risk could increase in areas where fishing vessels relocate their fishing activities outside the SFWF. In contrast, recreational fishing vessel use of the SFWF area may increase in response to the anticipated reef effect created by the monopile foundations. The degree to which these effects offset each other cannot be fully evaluated because turtle densities in the SFWF and SFEC are low overall and likely not uniform, and future changes in the distribution of commercial and recreational fishing vessel activity are difficult to predict. However, increases in collision risk in some areas is anticipated to be commensurate with the decreased risk within the SFWF, so changes in collision risk from relocated commercial and recreational vessels during operation of the SFWF would not be measurable from baseline.

Vessel operations associated with deploying and maintaining PAM devices, Innovasea receivers, HRG surveys associated with benthic monitoring, and other associated mitigation and monitoring activities could result in vessel strike effects on sea turtles. However, these vessel operations will represent a very small increase in regional vessel traffic relative to baseline conditions. Additionally, as described in Table G-1 of Appendix G, all Project vessels would adhere to seasonal and area-specific speed restrictions and guidance to avoid and minimize collision risks to ESA-listed species. On this basis, BOEM considers the likelihood of vessel strike effects on sea turtles to be minor.

As with construction, a similar increase in vessel round trips during conceptual decommissioning is expected to increase the relative risk of vessel strike for sea turtles. The implementation of NOAA guidelines (see Table G-1 in Appendix G) as an EPM is intended to minimize the potential of vessel strikes for sea turtles by reducing vessel speed and maintaining a separation distance from sighted turtles. Collisions, if they do occur, are expected to be fatal to individuals. Because the abundance of sea turtles in the SFWF and SFEC is anticipated to be generally low with patchy distribution, and the proportional increase in vessel traffic also low, the number of sea turtles injured or killed by vessel strikes as a result of Project construction would be low and would not result in significant effects at the population level. Therefore, potential effects of vessel strikes on sea turtles from vessels supporting the Project conceptual decommissioning would be minor.

Cumulative Impacts

<u>Accidental releases and discharges</u>: Toxic contaminants and marine debris are recognized as significant sources of sea turtle injury and mortality and are leading threats to successful species conservation and recovery. The Proposed Action would increase commercial vessel activity on the OCS, creating a potential source for accidental spills, trash, and debris. BOEM estimates that the Project would result in a negligible, up to 1% incremental increase in total chemical usage in the geographic analysis area relative to the No Action alternative. When combined with other offshore wind projects, up to approximately 2.3 million gallons of coolants and 10.5 million gallons of oils and lubricants that could cumulatively be stored within WTG foundations and the OSS within the geographic analysis area (see Section 3.4.6.2.2 [No Action Alternative] for quantities and details). Compliance with USCG regulations and BOEM requirements to minimize the risk of accidental spills and/or release of trash and debris would limit the volume and extent of Project-related trash/debris or invasive species potentially released accidentally. Additionally, as discussed in Section 3.4.6.2.2 (No Action Alternative), the volumes of trash/debris potentially released accidentally under the No Action alternative would be negligible and would not contribute to potential adverse impacts. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be negligible.

<u>EMF</u>: The Proposed Action would result in negligible incremental impacts to sea turtles from EMF exposure via the addition of 82.5 to 86.9 miles of cable (1%) as compared to conditions under the No Action alternative. Submarine power cables would be installed with appropriate shielding and burial depth to reduce potential EMF at the substrate surface. The SFEC and inter-array cables would maintain a minimum separation of at least 330 feet from other known cables to avoid inadvertent damage during installation. This separation distance ensures that there are no additive EMF effects from adjacent cables.

Additionally, exposure to detectable levels of EMF would be limited to within 25 feet of the small number of areas where cable segments cannot be buried to the anticipated depth. This represents an extremely small percentage of the geographic analysis area for sea turtles and is unlikely to lead to biologically significant effects on sea turtle movement, migration, or foraging patterns.

BOEM estimates a cumulative total of up to 8,125 miles of cable for the Proposed Action plus all other future offshore wind projects in the geographic analysis area. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominately of impacts described under the No Action alternative, which would represent a long-term negligible impact on sea turtles.

Light: The Proposed Action would result in negligible incremental impacts to sea turtles through the installation of 16 lighted structures (15 WTGs and one OSS). This represents less than a 1% increase to conditions under the No Action alternative. BOEM estimates a cumulative total of 2,563 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the geographic analysis area. Nighttime lighting associated with offshore structures and vessels could represent a source of attraction, avoidance, or other behavioral responses in sea turtles. However, BOEM assumes that all offshore wind projects would be sited offshore, away from nesting beaches and would not disorient nesting females or hatchling sea turtles.

For the same reasons, the Proposed Action when combined with past, present, and reasonably foreseeable activities would also represent a negligible impact on sea turtles.

New cable emplacement/maintenance: Cable installation associated with the Proposed Action would result in localized, temporary, negligible incremental impacts to sea turtles through an estimated 913 acres of temporary seabed disturbance and associated increased suspended sedimentation within the geographic analysis area. BOEM estimates a cumulative total of 11,044 acres of seabed disturbance for the Proposed Action plus all other future offshore wind projects in the geographic analysis area. While increases in foraging effort or displacement due to turbidity may occur to individual sea turtles, these temporary effects are not anticipated to lead to population-level effects on sea turtle populations. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in negligible impacts to sea turtles.

Noise: The Proposed Action would result in localized, temporary, negligible to minor incremental impacts to sea turtles through the generation of impulsive and non-impulsive underwater noise associated with offshore wind construction activities. BOEM estimates a cumulative total of 2,563 offshore WTGs and OSS foundations will be developed in the geographic analysis area for sea turtles between 2022 and 2030. Sea turtles are anticipated to occur at generally low densities (see Section 3.4.6.1 [Affected Environment]) near wind farms in the region, reducing the probability of individual exposure to noise effects. Noise sources associated with the Proposed Action could incrementally add to the ambient noise environment under the No Action alternative if noise sources overlap temporally or geographically. Pile driving would represent the most significant source of noise. As noted in Section 3.4.4.2.2 [No Action Alternative], there are three possible exposure scenarios for pile-driving noise: 1) concurrent exposure from two or more impact hammers for the same or adjacent projects; 2) non-concurrent exposure from multiple pile-driving events in the same years; 3) exposure to concurrent and non-concurrent pile-driving events over multiple years. Although the extent, duration, and significance of exposure would vary based on project-specific factors, the effects would be similar in nature to those described for the Proposed Action alternative. The behavior of sea turtles would be anticipated to return to normal over time following the ceasing of pile driving (NOAA 2020a). Permanent hearing impairment could occur to some individuals, but science has not determined whether hearing ability is critical to sea turtles completing essential life history requirements. Due to the limited information about noise-related stress responses in sea turtles, physiological stress responses may likely occur concurrently with any other response, such as hearing impairment or behavioral disruptions.

For impulsive noise, BOEM anticipates that projects would employ soft starts during pile driving to allow the small number of turtles in the region to leave the area before underwater noise increases to injurious levels. Additionally, the implementation of monitoring zones and clearance zones associated with wind farm construction projects would further reduce the likelihood of injury from the potential moderate cumulative impacts associated with pile driving. With regard to non-impulsive noise sources, potential behavioral impacts on sea turtles from vessel traffic noise would be intermittent and temporary as animals and vessels pass near each other. During construction and operation, helicopter traffic may cause some short-term behavioral reactions in sea turtles, but energy expenditures would be minimal.

Based on the above findings, noise-related impacts of the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in negligible to minor impacts to sea turtles, depending upon the noise source.

Port utilization: Although dredging or in-water work for the Port of Montauk could be required for the Proposed Action, these actions would occur within heavily modified habitats. BOEM expect impacts to sea turtles due to the incremental increase in port expansion resulting from the Proposed Action to be negligible. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominately of impacts described under the No Action alternative, which would represent a minor impact to sea turtles.

Presence of structures: The Proposed Action would result in long-term negligible and minor beneficial incremental impacts to sea turtles through the installation of 16 structures (15 WTGs and one OSS) to conditions under the No Action alternative. The installation of monopile foundations would alter the character of the ocean environment, and their presence could affect sea turtle behavior. Increased prey availability, attraction to structures, and/or displacement could occur as a result of the installation of WTG facilities. As described in Section 3.4.6.2.3 (Operations and Maintenance and Conceptual Decommissioning), structures associated with offshore wind farms are expected to provide some level of reef effect and may benefit sea turtle foraging by creating new hard-bottom habitat, increasing pelagic productivity in local areas, or promoting prey aggregations on foundations.

Some level of displacement of sea turtles out of the Lease Area and into areas with a higher potential for interactions with ships or fishing gear could occur, particularly during construction phases, when elevated underwater noise levels occur. These intermittent impacts would persist until conceptual decommissioning is complete and structures are removed. Impacts could occur as a result of increased interaction with fishing gear, although annual monitoring, reporting, and cleanup of fishing gear around the base of the WTGs would reduce the extent of these impacts.

BOEM estimates a cumulative total of 2,563 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the geographic analysis area. For similar reasons as described above, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in negligible to minor impacts and potential minor beneficial impacts to sea turtles.

Vessel traffic: The Proposed Action would result in minor impacts to sea turtles through the addition of construction and maintenance vessels within the geographic analysis area. This increased offshore wind-related vessel traffic during construction, and associated noise impacts, could result in localized, intermittent impacts on sea turtles, resulting in brief, minor behavioral responses that would be expected to dissipate once the vessel or the individual has left the area. However, BOEM expects that these brief responses of individuals to passing vessels would be unexpected given the patchy distribution of sea turtles; no stock or population-level effects would be expected. Additionally, the Proposed Action would implement EPMs (see Table G-1 in Appendix G) to minimize vessel strikes.

BOEM estimates a peak of 379 construction vessels due to offshore wind project construction over a 10-year time frame, of which 13 would result from the Proposed Action alone. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be moderate; however, BOEM does not expect the viability of sea turtle populations to be affected.

Climate change: The types of impacts from global climate change described for the No Action alternative would occur under the Proposed Action, but the Proposed Action could also contribute to a long-term net decrease in GHG emissions. As described in Section 3.4.6.2.2, the interactions between climate change and other potential impacts associated with the Proposed Action are complex and difficult to predict with certainty. Northward shifts in sea turtle distributions due to warming waters could result in magnification of the anticipated impacts due to increased exposure. However, this magnification includes potential benefits associated with the creation of artificial reef habitat and may represent an incrementally increasing impact over the life of the Project. Based on the potential for increased exposure to the various effects of the Proposed Action described above, the Proposed Action when combined with other past, present, and reasonably foreseeable actions is expected to result in minor impacts to sea turtles.

Conclusions

Project construction and installation, O&M, and conceptual decommissioning would result in habitat disturbance, entrainment and impingement, underwater and airborne noise, water quality degradation, vessel traffic (strikes and noise), artificial lighting, and potential discharges/spills and trash. BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible** to **minor** adverse impacts and could include potentially **minor beneficial** impacts. Adverse impacts are expected to result mainly from pile-driving noise and increased vessel traffic. Beneficial impacts are expected to result from the presence of structures.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor adverse** and **minor beneficial**. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** impacts to sea turtles. The main drivers for these impact ratings are pile-driving noise and associated potential for auditory injury, the presence of structures, ongoing climate change, and ongoing vessel traffic posing a risk of collision. The Proposed Action would contribute to the overall impact rating primarily through pile-driving noise and the presence of structures. BOEM made this decision because the overall effect would be detectable and measurable, but these impacts would not result in population-level effects.

While the significance level of impacts would remain the same, BOEM could further reduce impacts with mitigation measures conditioned as part of the COP approval by BOEM that also includes the mitigation, monitoring, and reporting requirements required in the NMFS biological opinion (see Table G-2 in Appendix G).

3.4.6.2.4 VESSEL TRANSIT LANE ALTERNATIVE

The Transit alternative would lead to the same types of impacts on sea turtles from construction and installation, O&M, and conceptual decommissioning activities as described for the Proposed Action. However, the Transit alternative would result in a smaller area of seabed and water column disturbance and include a shorter duration of associated water quality degradation due to fewer WTGs constructed. Fewer structures in the water could also reduce the reef effect, indirectly reducing recreational fishing and the subsequent risk to sea turtles from entanglement. Fewer vessels and/or vessel trips would be expected, which would reduce the risk of discharges, fuel spills, and trash in the area and decrease the risk of collision with sea turtles. The duration of noise associated with pile driving would decrease. However, the sound levels resulting from construction activities would remain unchanged: sea turtle injury and behavioral-level effects thresholds described in the Proposed Action would similarly apply to this alternative.

Operational impacts of the Transit alternative on sea turtles would be minimally decreased compared to the Proposed Action due to the fewer number of WTGs and subsequent smaller area of impact. Less habitat would be altered and impacted by WTG operational noise, artificial lighting, and EMF from the inter-array cable. However, within the vicinity of the SFWF, effects would not be measurably different than the Proposed Action. Annual maintenance dredging and resulting water quality impacts at the O&M facility would not be measurably different than the Proposed Action.

Based on the above findings, the Transit alternative would be expected to have negligible to minor adverse impacts and potentially minor beneficial impacts.

Cumulative Impacts

If the Transit alternative is implemented, proposed WTGs could need to be eliminated within offshore wind lease areas to accommodate the proposed transit lanes. If the Transit alternative reduced the number of WTGs, associated risks to sea turtles, particularly related to pile-driving noise, would subsequently decrease. However, noise associated with additional vessel traffic and the risk of vessel collision or disturbance would be elevated due to increased use of the transit lane. Therefore, BOEM expects that reductions in WTGs and establishing transit lanes in their place would result still result in negligible to minor adverse and minor beneficial cumulative impacts to sea turtles, when combined with past, present, and reasonably foreseeable activities.

Conclusions

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **minor**.

In the context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor adverse** and **minor beneficial**). The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor**.

3.4.6.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

The Habitat alternative under either layout option would lead to the same types of impacts on sea turtles from construction and installation, O&M, and conceptual decommissioning activities as described for the Proposed Action. However, the total number of monopiles and associated scour protection may be reduced, and additional micrositing would be used to preferentially avoid gravel, cobble, or boulder substrates that provide complex fisheries habitat. The duration of noise-producing pile driving during construction would be shorter due to the reduced number of monopiles, but the extent of noise and the overall impact to sea turtles from construction of the SFWF would be the same as the Proposed Action. Therefore, the Habitat alternative under either layout option would result in negligible to minor adverse impacts and potentially minor beneficial impacts to sea turtles.

Cumulative Impacts

The Habitat alternative under either layout option is similar to the Proposed Action except that it may have a slightly smaller construction and operational footprint and duration of construction impacts. Therefore, the overall cumulative impacts of this alternative to sea turtles when combined with past, present, and reasonably foreseeable activities are anticipated to be negligible to minor adverse and minor beneficial.

Conclusions

Although the Habitat alternative under either layout option could reduce the number of WTGs and the associated length of inter-array cables, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **minor**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor adverse** and **minor beneficial**). The overall impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor**.

3.4.6.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, BOEM expects that sea turtle impacts would range from **negligible** to **minor adverse** for all action alternatives due to habitat disturbance, entrainment and impingement, underwater and airborne noise, water quality degradation, vessel traffic (strikes and noise), artificial lighting, and potential discharges/spills and trash. **Minor** beneficial impacts are expected to result from the presence of structures.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from **negligible** to **minor adverse** and **minor beneficial**. The main drivers for these impact ratings are pile-driving noise and associated potential for auditory injury, the presence of structures, ongoing climate change, and ongoing vessel traffic posing a risk of collision. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **minor**. BOEM made this decision because impacts would be detectable and measurable, but these impacts would not result in population-level effects.

3.4.6.4 Mitigation

Time of day visibility, exclusion zones, weather restrictions, daily pre-construction surveys, and vessel strike avoidance measures would further reduce the expected negligible to minor impacts to sea turtles by allowing observers to visually establish required exclusion zones and identify/avoid impacts to any individuals that could be affected by Project actions or vessel interactions. Crew training and educational awareness would also reduce impacts by increasing the effectiveness of mitigation and monitoring measures. Pile -driving sound source verification, data collection and reporting efforts, and monitoring plans would not reduce pile-driving or other Project-related impacts, but would ensure that the deployed noise reduction technologies and other employed mitigations are effective. Likewise, injury reporting would ensure that the amount of take that potentially occurs does not exceed the exempted take under the ESA and MMPA. Additionally, the data gathered could be used to evaluate impacts and potentially lead to recommendations for additional mitigation measures or monitoring methods, if required (30 CFR 585.633(b)). See Table G-2 in Appendix G for details.

3.4.7 Wetlands and Other Waters of the United States

3.4.7.1 Affected Environment

The onshore portions of the Project are located within the Shinnecock Bay-Atlantic Ocean watershed (HUC-0203020206), Shelter Island Sound-Gardiners Bay watershed (HUC-0203020207), and Long Island-Atlantic Ocean watershed (HUC-0203020209), which are part of the Southern Long Island Subbasin (HUC-02030202). Three subwatersheds overlap the Project: Moriches Bay-Atlantic Ocean (HUC-020302020902), Acabonack Harbor-Gardiners Bay (HUC-020302020704), and Georgica Pond-Frontal Atlantic Ocean (HUC-020302020606) (USGS 2019). A variety of freshwater and tidal wetlands were observed during the field surveys for the Project, including marine subtidal waters, intertidal beaches, intertidal marshes, mudflats, tidal creeks, and vegetated high marshes, as well as freshwater wetlands such as ponds, deepwater and emergent marshes, forested swamps, shrub swamps, bogs, wet meadows and various groundwater-influenced depressional features, including vegetated ditches and swales (VHB 2018). In all, 93 wetlands (83 freshwater wetlands and 10 tidal wetlands) were delineated during field surveys (VHB 2018:Section 3.0 [Table 2]). Table 3.4.7-1 provides a quantitative summary of delineated wetlands by Project component (VHB 2018:Section 3.0 [Table 3]).

The onshore O&M facility is 100 feet east of the inlet that connects Lake Montauk to Block Island Sound and the Atlantic Ocean. Based on a desktop review, no jurisdictional wetlands or other water resources are within the upland portion of the proposed facility site. The portion of Lake Montauk within the proposed O&M facility is a federal water under jurisdiction of USACE and a state tidal wetland (SM code: coastal shoal, bar, or mudflat) under jurisdiction of the NYSDEC (Stantec 2020).

Table 3.4.7-1. Delineated Wetlands by Project Component

Project Component	Freshwater Wetlands		Tidal Wetlands	
	Wetlands Within Project Component (number/acres)	Wetland Adjacent Areas Within Project Component (number/acres)*	Wetlands Within Project Component (number/acres)	Wetland Adjacent Areas Within Project Component (number/acres)*
Beach Lane landing site	0/0	0/0	0/0[c]	0/0[c]
Beach Lane cable route†	0/0	0/0	0/0	0/0
Hither Hills landing site	0/0	0/0	0/0	0/0
Hither Hills cable route†	22/2.02	7/13.21	0/0	5/4.73
Interconnection facility	0/0	0/0	0/0	0/0

Source: VHB (2018).

* The NYSDEC-regulated adjacent areas for freshwater wetlands and tidal wetlands are 100 feet and 300 feet, respectively.

† The area surveyed during wetland delineations is greater than the actual Project footprint, therefore the number/area of delineated wetlands within the construction footprint for each cable route would be less than those shown in this table.

3.4.7.2 *Environmental Consequences*

3.4.7.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.4.7-2 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for this final EIS.

Table 3.4.7-2. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Wetlands and other Waters of the United States

<table>
<tr><th>Issue</th><th>Impact Indicator</th><th>Significance Criteria</th></tr>
<tr><td>Land disturbance/loss of wetlands</td><td>Acres of wetlands impacted</td><td rowspan="3">Negligible: No measurable loss or modification of wetlands would occur; no measurable change in wetland quality or function would occur.
Minor: Most impacts to wetlands could be avoided with mitigation; if impacts occur, the wetland would recover completely.
Moderate: impacts to wetlands are unavoidable, but the overall wetland function would not be threatened.
Major: impacts to wetlands could be severe and long lasting.</td></tr>
<tr><td>Soil erosion and sedimentation</td><td>Qualitative assessment of potential Increased sedimentation into wetlands</td></tr>
<tr><td>Discharges/releases</td><td>Qualitative assessment of potential changes in water quality from HDD activity and spills</td></tr>
</table>

3.4.7.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing wetland and other wetlands and other waters of the United States (WOTUS) trends from past and present activities. Attachment 3 in Appendix E provides additional information regarding past and present activities and associated wetland and other WOTUS impacts. Future non-Project actions include residential, commercial, and industrial developments, as described in Appendix E, as well as the FIMP Project, LIRR improvements, dredging and port improvement projects, and existing and proposed WTGs and communications towers. Attachment 3 in Appendix E discloses future non-offshore wind activities and associated wetland and other WOTUS impacts. These impacts are also described below.

Future Activities (without the Proposed Action)

Future onshore projects could temporarily disturb wetlands or areas near wetlands. All projects would be required to comply with federal, state, and local regulations related to the protection of wetlands and other WOTUS, thereby avoiding or minimizing impacts. If impacts would not be entirely avoided, mitigation would be anticipated for projects that would allow wetlands to recover to the extent possible. BOEM is not aware of any future offshore wind activities other than the Proposed Action that would overlap the geographic analysis area. However, this final EIS assumes that any onshore impacts associated with these future projects would be similar to the Proposed Action. As a result, adverse impacts from future activities on wetlands and other WOTUS under the No Action alternative would be short term and minor.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on wetlands and other WOTUS associated with the Project would not occur. However, ongoing and future activities would have continuing short-term impacts on wetlands and other WOTUS, primarily due to land disturbance.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities and onshore activities would be negligible to **minor**. As described in Attachment 3 in Appendix E, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable offshore activities other than offshore wind would be **minor**.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts because the effect would be small and the resource would be expected to recover completely.

3.4.7.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

During construction of the onshore SFEC cable, there could be up to 2.02 acres of impacts to freshwater wetlands and wetland adjacent areas from dredging and/or filling if the Hither Hills route is selected (see Table 3.4.7-1). These impacts would be long term, localized, and minor. The Project would comply with the federal Clean Water Act of 1972, NYDEC, and local regulations to prevent degradation to wetlands (VHB 2018:Section 3.0). There would be no direct impacts to freshwater wetlands or wetland adjacent areas if the Beach Lane route is selected. No impacts to tidal wetlands would occur for Beach Lane; however, impacts of up to 4.73 acres of tidal wetland adjacent areas could occur if the Hither Hills route is selected. No wetlands were delineated within the proposed interconnection facility. Additionally, no impacts in the intertidal areas from construction at the landing sites are anticipated due to subsurface installation techniques proposed (i.e., HDD). The transition vault and HDD work area would be protected by erosion and sedimentation controls outlined in the Project SWPPP required for construction. The underground transition vault located at the selected onshore cable landing site would also be installed above mean high water, outside of wetlands and waterbodies, within paved roadway or a parking lot, and would have a manhole cover at the ground surface. Therefore, potential adverse impacts to wetland adjacent areas from construction activities would be long term, localized, and minor.

Temporary, localized decreases in water quality to tidal and freshwater wetlands from increased sedimentation during construction of the onshore SFEC route, the O&M facility, and interconnection facility could occur, but they are considered negligible. All earth disturbances from construction activities would be conducted in compliance with the New York State Pollutant Discharge Elimination System General Permit for Stormwater Discharges associated with Construction Activities and the approved SWPPP for the Project. The in-water work for construction of the Montauk O&M facility would be in compliance with NYSDEC permits for Excavation and Fill in Navigable Waters and Tidal Wetlands (dredging permits) and SFW would be required to apply for a CWA Section 404 Individual Permit from USACE and a Section 401 Water Quality Certification (Stantec 2020). SFW would comply with all requirements of any issued permits. Any non-routine spills or accidental releases could result in negligible and short-term impacts to surface water resources would be avoided or minimized through the implementation of the Project SPCC plan.

Operations and Maintenance and Conceptual Decommissioning

The onshore underground transition vault, cable route, and interconnection facility have no maintenance needs unless a fault or failure occurs; therefore, O&M is not expected to impact wetlands or WOTUS. In the event of a fault or failure, impacts would be expected to be short term and negligible. Conceptual decommissioning of the onshore Project components would have similar impacts as construction; long term, localized, and minor.

Cumulative Impacts

Onshore construction and installation could incrementally add up to 2.02 acres of wetlands impacts to the No Action alternative, depending on the onshore cable route selected. Project developers would comply with all local, state, and federal wetland regulations and permit requirements. Therefore, the incremental impact for the Proposed Action would be short term to long term and negligible to minor. The cumulative impact of the Proposed Action when combined with past, present, and reasonably foreseeable projects to wetlands and WOTUS would be short term to long term and negligible to minor.

Conclusions

Project construction and installation and conceptual decommissioning would result in wetland dredging or fill if the Hither Hills route is selected. Sedimentation could also occur during construction of the onshore SFEC route, the O&M facility, and interconnection facility. No O&M impacts are anticipated. BOEM anticipates the impacts resulting from the Proposed Action alone would be short term to long term and **negligible to minor**. Therefore, BOEM expects the overall impact on wetlands or other WOTUS from the Proposed Action alone to be **minor** because the effect would be small and the resource would be expected to recover completely without remedial or mitigating action.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would be **negligible** to **minor**. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor** impacts to wetlands or other WOTUS. BOEM made this call as the effect would be small and the resource would be expected to recover completely.

3.4.7.2.4 VESSEL TRANSIT LANE ALTERNATIVE

Changes in offshore transit routes under the Transit alternative would not increase or decrease proposed impacts to onshore or nearshore freshwater and tidal wetlands when compared to the Proposed Action. All onshore Project components and activities, including construction and installation, O&M, and conceptual decommissioning, would be the same as the Proposed Action. Therefore, the impact of this alternative would be the same as the Proposed Action: short term to long term and negligible to minor.

Cumulative Impacts

For the same reasons described above, the cumulative impacts of this alternative when combined with other past, present, and reasonably foreseeable activities would be the same as the Proposed Action: short-term and negligible to minor.

Conclusions

Since reductions to the number of WTGs and their associated inter-array cables considered under this alternative would not impact wetlands and other WOTUS, BOEM expects that the impacts resulting from the alternative alone would be the same as the Proposed Action and range from **negligible** to **minor**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to minor impacts). The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor**.

3.4.7.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

Changes in the number of turbines and their associated inter-array cables and micrositing of turbines under the Habitat alternative for either layout option would not increase or decrease proposed impacts to onshore or nearshore freshwater and tidal wetlands when compared to the Proposed Action. All onshore Project components and activities, including construction and installation, O&M, and conceptual decommissioning, would be the same as the Proposed Action. Therefore, the impacts of this alternative would be the same as the Proposed Action: short to long term and negligible to minor.

Cumulative Impacts

For the same reasons described above, the cumulative impacts of this alternative under either layout option when combined with other past, present, and reasonably foreseeable activities would be the same as the Proposed Action: short to long term and negligible to minor.

Conclusions

Since reductions to the number of WTGs and their associated inter-array cables considered under this alternative for either layout option would not impact wetlands and other WOTUS, BOEM expects that the impacts resulting from the alternative alone would be similar to the Proposed Action and range from **negligible** to **minor**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to **minor** impacts). The overall impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor**.

3.4.7.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change across evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, these alterations would not impact wetlands and other WOTUS. Therefore, BOEM expects that terrestrial and coastal fauna and habitats impacts would range from **negligible** to **minor** for all action alternatives due to potential wetland dredging or fill and sedimentation.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts as **negligible** to **minor**. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **minor**. BOEM made this call as the effect would be small, and the resource would be expected to recover completely.

3.4.7.4 Mitigation

If impacts to wetlands and WOTUS occur, the Project would be subject to mitigation measures imposed by the USACE in compliance with the CWA. Currently, no potential additional mitigation measures for wetlands and WOTUS are identified in Appendix G.

3.5 SOCIOECONOMIC AND CULTURAL RESOURCES

3.5.1 Commercial Fisheries and For-Hire Recreational Fishing (see section in main EIS)

3.5.2 Cultural Resources (see section in main EIS)

3.5.3 Demographics, Employment, and Economics (see section in main EIS)

3.5.4 Environmental Justice (see section in main EIS)

3.5.5 Land Use and Coastal Infrastructure (see section in main EIS)

3.5.6 Navigation and Vessel Traffic

3.5.6.1 Affected Environment

This section discusses navigation and vessel traffic characteristics and potential impacts on the waterways and water approaches adjacent to the Lease Area. It primarily draws on the navigational safety risk assessment (DNV-GL 2021) prepared to comply with the guidelines in USCG *Navigation and Vessel Inspection Circular (NVIC) 02-07* (USCG 2007), which has since been canceled and replaced with *NVIC 01-19* (USCG 2019). This section groups vessel types into deep draft vessels (cargo and tanker vessels) and tug and towing vessels that would generally avoid the Lease Area, and vessels that travel within and through the Lease Area (commercial fishing, passenger, and other vessels).

The navigational safety risk assessment analyzed all vessels with AIS data[3] using data for July 1, 2018, through June 30, 2019, in addition to vessel monitoring system (VMS) data for calendar year 2016 (DNV-GL 2021). The assessment used a 5-mile radius around the Project to determine the vessel types transiting in the area during this time period and evaluation incidents; AIS data suggest that only fishing, other and unidentified, and pleasure vessels currently transit within the SFWF. Most vessels sail between 5 and 15 knots.

USCG's (2020) *The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study* (MARIPARS) analyzed AIS data in the eight BOEM OCS lease areas in the Rhode Island and Massachusetts region (study area).[4] (USCG 2020:Figure 3). The MARIPARS study found 13,000 to 46,900 annual vessel transits through the study area. Activity during the summer months was quadruple that of January and February. The study concluded that vessel activity in the study area was largely commercial fishing. Fishing vessels primarily originated from several ports in Rhode Island, Massachusetts, or New York and transited the study area to reach fishing ground and other areas southeast of the study area. Recreational vessels were more expected to transit within the turbine arrays

[3] AIS data cover those vessels that are required to carry a transponder—or that choose to carry one—according to AIS requirements at 33 CFR 164.01, 164.02, 164.46, and 164.53. Most smaller vessels are not covered in the data. AIS data underestimate the scale of commercial fishing vessel activities, as transponders are only required for vessels over 65 feet and can be turned off after 12 nm. See Section 3.5.1 (Commercial Fisheries and For-Hire Recreational Fishing) for a discussion of VMS data used for commercial fishing vessels.

[4] The MARIPARS includes the following BOEM lease areas: OCS-A 486 (now subdivided as OSC-A 0517 and OCS-A 0486), OCS-A 0487, OCS-A 0500, OCS-A 0501, OCS-A 0520, OCS-A 0521, and OCS-A 0522.

and less expected to use USCG designated routes. Passenger vessels largely did not transit the study area. Deep draft and towing vessels transited the study area, mostly on the west side, and tug and towing vessels had a low frequency of transit in the study area. MARIPARS did not evaluate other and unidentified vessels, though many appeared to be misclassified fishing vessels.

AIS data for 2018 (Office for Coastal Management [OCM] 2019) were further analyzed to measure the time and distance that vessels spent within the Lease Area. In 2018, vessels traveled 5,521 miles and spent 25,880 hours within the Lease Area and nearby lease areas. The majority of miles and time are attributed to vessels that could not be identified. Fishing vessels accounted for 23% of all vessel miles traveled and 23% of hours spent in the area. Pleasure craft accounted for 13% of miles and 20% of time (Table 3.5.6-1). Table 3.5.6-2 summarizes activity in bays in the geographic analysis area, as measured by miles traveled. Passenger vessels and pleasure craft account for the majority of activity in Buzzards Bay, Massachusetts Bay, and New York Harbor, while deep draft vessels account for most of the activity in Chesapeake Bay and Delaware Bay.

Table 3.5.6-1. Existing Vessel Traffic in Lease Area Groups, 2018 (AIS data)

Vessel Type	SFWF	Block Island	Other RI/MA and MA WEAs
Time Vessels Spent inside Lease Area Groups (hours)			
Cargo	2,023	0	34,306
Fishing	5,961	334	239,112
Not available	6,519	8	36,506
Other	4,696	42,031	129,080
Passenger	479	534	7,272
Pleasure craft/Sailing	5,281	1,957	58,639
Tanker	901	0	17,279
Tug/Tow	20	0	6,749
Total	**25,880**	**44,863**	**528,943**
Distance Vessels Traveled inside Lease Area (miles)			
Cargo	132	0	4,956
Fishing	1,259	21	68,373
Not available	2,654	1	3,786
Other	260	790	22,095
Passenger	422	118	3,152
Pleasure craft/Sailing	722	26	11,230
Tanker	71	0	3,139
Tug/Tow	1	0	468
Total	**5,521**	**956**	**117,199**

Source: OCM (2019).

Table 3.5.6-2. Existing Vessel Traffic in Bays, 2018

Vessel Type	Distance Vessels Traveled inside Bays (thousands of miles and percentage of totals)									
	Buzzards Bay		Chesapeake Bay		Delaware Bay		Massachusetts Bay		New York Harbor	
Cargo	31,582	(2%)	663,095	(16%)	276,308	(18%)	26,153	(2%)	125,120	(3%)
Fishing	302,085	(17%)	111,658	(3%)	15,360	(1%)	72,835	(6%)	5,223	(0%)
Not available	81,330	(5%)	232,338	(6%)	81,930	(5%)	150,056	(12%)	296,171	(7%)
Other	79,626	(4%)	339,487	(8%)	88,305	(6%)	86,837	(7%)	143,048	(3%)
Passenger	392,097	(22%)	388,190	(10%)	191,493	(12%)	456,082	(35%)	2,198,312	(52%)
Pleasure craft/Sailing	576,292	(32%)	1,078,695	(27%)	99,874	(6%)	223,474	(17%)	151,634	(4%)
Tanker	18,695	(1%)	47,466	(1%)	136,507	(9%)	21,639	(2%)	62,033	(1%)
Tug/Tow	302,406	(17%)	1,188,461	(29%)	667,005	(43%)	247,764	(19%)	1,226,713	(29%)
Total	**1,784,112**		**4,049,389**		**1,556,782**		**1,284,840**		**4,208,253**	

Source: Developed using OCM (2019).

Figures C-29a and C-29b in Appendix C show close-up views of the Project with vessel traffic (based on AIS data). Tankers cargo vessels, and tug and towing vessels generally travel in the internationally designated Traffic Separation Schemes to the north and west of the Lease Area. These vessels can approach or exit the Narragansett Bay Traffic Separation Scheme in a northwest–southeast orientation leading some to transit through the Lease Area. East of and at the approximate latitude of Old Harbor, cargo vessels diverge from the north–south traffic lanes, and some transit through the Lease Area. Passenger vessels, typically ferries or cruise ships, generally avoid the Lease Area and would often follow a similar route. The Lease Area is located outside of the designated lanes used by most commercial vessel traffic. Fishing vessels operate all over the region, sometimes fishing and often transiting, with their vessel movements recorded through AIS, VMS, or not at all (see Section 3.5.1.1 [Affected Environment] in Section 3.5.1 Commercial Fisheries and For-Hire Recreational Fishing). Relative to the larger geographic area, there is less vessel traffic near the Lease Area.

The navigational safety risk assessment analyzed vessel incident data and found no collisions or allisions in the Lease Area, and a total of 0.2889 collisions per year and no allisions in the assessment's study area, which encompassed a much larger area than the Lease Area (DNV-GL 2021). Fishing vessels and passenger vessels experienced the most frequent rate of incidents and accounted for more than half of the collisions, at 0.1588 per year.[5]

3.5.6.2 Environmental Consequences

3.5.6.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.5.6-3 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for this final EIS. Construction and conceptual decommissioning activities would have short-term impacts of 1 to 2 years, and long-term impacts during operations would last for the duration of the Project (25 years, plus up to an additional 2 years for conceptual decommissioning) until conceptual decommissioning.

[5] The USCG is beginning a new study of routes used by ships to access ports on the Atlantic Coast, Atlantic Coast Port Access Route Study: Port Approaches and International Entry and Departure Transit Areas (USCG 2019).

Table 3.5.6-3. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Navigation and Vessel Traffic

Issue	Impact Indicator	Significance Criteria
Vessel or structural damage due to incident	Increased frequency of strikes/allisions, collisions, and groundings	Negligible: No measurable impacts would occur. Minor: Impacts to vessels and turbines could be avoided with EPMs. Impacts would not disrupt the normal or routine functions or navigation of the vessel or turbine. Moderate: Impacts are unavoidable, although EPMs would reduce impacts substantially during the life of the Project. The vessel would have to adjust somewhat to account for disruptions due to impacts of the Project Major. Vessel traffic would experience unavoidable disruptions to a degree beyond what is normally acceptable.
Vessel traffic	Increased vessel traffic or congestion	
Navigation	Changes to navigational patterns and increased risk of navigational hazards	

3.5.6.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing navigation and vessel traffic trends from past and present activities. Table 3.13-1 in Appendix E, Attachment 3 provides additional information regarding past and present activities and associated navigation and vessel traffic impacts. Future non-Project actions include offshore wind development activities, tidal energy projects, dredging and port improvement projects [see Appendix E]) and future marine transportation and fisheries use. Attachment 3 in Appendix E discloses future non-offshore wind activities and associated navigation and vessel traffic impacts. Impacts associated with future offshore wind activities are described below.

Future Activities (without the Proposed Action)

Traffic: Applying vessel activity estimates developed by BOEM based on their 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019), if construction of the Project does not occur, vessel activity could peak in 2024 with as many as 379 vessels involved in the construction of reasonably foreseeable projects (Table 3.5.6-4.).

Table 3.5.6-4. Cumulative Construction and Operations Vessels from Future Activities

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Average construction vessels	0	0	69	202	95	112	69	0	0	0	0
Maximum construction vessels	0	0	126	372	174	205	127	0	0	0	0
Average operation vessels	1	1	1	5	17	26	33	44	44	44	1
Maximum operation vessels	1	1	1	7	25	39	49	66	66	66	1
Average daily vessels, total	1	1	70	207	112	138	102	44	44	44	1
Maximum daily vessels, total	1	1	127	379	199	244	176	66	66	66	1

Source: Developed using OCM (2019).

Construction activities would result in increased vessel traffic near the lease areas and ports used as well as obstructions to navigation and changes to navigation patterns. Additional impacts would include delays within or approaching ports; increased navigational complexity; detours to offshore travel or port approaches; or increased risk of incidents such as collision, strikes or allisions, and groundings. Other reasonably foreseeable future offshore projects would produce additional vessel traffic during construction, but because of their timing, they are not anticipated to use the same traffic routes. Construction of other offshore wind projects would be scheduled to minimize overlapping construction periods and reduce the number of construction vessels in operation at any given time, effectively reducing the cumulative impact on port congestion and construction vessel rerouting. As a whole, this level of traffic activity would represent a minor to moderate adverse impact to navigation under the No Action alternative because the construction would be located outside of major shipping lanes and the number of vessels would be small compared to the overall level of traffic near each of the potential developments.

Cumulative impacts during O&M of reasonably foreseeable offshore wind projects (see Table 3.5.6-4.) would also represent a negligible to minor adverse impact to navigation due to the smaller number of vessels and lower frequency of activities (growing to an average of 44 vessel trips per day by 2029). Conceptual decommissioning of each of the projects is anticipated to have cumulative impacts similar to those experienced during construction. All reasonably foreseeable offshore wind projects would be required to prepare a navigational safety risk assessment in compliance with the guidelines in USCG *NVIC 01-19* (USCG 2019), which would minimize impacts to marine navigation.

New cable emplacement/maintenance: Under the No Action alternative, up to 4,247 miles of cable could be installed in the RI/MA WEA to support future offshore wind projects. Offshore cable emplacement would have temporary, localized adverse impacts on boating because vessels would need to navigate around work areas, and some boaters would prefer to avoid the noise and disruption caused by installation.

Presence of structures: The placement of 1,294 WTGs and OSS in the RI/MA WEA would have long-term adverse impacts on vessels through the risk of allision, navigation hazards, space use conflicts, the presence of cable infrastructure, and visual impacts. While lease areas are generally located in low vessel traffic areas, they do receive some use. Table 3.5.6-2 summarizes the time spent and miles traveled by vessels within the SFWF and other lease areas in 2018.

The presence of offshore wind structures would increase the geographic analysis area’s navigational complexity, thereby increasing the risk of allision or collision. Deep draft and tug and towing vessels would need to minimally divert to avoid traveling near structures. Vessels that generally travel within and through lease areas could require adjustment of navigation practices. The attraction of the artificial reef effects would incrementally increase vessel congestion and the risk of allision, collision, and spills near WTGs. BOEM assumes that all offshore wind developments in the geographic analysis area would use the developer agreed upon 1 × 1–nm spacing in fixed east–west rows and north–south columns and would evaluate each of those individual projects in their respective NEPA analyses. Because this layout supports the traditional east–west active fishing operations, this arrangement would reduce, but not eliminate, navigational complexity and space-use conflicts during the operation phases of the projects.

Port utilization: Construction and operation of improvements at various ports in support of reasonably foreseeable offshore wind projects could coincide with forecasted port improvements listed in Appendix E, some of which are intended to directly support offshore wind energy development. Port improvements could increase vessel congestion and stress port capacity during construction. However, state and local agencies would be responsible for minimizing the potential adverse impacts of additional port utilization by managing traffic to ensure continued access to ports.

Anchoring: In total, BOEM estimates approximately 1,440 acres of seabed would be disturbed by anchoring associated with offshore wind activities in the RI/MA WEA. Future offshore wind developers are expected to coordinate with the maritime community and the USCG to avoid laying export cables through any traditional or designated lightering/anchorage areas, meaning that any risk for deep-draft vessels would come from anchoring in an emergency scenario, specifically in or near the Buzzards Bay and Narragansett Bay traffic separation schemes. Generally, larger vessels accidently dropping anchor on top of an export cable (buried or mattress protected) to prevent drifting in the event of vessel power failure would result in damage to the export cable, risks to the vessel associated with an anchor contacting an electrified cable, and impacts to the vessel operator’s liability and insurance. Impacts on navigation and vessel traffic would be temporary and localized, and navigation and vessel traffic would fully recover following the disturbance.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on navigation associated with the Project would not occur. However, ongoing and future activities would have continuing temporary to long-term impacts on navigation, primarily through existing traffic activity, port use, and the presence of structures.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities, especially the presence of structures, port utilization, and vessel traffic, would be **minor** to **moderate**. As described in Attachment 3 in Appendix E, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would also be **minor** to **moderate**. Future projects would increase vessel activity, which could lead to congestion at affected ports, the possible need for port upgrades beyond those currently envisioned, as well as an increased likelihood of collisions and allisions, with resultant increased risk of accidental releases. In addition, the presence of new WTGs would also increase the risk for collisions, allisions, and resultant accidental releases and threats to human health and safety.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **moderate** adverse impacts because the overall effect would be notable but vessels would be able to adjust to account for disruptions and EPMs would reduce impacts.

3.5.6.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Project construction could impact navigation and vessel traffic. Project effects on navigation and vessel traffic would include increased vessel traffic near the SFWF, offshore SFEC, and ports used by the Project; obstructions to navigation; delays within or approaching ports; increased navigational complexity; changes to navigation patterns; detours to offshore travel or port approaches; or increased risk of incidents such as collision, strikes or allisions, and groundings.

Monopile turbine construction would require approximately 5,000 to 10,000 vessel work days[6] over 1 to 2 years, and offshore SFEC construction would require approximately 4,000 to 4,500 vessel work days[7] over 1 year (Jacobs 2021). The navigational safety risk assessment indicates the highest risk would be from smaller, non-Project vessels operating close to construction and work vessels. Because of the small number of vessels used for construction and the location of the Project outside of shipping lanes (as shown in Figures C-29a and C-29b in Appendix C), there would be a negligible to minor adverse impact on deep draft and tug and towing vessels, which would need to reroute around the Project for a slightly longer route, and smaller passenger vessels, (which may reroute closer to shore, increasing grounding potential). As noted in Section 3.5.1.2.3, during construction and installation, commercial fishing vessels would need to avoid work areas and could be adversely impacted, depending on the location of the

[6] Monopile construction vessels would include a floating/jack-up crane barge, two towing tugs, two material barges, an anchor handling barge, a rock dumping vessel, two crew transport vessels, an inflatable support vessel, a helicopter, and two Monco 335 feeder barges. A bunkering vessel would support the construction fleet. These 13 vessels would operate 24 hours per day during construction.

[7] Offshore SFEC construction vessels would include a transportation barge, a fuel bunkering vessel, two towing tugs, a material barge, an anchor handling barge, a cable laying vessel, a work vessel, a work vessel support tug, two crew transport vessels, and an inflatable support vessel. A bunkering vessel would support the construction fleet. These 13 vessels would operate 24 hours per day during construction.

exploitable biomass and whether there are suitable alternative locations; with respect to navigation, commercial fishing vessels would experience temporary, minor to moderate adverse impacts. Because of the small number of vessels involved in construction, there would be a negligible impact on port congestion (see Table 3.1-5 in the COP for list of potential ports). Sheet Harbor may be used as a backup port for some installation activities, resulting in a minimal number of trips to that port and a corresponding reduction of the use of U.S. ports. Cable laying would have a temporary, negligible to minor adverse impact on vessels entering or exiting commercial shipping lanes and the precautionary area. Project construction would have a negligible impact on commercial traffic.

SFW would implement temporary safety zones around the locations with active construction, develop a mariner communication plan, and limit construction activities to periods of good weather conditions would minimize impacts from offshore SFEC construction and result in a negligible adverse impact (see Table G-1 in Appendix G).

Because of the small number of vessels involved with Project construction, any ports potentially used by these vessels would be able to accommodate their needs at existing facilities without significant modifications or upgrades; therefore, the impact to port operations would be negligible. See Table 3.1-5 in COP for a list of potential port facilities the Project could use and how they would be used.

Operations and Maintenance and Conceptual Decommissioning

During operations, planned maintenance and unplanned maintenance are each expected to require 1 week of work each year (Deepwater Wind South Fork, LLC 2019) and would include three crew transport vessels, a floating/jack-up crane barge, and two feeder barges (Jacobs 2021). This limited operation activity would have a negligible adverse impact on navigation and vessel traffic. Any ports used by these vessels would likewise have a negligible impact because ports potentially used by these vessels would be able to accommodate their needs at existing facilities without significant modifications or upgrades.

Under the Proposed Action, there would be an increase of 0.04 incidents per year (0.14%) in the navigational safety risk assessment's study area over baseline conditions as a result of changes to travel patterns to certain vessel types (DNV-GL 2021:Table 11-1); 31% of total incidents would be groundings. Collisions are expected to increase by 2%, and allisions are expected to increase by 66%. Pleasure vessels are expected to account for 48% of the increased incidents, and fishing vessels are expected to account for 32% of the increase. In the Lease Area, there would be an increase of 0.027 incidents, of which fishing vessels would account for 0.012 incidents. Most of these incidents would be drift allisions, and there would be a negligible increase (< 0.0005) in collisions.

Because of the low frequency of incidents (less than 1% of which would be collisions or allisions) and Project EPMs (see Table G-1 in Appendix G), the expected risks to navigation would be negligible. Most deep draft vessel traffic already avoids the area and would not need to meaningfully reroute, as shown in Figures C-29a and C-29b in Appendix C. For cargo, passenger, and tanker vessels that travel through the Lease Area, only slight reroutes would be necessary to avoid Project components (DNV-GL 2021:Section F.4.2).

According to the NSRA, the Project would not have an impact on the USCG's missions, primarily because of the low frequency of missions in the area, averaging 0.18 missions in the Lease Area (DNV-GL 2021).

For vessels that generally travel within and through the Lease Area, the NSRA mapped out the placement of the turbines and evaluated the time of potential visual obstruction each would present based on a vessel's speed (DNV-GL 2021:Section 9). At a speed of 5 knots, a vessel's view could be obstructed for as much as 9 seconds. The navigational safety risk assessment notes that this is a conservative estimate because it reflects the view of a single moving vessel and not multiple moving vessels that would enhance each vessel's ability to see the others. Because of the 1 × 1–nm spacing of the turbines, the impact on visibility would be further reduced. The turbines would not impact a mariner's ability to use navigation aids or the coastline as a reference for navigation. Overall, spacing and placement of the turbines would result in a negligible impact to visibility. NOAA also would identify and chart the WTGs and offshore SFEC.

As noted in Section 3.5.1.2.3, commercial fishing vessels that are unable to adapt to the presence of structures or find suitable alternative fishing locations may experience moderate adverse impacts because of reduced fishing opportunity. For those vessels that can adapt to the presence of structures or relocate to other fishing locations, the adverse impacts would be temporary and minor.

The nearest anchorage area is 12 nm away from the Project (DNV-GL 2021), although the southern portion of the precautionary area, consisting of vessels operating between Narragansett Bay or Buzzards Bay and an established traffic lane (NOAA 2020), is located within 1 to 2 nm of the Lease Area. As a result, the Project would have no impact to ordinary vessel anchorage operations, though risks would still exist for emergency anchoring and for vessels transiting the area. The Project would use USCG-approved lighting to make nearby vessels aware of turbine locations (see Table G-1 in Appendix G for EPMs). Impacts of navigational lighting on deep draft vessels during operations would be long term and negligible.

Impacts to traffic from the offshore SFEC maintenance would be negligible because of the infrequent nature of monitoring and inspection. Conceptual decommissioning of the Project would have similar negligible to minor adverse impacts as construction because conceptual decommissioning would use similar numbers of vessels and implement the same EPMs. After the facility is decommissioned, the navigation conditions in the area would return to pre-Project conditions.

Cumulative Impacts

Traffic: The Proposed Action would incrementally add 13 construction vessels per construction day in 2023 and 2024 to conditions under the No Action alternative (see Table 3.5.6-4.). This additional vessel activity would increase the risks of collisions, allisions, and spills. Vessel traffic in ports may become congested with limited maneuvering space, causing delays. However, the Proposed Action represents a small proportion (2%) of the total maximum vessels potentially present. Non-Project traffic would be able to adjust routes and avoid the work area and transiting construction vessels. Project O&M vessel traffic would be substantially less, representing no more than 13% of the 48 to 71 vessels active each day by 2030 under the No Action alternative. Therefore, the Proposed Action would result in a negligible incremental impact to vessel traffic. BOEM estimates a peak of 379 vessels due to offshore wind project construction and O&M over a 10-year time frame. Although the number of construction vessels (reaching a maximum of 360 in 2024) would represent a large portion of the traffic in the region, most vessels would remain in the work area, with fewer vessels transporting materials back and forth from ports. With multiple offshore wind projects under construction, traffic would also be spread among multiple ports to ensure sufficient capacity exists at each port and in each waterway. Therefore, cumulative impacts associated with the Project when combined with past, present, and reasonably foreseeable future activities would be short-term and minor.

New cable emplacement/maintenance and anchoring: The Proposed Action would add up to 913 acres of seafloor disturbance from SFEC and inter-array cable installation, or 18% of seafloor cable-related disturbance estimated under the No Action alternative. The Proposed Action would also add an additional 821 acres of seabed disturbance from anchoring/mooring activity. This would result in localized, temporary, negligible to minor incremental impacts on navigation and vessel traffic due to increased collision and spill risk during construction. BOEM estimates a total of 2,261 acres of anchoring and mooring-related disturbance and 5,891 acres of sea floor disturbance for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA. During installation and maintenance, other vessels could also be forced to reroute to avoid installation and maintenance vessels. Based on the location of other offshore wind projects and proposed construction schedules (see Appendix E), however, it is unexpected that Project cable installation would overlap with other project cable routes. Therefore, when considered in combination with past, present, and other reasonably foreseeable projects, the Project would have short-term, minor impacts on navigation and vessel traffic.

<u>Presence of structures</u>: The Proposed Action would add up to 15 additional WTGs and one OSS to the 1,294 structures present under the No Action alternative, which would increase navigational complexity and therefore the risk of collision, allision, and potential spills. Additional structures could also interfere with marine radars and aircraft engaging in search and rescue efforts. See Table 3.5.6-1 for a summary of time spent and miles traveled by vessels carrying AIS within the SFWF and grouped lease areas in 2018. Section 3.5.1.1.1 Commercial Fisheries presents VMS numbers for commercial fishing vessels. However, the Proposed Action would account for less than 2% of the total future structures on the RI/MA WEA and would implement 1 × 1–nm with uniform north–south and east–west grid spacing, consistent with other surrounding lease areas. Therefore, the Project would only contribute a negligible incremental impact to navigation and vessel traffic. The cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominately of impacts described under the No Action alternative, which would represent a long-term, moderate impact on navigation and vessel traffic.

<u>Port utilization</u>: Port upgrades and vessel activity associated with the Proposed Action could result in negligible incremental impacts to navigation and vessel traffic. The Proposed Action is expected to require 13 construction vessels per construction day in 2023 and 2024. This additional vessel traffic could cause delays or changes in berthing patterns at primary ports. It could lead to operators being redirected to use alternate ports or facilities on a temporary basis. To some extent, individual ports may independently undertake facility improvement projects in anticipation of this demand to relieve some of the potential congestion. The Project's impact would also be limited due to the small number of additional vessels and impact on port capacity.

Project port activity and upgrades (via dredging and in-water work) could coincide with other forecasted projects, as shown in Table 3.5.6-4. Port activities could be delayed or experience port congestion or changes in utilization as result of the overlap in construction activities. Therefore, the cumulative impacts of the Proposed Action when combined with past, present, and reasonably foreseeable future projects would have short-term, moderate impacts on navigation and vessel traffic.

Conclusions

Project construction and installation, O&M, and conceptual decommissioning would impact navigation and vessel traffic, primarily through increased traffic, obstructions to navigation; delays within or approaching ports; increased navigational complexity; changes to navigation patterns; detours to offshore travel or port approaches; or increased risk of incidents such as collision, strikes or allisions, and groundings. BOEM anticipates the impacts resulting from the Proposed Action alone would be **negligible to minor**. Therefore, BOEM expects the overall impact on navigation from the Proposed Action alone to be **minor**, as the change in navigation and safety risk would be small.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor**. The main IPF is the presence of structures, which increase the risk of collision/allision and navigational complexity. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **moderate** impacts to navigation. The overall effect to navigation and vessel traffic would be notable, but the resource would recover completely when the impacting agents are removed and remedial or mitigating actions are taken.

3.5.6.2.4 VESSEL TRANSIT LANE ALTERNATIVE

The transit lane direction is oriented to assist common commercial fishing transit routes, though its orientation would not necessarily provide a useful route for all recreational vessels. Use of the transit lane by both recreational and commercial fishing could result in a simultaneous mixture of transiting and fishing activities, which could increase the potential for allision, collision, and other navigation conflicts. The Transit alternative would eliminate WTGs located within the transit lane; remaining Project WTGs would be arranged in accordance with MARIPARS recommendations for commercial fishing and with USCG First District and Sector Southeast, which call for uniform north–south and east–west grid spacing and separation of 1 nm. Therefore, this alternative would result in a minor, long-term adverse impact on both recreational and commercial vessels.

All other impacts would be similar to the Proposed Action. Therefore, this alternative would have similar temporary, negligible to minor adverse impacts to navigation as those described above under the Proposed Action.

Cumulative Impacts

The Transit alternative would incrementally add sources of navigation impacts (e.g., structures, port utilization, and traffic) to the cumulative, No Action scenario at a similar duration but to a lesser extent than the Proposed Action. Therefore, the overall cumulative impacts of the Transit alternative on navigation and vessel traffic when combined with past, present, and reasonably foreseeable activities would be localized, long term, intermittent, and moderate.

Implementation of the Transit alternative could reduce cumulative impacts related to allision and collision risk throughout the geographic analysis area. However, there would be no formal designation of the transit lanes prohibiting other activities from occurring within them, possibly increasing risks of collisions and allisions in these areas.

Conclusions

Although the Transit alternative would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel activity, this alternative would maintain uniform north–south and east–west grid spacing and separation of 1 nm. Therefore, BOEM expects that the impacts resulting from the alternative alone would be similar to but slightly less than the Proposed Action and would range from **negligible** to **minor**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative’s incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor**). The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **moderate**.

3.5.6.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

The Habitat alternative under either layout option would reduce the number of WTGs while still maintaining a 1 × 1–nm uniform east–west/north–south grid. All other impacts would be similar to the Proposed Action. Therefore, this alternative would have similar temporary, negligible to minor adverse impacts to navigation as those described above under the Proposed Action.

Cumulative Impacts

This alternative under either layout option would incrementally add sources of navigation impacts (e.g., structures, noise, port utilization) to the No Action alternative at quantities and durations similar to the Proposed Action. Therefore, the overall cumulative impacts of the Habitat alternative on navigation and vessel traffic when combined with past, present, and reasonably foreseeable activities would be localized, long term, intermittent, and moderate.

Conclusions

Although the Habitat alternative under either layout option would reduce the number of WTGs and their associated inter-array cables, which would have an associated reduction in associated vessel activity, this alternative would maintain uniform north–south and east–west grid spacing and separation of 1 nm. Therefore, BOEM expects that the impacts resulting from the alternative alone would be similar to but slightly less than the Proposed Action and range from **negligible** to **minor**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **minor**). The overall impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **moderate**.

3.5.6.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives. Although the number of WTGs and their associated inter-array cables varies slightly, all action alternatives would maintain uniform north–south and east–west grid spacing and separation of 1 nm. Therefore, BOEM expects that navigation impacts would range from **negligible** to **minor** for all action alternatives.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from **negligible to minor**, primarily due to risk of collision/allision and navigational complexity. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **moderate**. The overall effect to navigation and vessel traffic would be notable, but the resource would recover completely when the impacting agents are removed and remedial or mitigating actions are taken.

3.5.6.4 Mitigation

Documenting locations of relocated boulders would further reduce the expected negligible to minor impacts on navigation by better understanding seafloor elements that can potentially affect navigation and vessel traffic. WTG and OSS marking would also reduce impacts by making Project elements more clearly identifiable to mariners. Compliance with USCG and SOLAS standards, development of an O&M plan, USCG monthly reporting, and the USCG's review and BOEM's approval of the submarine cable system burial and WTG/OSS installation plans would provide an added layer of coordination to aid in reducing impacts on navigation and vessel traffic. WTG shutdown mechanisms, USCG training exercises, mooring attachments/ladders, provision of helicopter landing platforms on OSSs, and web-based cameras would also aid in the USCG's ability to respond if an emergency situation were to occur.

3.5.7 Other Uses (marine, military use, aviation, offshore energy) (see section in main EIS)

3.5.8 Recreation and Tourism

3.5.8.1 Affected Environment

Recreation and tourism as a resource refers to an area or activity that combines the natural qualities of land and water areas with the ability and desire to use this combination for personal satisfaction and enjoyment. Recreation and tourism could be undertaken individually or with others. Recreation can be passive or active and may or may not require specialized skills, e.g., boating or walking, respectively. The environment and landscape of the Project offer settings for a range of high-quality recreation opportunities and experiences. The primary recreation and tourism concerns, as they relate to the Project, are coastal and nearshore/offshore activities. Inland and open ocean recreation and tourism are also discussed.

Recreation and tourism play a major role in the coastal economies of the states affected by the Project as well as surrounding states (see Section 3.5.1 Commercial Fisheries and For-Hire Recreational Fishing and Section 3.5.3 Demographics, Employment, and Economics), and is present on and off the coasts of New York's Long Island and in the Lease Area (approximately 19 miles southeast of Block Island, Rhode Island, and 35 miles east of Montauk Point, New York). NOAA collects economic data for six sectors dependent on the ocean and Great Lakes: living resources, marine construction, marine transportation, offshore mineral resources, ship and boat building, and tourism and recreation. National Ocean Watch tourism and recreation statistics are good indicators of coastal and ocean tourism because they estimate the ocean-dependent portion of business for hotels and restaurants by including only those establishments located in shore-adjacent zip code areas, and they exclude all forms of sports and entertainment that are not ocean-related. A summary of economic data for counties and states that would be directly or indirectly affected by the Project, as identified in Section 3.5.3, is aggregated in Table 3.5.8-1 and revised to include only those data that fall within the 40-mile visual radius of the SFWF. As of 2016, ocean economy sectors accounted for 2% to 21% of the total economy for affected counties and states. Tourism and recreation were the predominant sources of economic activity for most locations.

Table 3.5.8-1. Ocean Economies for Counties and States that Would be Directly or Indirectly Affected by the Project

Location	% of Total Economy	Number of Employed Residents for Tourism and Recreation (% of total residents employed in ocean economy)	Total Wages for Tourism and Recreation (% of total wages generated by ocean economy)	Total GDP for Tourism and Recreation (% of total GDP generated by ocean economy)
New York	4%	354,828 (91%)	$11.9 billion (83%)	$24.8 billion (85%)
Suffolk County, NY	6%	35,473 (87%)	$851.9 million (68%)	$1.7 billion (70%)
Connecticut	3%	39,413 (69%)	$955.5 million (40%)	$2.1 billion (44%)
New London County, CT	16%	7,538 (37%)	$172.9 million (13%)	$413.6 million (17%)
Massachusetts	1%	77,885 (78%)	$2.0 billion (56%)	$4.2 billion (56%)
Bristol County, MA	3%	3,072 (37%)	$59.6 million (18%)	$115.9 million (16%)
Rhode Island	5%	36,964 (82%)	$814.9 million (62%)	$1.8 billion (60%)
Washington County, RI	18%	6,141 (57%)	$138.9 million (34%)	$308.7 million (30%)
Newport County, RI	21%	6,957 (82%)	$173.8 million (55%)	$408.3 million (56%)

Source: NOAA (2020).

Notes: CT = Connecticut, MA = Massachusetts, NY = New York, RI = Rhode Island.

Recreation and tourism in the analysis area are noticeably higher in the spring, summer, and fall, when the ambient air and water temperatures are comfortable, whereas winter recreation and tourism uses occur at a much reduced scale (Parsons and Firestone 2018).

The analysis area supports inland, shoreline or beach, and ocean-based recreation and tourist activities. Recreational activities revolve mostly around beach-going, boating (for pleasure and competition), walking/hiking, swimming, surfing, metal detecting, horseback riding, camping, stand-up-paddleboarding, cross-country skiing, kite sailing, and scenic/bird/nature viewing. Based on one survey in the Northeast, the five most popular activities were beach going (61.9%), scenic enjoyment/sightseeing (50.2%), watching marine life (33.7%), photography (32.5%), and collecting non-living resources/beachcombing (27.4%) (Bloeser et al. 2015). Recreational fishing along the shoreline and the pursuit of highly migratory species (HMS) such as tuna, shark, swordfish, and billfish are also popular recreational activities in the analysis area. In the nearby Vineyard Wind lease area, the recreational fishing effort for HMS occurs seasonally from June to October using a wide range of fishing methods, although mobile fishing methods predominate (Kneebone and Capizzano 2020). Coxes Ledge, The Fingers, and The Claw were identified as the three areas in the WEA that support the highest level of recreational fishing for HMS. Recreation is generally concentrated along the eastern tip of Long Island and along dunes, inlets, harbors/marinas, or barrier islands that provide cover or shelter from the open ocean (see Figure C-30 in Appendix C). Recreation and tourism are promoted both locally (towns, private clubs) as well as regionally (county or state parks), and users could drive from local or distant locations. Several long-distance sailboat races may pass through the offshore portions of analysis area, depending upon the route selected for a particular year; these races include the Transatlantic Race, Marion to Bermuda Race, and Newport Bermuda Race. Larger sightseeing boats also travel to offshore locations where sightings of whales are more likely.

Most publicly available recreation and tourism activities are free (equipment requirements notwithstanding). Local businesses offer boat rentals, private boat/cruise charters, canoe, kayak, and stand-up-paddleboard touring. There are multiple targeted recreation (e.g., whale watching, deep-sea fishing charters, and scuba diving) opportunities in the analysis area that have a direct link to local businesses, including non-ocean-related leisure, hotels, and restaurants (see Figure C-30 in Appendix C). Section 3.5.1 provides additional detail on for-hire recreational fishing.

In the analysis area, Suffolk County Department of Parks manages dozens of parks and recreation sites, and the Division of Historic Services manages more than 200 local historic sites. Two state parks exist within the analysis area: Hither Hills State Park and Napeague State Park. Hither Hills offers scenic picnic areas, sport fishing and beach access, playing fields, and a public campground. One of the two optional cable landing sites is located at Hither Hills. Napeague State Park, located west of Hither Hills, is mostly undeveloped, with few specifically permitted uses and no camping allowed at the park.

The Towns of East Hampton and Montauk, New York, are the two nearest communities to the onshore Project components, west and east of the analysis area, respectively. Many of the local recreation users would be based out of these locations. Many local residents have private beach-front access within the analysis area along the coastline of Long Island. Where local roads terminate at an access beach, limited public parking is typically provided, such as at Beach Lane and Napeague Lane in East Hampton. The second of the landing sites is located at Beach Lane. Block Island Southeast Lighthouse is a popular recreation and sightseeing location. The lighthouse is approximately 4 miles northwest of the BIWF.

An O&M facility would be established at an existing port in either at Quonset Point, Rhode Island, or Montauk Harbor, New York. North Kingston, Rhode Island is located on the eastern side of Narragansett Bay, and offers similar recreation experiences as East Hampton, New York (offshore recreation notwithstanding) on a much smaller and less-crowded scale.

The State of New York administers recreational boating in the nearshore coastal portions of the analysis area. The USCG administers all boating activities in offshore areas, including the proposed locations for the SFEC and SFWF. The offshore SFEC would cross nearshore areas and offshore areas popular for recreational fishing and boating, whale watching, birdwatching, and scuba diving. Scuba diving is pursued in this area because of the sea life and shipwrecks that can be accessed at relatively shallow depths. Recreational boating within the SFWF is sparse, but does occur, as shown on Figure C-30 in Appendix C.

3.5.8.2 Environmental Consequences

3.5.8.2.1 ISSUES, INDICATORS, AND SIGNIFICANCE CRITERIA

Table 3.5.8-2 lists the issues identified for this resource and the indicators and significance criteria used to assess impacts for this final EIS. EDR (2020) and BOEM-funded studies were used to guide this analysis. Additionally, the analysis for recreation and tourism has a strong relationship to Section 3.5.9 Visual Resources because the recreation setting is heavily dependent upon the viewscape.

Table 3.5.8-2. Issues, Indicators, and Significance Criteria Used to Assess Impacts to Recreation and Tourism

Issue	Impact Indicator	Significance Criteria
Changes to recreation access and opportunity	Qualitative assessment of changes to the following: Vehicle/vessel traffic volume Viewshed Navigation hazards Access restrictions	**Negligible:** No measurable impacts to the recreation setting, recreation opportunities, or recreation experiences would occur. **Minor:** Most impacts could be avoided with EPMs. Moderate: EPMs would minimize, but not fully resolve impacts. **Major:** Impacts would be unavoidable even with EPMs; additional mitigation could be required.

3.5.8.2.2 NO ACTION ALTERNATIVE

The Affected Environment section provides information on existing recreation and tourism trends from past and present activities. Attachment 3 in Appendix E provides additional information regarding past and present activities and associated recreation and tourism impacts. Future non-Project actions include offshore wind energy development; undersea transmission lines, gas pipelines, and other submarine cables; tidal energy projects; marine minerals use and ocean-dredged material disposal; military uses; marine transportation; fisheries use and management; global climate change; oil and gas activities; and onshore development activities. Attachment 3 in Appendix E also discloses future non-offshore wind activities and associated recreation and tourism impacts. Impacts associated with future offshore wind activities are described below.

Future Activities (without the Proposed Action)

Onshore

Future projects would generate increased onshore vehicle traffic or alter traffic patterns that could inconvenience recreational users, primarily during construction in localized areas near port facilities and on existing roadways frequented by recreational users. Construction vehicles and construction areas would follow established safety guidelines that would prevent most conflicts for recreational uses. Impacts from onshore activities would be temporary and localized; therefore, construction impacts from future projects would not incrementally add to adverse impacts on recreational users. Although long-term increased traffic volumes from O&M activities of future projects would be relatively low, they would incrementally add to the existing onshore traffic and therefore present minor, localized, long-term impacts on recreational users.

Existing ports that would be used for staging and construction of planned future projects may provide opportunities or facilities for some recreational vessels, or may be on waterways shared with recreational marinas. Increased onshore traffic from future projects could affect some recreational travelers on local roadways. However, these ports are primarily industrial in character and are not intended to service recreational activity. Impacts to onshore recreation and tourism related to current marine industrial activities at existing ports would not experience significant changes, regardless of offshore wind industry development (BOEM 2016), and therefore would not contribute to cumulative impacts on recreation and tourism.

Construction of some planned future onshore projects would require new visible structures or nighttime lighting on structures that could be visible by onshore recreational users and tourists. The O&M of some onshore projects would include permanent nighttime lighting on some of the taller communications towers and port improvements. Construction noise from planned future projects onshore would be variable based on project type, but many projects would also include one or more noise-generating activities such as earth moving, pile driving, trenching, jack hammering, and other similar large equipment operation. Recreational users could be subject to these construction noises anywhere future projects intersect public access areas, public recreational facilities, public roadways, or private and commercial facilities where tourism occurs (e.g., restaurants, shopping, and lodging establishments). However, most of these onshore project components are anticipated to be in previously developed and lighted areas. Therefore, adverse effects of onshore noise and lighting from construction would be short term and localized to discrete construction sites. Onshore visual impacts, O&M noise, and lighting from future projects would be variable based on project type (i.e., increased rail and road infrastructure use, increased port operational noise), which would be adverse and long term with variable minor to moderate impacts experienced based on the observed distance.

Offshore

Traffic and anchoring: Future projects would generate increased nearshore and offshore vessel traffic, primarily during construction, along routes between ports and the offshore wind construction areas. Construction of future projects would also increase the number of anchored vessels and work platforms used for survey and construction purposes. Applying vessel activity estimates developed by BOEM based on their 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019), vessel activity could peak in 2024 with as many as 379 vessels involved in the construction of reasonably foreseeable projects (see Table 3.5.6-4.). Most of the anchored and moving construction-related vessels would be located within temporary safety zones (anticipated to be established and monitored by offshore wind developers), and onshore work areas would follow established safety guidelines that would prevent most conflicts for recreational uses. These activities would also be temporary and localized; therefore, construction impacts from future projects would not incrementally add to adverse impacts on recreational users. Anchoring impacts to fish species used for recreational fishing are addressed in Section 3.4.2.2.2. Although long-term increased traffic volumes from O&M of future projects would be low, they would incrementally add to the existing in-water vessel traffic and therefore present minor, localized, long-term impacts on recreational users.

Presence of structures: In-water structures (WTGs and the OSS) associated with future offshore wind projects could affect recreation and tourism. These structures would represent the most visible components of planned future projects in the area from onshore and offshore locations. The placement and operation of up to 1,294 structures (see Table E-3 in Appendix E) are proposed within the recreation and tourism geographic analysis area. Recreational impacts would include the risk of recreational vessel allision with in-water structures, fishing gear entanglement, vessel damage or loss, increased navigation hazards, vessel traffic congestion, space use conflicts, presence of cables and infrastructure, and visual impacts.

A 2012 survey of recreational boaters along the northeastern United States coast found that the highest density of recreational vessels routes in the 2012 survey's "study area" was within Nantucket Sound and within 1 nm of the coastline (Starbuck and Lipsky 2013). More than half (52%) of recreational boating occurred within 1 nm of the coastline (Starbuck and Lipsky 2013). A 2015 study of coastal and marine recreational activity in the Northeast noted that human-made features were attractive for scuba divers, although poor water clarity and pollution, low visibility, and limited shore access represent obstacles to diving (Bloeser et al. 2015). The same study noted that surfing, stand-up paddleboarding, and triathlon typically occurred in nearshore, bay-protected waters. Sailing events occur along the entire Long Island coastline, but are generally small (averaging less than 50 participants). In 2011, NOAA estimated that 97% of the 2011 recreational boating from Massachusetts occurred within 3 nm of shore (BOEM 2012). Based on these findings, under the No Action alternative, most recreational vessels would continue to navigate within 3 nm of shore and therefore would not interact with proposed WTGs and the OSS. The closest WTG in the geographic analysis area could be approximately 12 miles from shore (a potential WTG position within Lease Area OCS-A-6 0486). However, some smaller vessels could navigate to and through future in-water Lease Areas. WTGs could also attract additional recreational boaters and sightseeing vessels. These conditions could increase the number of congregating vessels and further increase collision risks.

Offshore routes for recreational boaters, anglers, sailboat races, and sightseeing boats could require adjustment to avoid allision risks with in-water structures. Additional in-water structures would force smaller vessels traveling in or around them to pass at potentially shorter distances, which would increase the risk of vessel collisions. Sailing vessels with tall masts that could be affected by in-water structures, like WTGs and associated platforms, could choose to avoid offshore in-water structures altogether.

Conversely, the new in-water structures could result in several beneficial impacts including increased recreational fishing by introducing new aquatic habitats and increased tourism by people interested in viewing the structures. New in-water structures could also create foraging opportunities for seals, small odontocetes, and sea turtles (see Section 3.4 Biological Resources), which could offer recreational sightseeing opportunities. Recreational users that approach these offshore structures could be doing so intentionally, suggesting a minor beneficial impact instead of an adverse impact.

Visual impacts from presence of vertical structures on the offshore horizon would create a visual contrast contrary to the horizontal plane of the ocean's water surface and the line at the visual horizon that separates the ocean from sky. A viewer engaged in onshore recreation and tourism activities would experience changing views of multiple projects as they turn their heads and/or move along a shoreline or other area with views toward the lease areas. Towers closer to shore may block other more distant towers from view and could produce a visual anomaly of the closer turbine appearing to have more than three blades. The white to light grey color of the turbines would also contrast at certain sun angles during the day. The motion of the WTGs would also draw an onshore viewer's attention. The contrast would vary in visual dominance, depending on the distance between the viewer and the WTGs, and would be influenced by sun angle, atmospheric conditions and the viewers' visual acuity. The visual dominance created by the contrasting elements (form, line, color) would be static as viewed from a given stationary point along the shoreline but would vary with changes in sun angle and atmospheric conditions.

For offshore recreation/ tourism viewers, visual dominance created by contrasting elements will vary from offshore locations as floating vessels navigate toward or away from the WTGs. If the purpose of the viewer's sightseeing excursion is to observe the mass and scale of the WTGs' offshore presence, then the increasing visual dominance would benefit the recreation/tourism experience as the viewer navigates toward the WTGs. However, if experiencing a vast pristine ocean condition is the purpose of the viewer's sightseeing excursion, then the increasing visual dominance may detract from the viewer's recreation/tourism experience.

New cable emplacement/maintenance: Up to 4,978 acres of seabed disturbance could occur from cable installation to support future offshore wind projects within the recreation and tourism geographic analysis area (see Attachment 4 in Appendix E). Offshore cables would create temporary, localized adverse impacts on recreational boating because vessels would need to navigate around work areas, and recreational boaters would prefer to avoid the noise and disruption caused by installation. Cable installation could also have temporary impacts on fish and invertebrates of interest for recreational fishing resulting from the required dredging, turbulence, and disturbance; however, species would recover upon completion. Once installed, cables would impact recreational boating only during maintenance operations. Buried offshore cables would not pose a risk for most recreational vessels because smaller vessel anchors would not penetrate to the typical target burial depth (4 to 6 feet) for most cables. Scour protection for cables and foundations could hinder anchoring and result in gear entanglement or loss. Offshore wind scour protection would also present a hazard for anchoring because anchors could have difficulty holding or become snagged and lost. If the hazards are not noted on charts, operators may lose anchors, leading to increased risks associated with drifting vessels that are not securely anchored. However, recreational vessel anchoring is uncommon in water depths where offshore structures would be installed.

Light: Construction of future planned offshore projects would require nighttime lighting on WTGs, vessels, and platforms that could be visible by onshore recreational users and tourists, as well as by offshore boaters recreating at night or in low-light conditions. O&M of the estimated 1,294 WTGs would require permanent aviation warning lights that would be visible from many beaches and coastlines, and could cumulatively impact recreation and tourism in certain locations if the decisions made by users in selecting locations to visit is influenced by lighting. Field observations made from the mainland shoreline during WTG operation at the BIWF indicated that at nighttime and under clear skies, the turbine lights were visible with the naked eye up to 26.75 miles (23.2 nm) (HDR 2019). Aviation obstruction lights would be visible from shore (see COP Figure 4.5-6 through 4.5-8) low on the horizon and would vary in appearance and intensity as the lights rotate and become intermittently blocked by passing turbine blades. Cumulative visual impacts on recreation and tourism from increased offshore lighting would be short term during construction with variable minor to moderate impacts experienced based on the observed distance. Long-term cumulative impacts from O&M of future planned Project lighting would be adverse and long term but variable and discontinuous.

Noise: Construction noise from offshore activities from planned future projects such as pile driving, trenching, and construction-related vessels would intrude upon the natural sounds of the marine environment. Pile driving is the loudest aspect of most planned future projects, which is estimated to be approximately 60 dB on the A-weighted scale at a distance of 2,400 feet from its source (CH2M HILL 2019a), comparable to the noise level of a normal conversation (OSHA 2011).

Most pile driving would occur far enough offshore that that work would be inaudible from onshore locations. However, pile driving and other construction noise could cause some offshore boaters and recreational fishers to avoid areas of noise-generating activity, although the loudest noise would be within the safety zones anticipated to be established for each project by offshore wind developers that would exclude recreational and tourism vessel access.

Most recreational fishing occurs close to shore, whereas most pile driving for future projects would be well offshore; therefore, only a small percentage of recreational users would be in the areas of loudest sound levels where pile driving would occur. However, because some fish species are sensitive to underwater sound, construction activities such as vessel traffic and especially pile driving are expected to temporarily cause fish to relocate to other habitats farther from the noise source, which could then adversely affect recreational fishing opportunities near in-water work areas (CH2M HILL 2019b). Most of the anticipated offshore O&M noise from future projects would be from the continuous noise generated by WTG operation. Sound pressure levels would be at or below ambient levels at relatively short distances from WTG foundations (Kraus et al. 2016). Field observations made during normal operations at the BIWF minimally exceeded ambient levels at 164 feet (35.4 meters) from the WTG base. These field observations also concluded that WTG operational noise from the BIWF was not detectable from shore, and further suggested that as wind speeds increase (causing increased ambient noise) the associated increase in operational noise of the WTG becomes less detectable (HDR 2019).

<u>Port utilization</u>: Existing ports that would be used for staging and construction of planned future projects may provide opportunities or facilities for some recreational vessels, or may be on waterways shared with recreational marinas. However, these ports are primarily industrial in character and are not intended to service recreational activity. Impacts to offshore recreation and tourism related to current marine industrial activities at existing ports would not experience significant changes, regardless of offshore wind industry development (BOEM 2016), and therefore would contribute only minor adverse cumulative impacts on recreation and tourism.

Conclusions

Under the No Action alternative, BOEM would not approve the COP; Project construction and installation, O&M, and conceptual decommissioning would not occur; and potential impacts on recreation and tourism associated with the Project would not occur. However, ongoing and future activities would have continuing short-term to long-term impacts on recreation and tourism, primarily due to interruption of access and introduction of new offshore hazards, as well as new aquatic habitat and curiosity tourism.

BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities would be **minor** to **moderate** adverse, and **minor** beneficial, primarily due to adverse impacts associated with marine construction and dredging activities, as well as beneficial impacts due to the presence of offshore structures and cable hard cover, which could provide opportunities for fishing and sightseeing. As described in Attachment 3 in Appendix E, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be **minor** to **moderate**.

Considering all the IPFs together, BOEM anticipates that the impacts associated with future offshore wind activities in the geographic analysis area combined with ongoing activities, reasonably foreseeable environmental trends, and reasonably foreseeable activities other than offshore wind would result in **minor** adverse impacts on recreation and tourism because the overall effect would be small and the resource would be expected to recover completely.

3.5.8.2.3 PROPOSED ACTION ALTERNATIVE

Construction and Installation

Onshore

Noise from construction activities and views of workers, equipment, vehicles, or debris and cleared areas could temporarily adversely impact the recreation experience of users near the landing site (i.e., junction manhole) at either Beach Lane (650 feet from the beach) or Hither Hills parking lot (800 feet from the beach). Similar construction activities could temporarily impact the recreation experience for users travelling in the vicinity because of the construction of the onshore SFEC route and interconnection facility (i.e., onshore substation) within and adjacent to the LIRR ROW. Recreation and tourism users driving on Montauk Highway could experience temporary delays from onshore SFEC construction activities along the highway.

All construction activities would be conducted such that public recreation would not be precluded from use. In coordination with local communities, groups, and Hither Hills State Park, SFW's communication planning would announce all construction plans via public outreach programs to minimize potential impacts to recreation and tourism. SFW anticipates construction activities for the O&M facility would occur between 6 a.m. and 6 p.m. daily, 7 days a week, with initial dredging occurring over a 60-day period and floating dock and pile installation occurring over a 30-day period. Additionally, construction activities at the manhole (e.g., earthworks, drilling, use of heavy machinery, and implementation of safety exclusion areas) would be planned for the non-tourist season to minimize the impacts (see Table G-1 in Appendix G). For most locals and tourists, adverse impacts would be temporary, minor and inconvenient but not cause a loss to their overall experience.

Construction staging areas would be located such that public parking, beach access, and access to campsites would be maintained (Appendix G). Surface disturbances related to construction of the manhole at either Hither Hills or Beach Lane would be rehabilitated to return the recreation setting to pre-construction conditions.

Construction of offshore Project components could elicit both temporary beneficial and adverse impacts to recreational use of resources within the viewshed of the WTGs. It is anticipated that ocean beaches could experience an increase in curiosity visits, as well as a decrease in visits from users who do not appreciate seeing the WTGs when visiting a beach (Parsons and Firestone 2018).

The proposed O&M facilities (located in either Quonset Point, Rhode Island, or Montauk Harbor, New York) would be located within existing industrial ports. The Montauk Harbor location may require dredging. However, dredging would occur outside the main navigational route and therefore no impact to recreational navigation is expected. The interconnection facility in East Hampton is proposed to be located adjacent to an existing substation in an area zoned for utility use and so impacts to recreational uses are not anticipated. Construction traffic detours would be temporary if required. A BOEM study suggests that impacts on recreation and tourism related to current marine industrial activities at existing ports would not experience significant long-term changes, regardless of offshore wind industry development (BOEM 2016). The study notes that although the Atlantic coast already possesses the necessary infrastructure to support offshore wind, the industry is still evolving (BOEM 2016), and communication, flexibility, and scalability are needed to ensure port selection would not impact tourism or recreation. Therefore, construction activities for the O&M facility and interconnection facility would result in negligible temporary adverse impacts to transportation related to recreation or tourism activities.

Offshore

During construction, recreational offshore uses such as boating, fishing, diving, and wildlife and whale watching could experience minor conflicts with construction boating traffic, increased construction noise, and increased public safety clearance requirements (i.e., during offshore SFEC construction, all recreational boaters would be directed to maintain minimum safe distance from construction activity, as established and monitored by SFW) (see also Section 3.5.1.2.3. and Section 3.5.6.2.3). Construction EPMs would be implemented to minimize adverse impacts to recreators (see Table G-1 in Appendix G), including communication with vessel operators and scheduling onshore construction in the non-busy season. These temporary, minor adverse impacts would extend from the shore to the OCS (as shown on Figure C-30 in Appendix C, where most recreational boating and fishing occurs) and would be short term. However, recreation and tourism use could increase slightly during construction, as interested onlookers attempt to view Project progress and thus impede other recreation and tourism users (Parsons and Firestone 2018). Noise from construction could lead to the displacement of fish in and around construction sites. This could lead to spatial competition, depending on migrating patterns, which could adversely impact recreational trips.

A survey-based study of 1,725 participants who typically visit the coast suggested that (based on visual simulations for prospective offshore wind facilities) at 2.5 miles from shore, approximately 53% of participants would experience adverse impacts, with the results diminishing to 10% of respondents experiencing adverse impacts at 10 miles from shore (Parsons and Firestone 2018). The study was carried out only to a distance of 20 miles, but the resulting trend suggests that coastal visitors could experience adverse reactions approaching 0% from WTG at approximately 25 to 30 miles offshore.

Operations and Maintenance and Conceptual Decommissioning

Onshore

Operations of onshore Project components (SFEC landing site manhole, onshore SFEC cable route, and interconnection facility) would have negligible, intermittent adverse impacts over the life of the Project to onshore recreation and tourism because these components would only require periodic routine maintenance. O&M and conceptual decommissioning of onshore Project activities could elicit both beneficial and adverse impacts to recreational use of resources within the viewshed of the WTGs. It is anticipated that ocean beaches could experience a temporary increase in curiosity visits, as well as a decrease in visits from users who do not appreciate seeing the WTGs while recreating. Recreational sightseers at Block Island Southeast Lighthouse could experience adverse effects when environmental conditions permit visibility of the new WTGs at a distance of 19 miles and visibility is not overshadowed by the existing Block Island WTGs. Conversely, existing tourism at locations like Block Island Southeast Lighthouse could benefit from sightseers interested in viewing the Project when environmental conditions permit. A wind farm’s visibility from a given recreational location is not considered an adverse or beneficial impact by itself; instead, the tourism impacts are dependent upon on an individual’s reactions to the view (Smythe et al. 2018). Conceptual decommissioning of onshore Project components would have similar temporary, minor adverse impacts to onshore recreation and tourism users as described above under construction.

Offshore

Operations of offshore Project components (offshore SFEC, OSS, WTGs, and inter-array cables) would have negligible long-term adverse impacts to recreation and tourism because of their distance from nearshore recreators and the infrequency of maintenance activities. The Project could improve habitat for popular recreational fish species via fish aggregating by the structures, which would provide a minor long-term beneficial impact to recreation and tourism (Section 3.4.2 and Section 3.5.1.2.3). Survey results from commercial and recreational fishermen in relation to the BIWF indicate an increase in recreational fishing near the WTGs (Smythe et al. 2018), which can be attributed to the reef effect that attracts a variety of fish and marine invertebrates. However, the magnitude of benefits to recreational fishermen resulting from the Project may be reduced due to the greater distance of these structures from the shore (Starbuck and Lipsky 2013). The increase in recreational fishing at the BIWF resulted in increased vessel congestion, which affected commercial and recreational fishermen. These users acknowledged they also had elevated concerns about damaged gear because as commercial, for-hire recreational, and private fishing all continue in the Lease Area. Recreational fishing in the Lease Area would continue but at a reduced rate because some fishermen could relocate to other fishing locations due to safety concerns. The presence of WTGs could affect some recreational fishing operations and limit the ability of anglers targeting highly migratory species to conduct certain fishing activities among WTGs. Charter cruises could also choose to market the operational WTGs as a tourist destination, though distance from shore may limit interest. However, SCUBA divers are known to be willing to travel greater distances. A 1989 survey of recreational fishermen and divers in the Gulf of Mexico found that fishermen were willing to travel up to 45 nm offshore and divers 77 nm offshore to visit abandoned platforms that have been reefed (Stanley and Wilson 1989). A subsequent 2002 study (Hiett and Milon 2002) also found that that there is substantial recreational activity associated with the presence of oil and gas structures in the Gulf of Mexico from Alabama through Texas. The report estimated a total of $324.6 million in economic output in coastal counties of the Gulf region associated with fishing and diving activities near oil and gas structures. A survey of United Kingdom offshore recreational fishermen by Hooper et al. (2017) found that respondents frequently fished at offshore wind farms, with a mean distance from shore of 10 nm. Approximately one quarter of the respondents reported having fished within or around the perimeter of wind farms. These surveys suggest that the SFWF could attract recreational fishing and diving activity, providing a long-term minor benefit. The Project could also potentially increase tourism activity during peak tourism months (Carr-Harris and Lang 2019). Operation of WTGs is not expected to exceed 35 dBA (CH2M HILL 2019a); therefore, operational noise from the WTGs would not be readily audible over ambient ocean noise such as wind and wave action.

Conceptual decommissioning of offshore Project components would have similar temporary, minor adverse impacts to recreational boaters as those described above under construction. SFW would implement the same EPMs for conceptual decommissioning (see Table G-1 in Appendix G), including communication with vessel operators and scheduling onshore construction in the non-busy season.

Cumulative Impacts

Onshore

Onshore construction and installation would incrementally add an O&M facility, an interconnection facility, and distribution cable to the No Action alternative. These new onshore structures would not result in visual impacts experienced by recreational users due to the existing settings at these locations (see Sections 3.5.2 and 3.5.9 for details on potential visual impacts). When considered cumulatively with past, present, and reasonably foreseeable activities, the Proposed Action would result in temporary negligible to minor adverse cumulative visual impacts on recreation and tourism.

Construction vehicles associated with the Proposed Action would incrementally add short-term traffic delays (10-minute delays or less) experienced by recreational travelers on local roadways, as well as temporary, minor adverse noise and light impacts experienced by onshore recreational users near the cable landing site at either Hither Hills or Beach Lane, or from the aviation hazard lighting on the new WTGs. Long-term increases in operational traffic, lighting, and noise from the Proposed Action would be negligible. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in temporary minor adverse cumulative impacts to onshore recreation and tourism.

Construction activities would incrementally add noise from construction of onshore facilities to the ambient noise levels of the No Action alternative. Onshore construction noise would be localized to the source, short term, and minor to moderate, depending on the distance of the receptor from the source.

Offshore

Offshore impacts would predominately be associated with the following offshore wind IPFs.

<u>Traffic and anchoring</u>: Offshore construction would incrementally add 13 construction vessels and approximately 821 acres of temporary mooring (see EIS Table 2.1.1-1) to the 1,440 acres of mooring estimated under the No Action alternative within the geographic analysis area. Project-related construction anchorages and vessels would incrementally add to disturbances of marine species and their habitats important to recreational fishing, and could require recreational and tourism vessels to navigate around moving and anchored construction-related vessels while in transit. Therefore, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short term and long term minor adverse cumulative impacts on recreation and tourism related to vessel traffic and anchoring.

Presence of structures and new cable emplacement/maintenance: The Proposed Action would incrementally add up to 15 WTGs; one OSS; and 82.5–86.9 miles of cable the No Action alternative. This represents a 2% increase, respectively, over the No Action alternative within the geographic analysis area. The buried cabling would present only short-term traffic and navigational hazards; however, new structures related to the Proposed Action would add to the long-term impacts on recreation and tourism throughout the life of the Project (25 years, plus up to an additional 2 years for conceptual decommissioning) by incrementally increasing navigational complexity; by risks of structure allision; by route adjustments for races, sightseeing, and fishing; by loss and damage of fishing gear to scour and cable protection; and by difficulty anchoring over scour and cable protection. However, new in-water structures from the Proposed Action could incrementally benefit recreation and tourism by attracting recreational vessels to WTGs for fishing and sightseeing activities. Therefore, new in-water structures from the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in short term and long term minor to moderate adverse and long term minor beneficial cumulative impacts on recreation and tourism.

Construction and O&M of the Project would also incrementally increase the visual impacts on recreational and tourism users by adding up to 15 new WTGs and one OSS to the No Action alternative. Based on visual simulations (see Section 3.5.9) from onshore locations, some offshore WTGs would be visible from various key observation points on clear days. However, atmospheric conditions would limit the number of these large structures discernable during daylight hours for a significant portion of the year (EDR 2020). Some seaside locations could experience reduced recreational and tourism activity as a result of visible in-water structures, but the visibility of large offshore structures is unexpected to impact shore-based recreation and tourism as a whole. Established offshore wind facilities in Europe did not result in decreased onshore tourist numbers, tourist experience, or tourist revenue (Smythe et al. 2018), and Block Island's WTGs provide recreational fishing and shellfishing opportunities (Smythe et al. 2018). Recreational users would also observe a relatively small onshore construction area used for HDD at either the Hither Hills State Park or the Beach Lane landing site. Cumulative visual impacts on recreation and tourism resulting from the Proposed Action when combined with past, present, and reasonably foreseeable projects would be short term and minor for onshore viewers at sensitive viewing locations because of the distance and natural atmospheric interference. Cumulative visual impacts on recreation and tourism resulting from the Proposed Action when combined with past, present, and reasonably foreseeable projects would be short term minor to moderate for offshore recreational users and would increase as users approach the WTGs. Impacts to viewers at sensitive viewing locations are address in Section 3.5.9 Visual Resources.

Light: Offshore construction activities would incrementally add 13 construction related vessels, and up to 15 new WTGs and one OSS to the No Action alternative. Construction vessels would employ navigational safety lighting, and offshore structures would employ aviation and navigation hazard lighting. New lighting from the Proposed Action would negligibly contribute to no more than a 1% increase in in-water lighting sources from past, present, and reasonably foreseeable future projects within the geographic analysis area by introducing built visual elements to views previously characterized by dark, open ocean. Given the distance from recreational viewers and atmospheric interference, lighting from the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in long-term, intermittent, minor cumulative impacts on recreation and tourism from construction and O&M related lighting.

Noise: Construction activities would incrementally add noise from 13 construction vessels, pile-driving activities for all 15 WTGs and one OSS, and offshore dredging for the export and inter-array cabling to the ambient noise levels of the No Action alternative. Noise from construction could lead to the displacement of fish in and around construction sites, leading to spatial competition, depending on migrating patterns. Recreational boaters and tourists would not be permitted to approach active construction zones, and would therefore not be expected to experience noise impacts from offshore construction. Because of the distance from receptors, the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in localized, short-term, minor to moderate cumulative impacts on recreation and tourism due to construction activities, whereas noise from O&M activities would result in long-term, negligible cumulative impacts.

Port utilization: Port activity and upgrades (dredging and in-water work) would result increased short-term construction traffic, and long-term operational traffic to the No Action alternative, which could coincide with recreational activity in the vicinity, depending on transportation type (vessels, rail, or road vehicle). However, activities related to the Proposed Action at port facilities would occur within the boundaries of existing ports or other re-purposed industrial facilities where recreational users would not be expected to occur. Project activities at ports would be similar to those already taking place at these facilities, and would be consistent with state and local agency guidelines regarding land use, access, land use, noise and air quality, and other impacts on nearby neighborhoods. Therefore, Proposed Action when combined with past, present, and reasonably foreseeable activities would result in would have negligible adverse cumulative impacts on recreation and tourism.

Conclusions

Project construction and installation and conceptual decommissioning would introduce noise, lighting, human activity, vehicles and vessels (increasing potential collision risk), and interruption to access points in the geographic analysis area. Noise, lighting, and human activity impacts from Project O&M would occur, although at lower levels than those produced during construction and conceptual decommissioning. BOEM anticipates the impacts resulting from the Proposed Action alone would range from **negligible** to **minor** and short term to long term. Project activities are expected to contribute to several IPFs, the most prominent being noise and vessel traffic during construction and the presence of offshore structures during operations. BOEM expects the overall impact on recreation and tourism from the Proposed Action alone to be **minor**; however, as the overall effect would be small and would be expected to recover completely without remedial or mitigating action.

In the context of other reasonably foreseeable environmental trends and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **moderate adverse** and **minor beneficial**. Impacts would result from short-term impacts during construction: noise, anchored vessels, and hindrances to navigation; and the long-term presence of cable hard cover and structures in the offshore wind energy area during operations, with resulting impacts on recreational vessel navigation and visual quality. Beneficial impacts would result from the reef effect and sightseeing attraction of offshore wind energy structures. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in **minor adverse** impacts and **minor beneficial** impacts to recreation and tourism. BOEM made this call because the overall effect would be small and the resource would be expected to recover completely, with no mitigating action required.

3.5.8.2.4 VESSEL TRANSIT LANE ALTERNATIVE

The Transit alternative would not affect the Project’s onshore activities; therefore, direct and indirect effects to onshore recreation and tourism would be the same as the Proposed Action: negligible to minor.

Offshore, this alternative could provide for improved safety for all vessels, including those used for recreational and tourism purposes. This alternative could benefit some recreational vessels by designating a specific route that allows a safer transit around the Lease Area. However, the transit lane direction is oriented to assist common commercial fishing transit routes, and its orientation might not provide a useful route for all recreational vessels. Additionally, use of the designated transit lane by both recreational and commercial fishing could reduce distances between vessels, which could increase the potential for collision and introduce navigational conflicts for recreational and other vessels. Likewise, flanking of structure foundations (that attract fish and recreational fishing) could also lead to increased congestion, space conflicts, and navigation risks. The reduced number of WTGs could also negligibly improve or diminish recreational experiences, depending on individuals' perception of offshore wind farms.

All other impacts are anticipated to be similar to those detailed under the Proposed Action: negligible to minor.

Cumulative Impacts

The Transit alternative would not affect onshore Project activities; therefore, cumulative onshore effects to recreation and tourism would be the same as previously discussed under the Proposed Action: negligible to minor.

Planned future offshore projects near the Lease Area, specifically wind projects, would result in increased short-term construction vessel traffic, long-term maintenance vessel traffic, and long-term recreation and tourism traffic. Ostensibly, some of the increased vessel traffic from planned future projects would use the new corridor as proposed under the Transit alternative.

Should the Transit alternative be implemented, the WTGs for other reasonably foreseeable offshore wind projects may need to be relocated or eliminated within those affected lease areas to avoid the transit lanes. If these shifts result in WTG reductions that further reduce views of structures and/or nighttime lighting, these effects could decrease recreational impacts relative to the Proposed Action. Conversely, if these lanes further exacerbate congestion, space conflicts, and navigation risks identified under the Transit alternative, then cumulative impacts could be increased relative to the Proposed Action.

Therefore, the overall cumulative impacts of the Transit alternative on recreation and tourism when combined with past, present, and reasonably foreseeable activities would be long term, minor, and beneficial from increased fishing and tourism opportunities, and negligible to moderate adverse if vessel navigation or recreational opportunities are reduced.

Conclusions

Although the Transit alternative would reduce the number of WTGs and introduce a designated transit lane, the designated transit lane would be used by recreational and commercial vessels which could increase the potential for collision. Additionally, flanking of structure foundations by recreational fishing vessels could also contribute to increased congestion, space conflicts, and navigation risks. The reduced number of WTGs could also negligibly improve or diminish recreational experiences, depending on individuals' perception of offshore wind farms. As a result, BOEM expects that the impacts from the Transit alternative alone would be similar to but less than the Proposed Action and range from **negligible** to **minor**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Transit alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate** adverse and **minor beneficial**). The overall impacts of the Transit alternative when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor** adverse and **minor beneficial**.

3.5.8.2.5 FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE

The Habitat alternative under either layout option would not affect the Project's onshore activities; therefore, effects to onshore recreation and tourism would be the same as the Proposed Action: negligible to minor.

Offshore, this alternative under either layout option would avoid sensitive benthic habitats that may support recreational fishing tourism. The reduced number of WTGs could also negligibly improve or diminish recreational experiences, depending on individuals' perception of offshore wind farms. All other impacts are anticipated to be similar to those detailed under the Proposed Action: negligible to minor.

Cumulative Impacts

The Habitat alternative under either layout option would not affect onshore Project activities; therefore, cumulative onshore effects to recreation and tourism would be the same as previously discussed under the Proposed Action: negligible to minor.

Offshore, this alternative under either layout option would incrementally add sources of impact (e.g., structures, noise, vessel activity) at quantities and durations similar to, or less than, the Proposed Action. Therefore, the overall offshore cumulative impacts on recreation and tourism when combined with past, present, and reasonably foreseeable activities would be long term and beneficial from increased fishing and tourism opportunities, and negligible to moderate adverse impacts if vessel navigation or recreational opportunities are reduced.

Conclusions

Although the Habitat alternative under either layout option would reduce the number of WTGs and introduce a designated transit lane, the transit lane would be used by both recreational and commercial vessels which could increase congestion, space conflicts, navigation risks, and the potential for collision. The reduced number of WTGs under this alternative could provide a long-term beneficial impact on recreational viewers and a minor, long-term adverse impact on recreational fishing and tourism. Therefore, BOEM expects that the impacts resulting from the alternative alone would be similar to but less than the Proposed Action and range from **negligible** to **minor**.

In context of other reasonably foreseeable environmental trends and planned actions, BOEM also expects that the Habitat alternative's incremental impacts would be similar to the Proposed Action (with individual IPFs leading to impacts ranging from **negligible** to **moderate** adverse and **minor beneficial**). The overall impacts of the Habitat alternative under either layout option when combined with past, present, and reasonably foreseeable activities would therefore be the same level as under the Proposed Action: **minor** adverse and **minor beneficial**.

3.5.8.3 Action Alternative Comparison

As discussed above, the impacts associated with Proposed Action alone do not change substantially under other evaluated action alternatives, although some variation in impacts is acknowledged due to fewer WTGs being constructed. Although the number of WTGs varies slightly, BOEM expects that recreation and tourism impacts would range from **negligible** to **minor** for all action alternatives due to noise, lighting, human activity, vehicles and vessels (increasing potential collision risk), and interruption to access points in the geographic analysis area.

In context of reasonably foreseeable environmental trends and planned actions, all action alternatives would occur within the same overall environment (e.g., ongoing and future activities). Therefore, impacts would only vary if the alternatives' incremental contributions differ, as they do here. However, as noted above, BOEM expects that the incremental impact from any action alternative would be similar, with the level of individual impacts ranging from **negligible** to **moderate** adverse and **minor beneficial**. Therefore, the overall impact of any action alternative when combined with past, present, and reasonably foreseeable activities would be **minor** adverse and **minor beneficial**. BOEM made this call because the overall effect would be small, and the resource would be expected to recover completely, with no mitigating action required.

3.5.8.4 Mitigation

If BOEM requires potential additional mitigation measures identified in Appendix G, such as requiring complete avoidance of construction activities from Memorial Day through Labor Day that would impede traffic or access to recreational areas, minor and short-term adverse impacts for local residents who recreate during non-summer months would be further reduced.

BOEM could require installation of an ADLS as a mitigation measure. If an ADLS is used on offshore structures, aviation hazard lighting would only activate when aircraft approach within 3 nm or within 1,000 feet above a structure. ADLS would reduce the amount of time WTGs would be visible at night. and further reduce negligible, long-term visual impacts on recreation and tourism.

3.5.9 Visual Resources (see section in main EIS)

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APPENDIX I

Public Comments and Responses

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CONTENTS

Tables

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INTRODUCTION

On January 8, 2021, the Bureau of Ocean Energy Management (BOEM) published a notice of availability for the *South Fork Wind Farm and South Fork Export Cable Project Draft Environmental Impact Statement* (EIS)[1], consistent with the regulations implementing the National Environmental Policy Act (NEPA; 42 USC 4321 et seq.) to assess the potential impacts of the Proposed Action and alternatives. The Draft EIS was made available in electronic form for public viewing at https://www.boem.gov/renewable-energy/state-activities/south-fork, and hard copies and/or electronic copies were delivered to other entities as specified in Appendix E of the Draft EIS. The NEPA review process requires agencies to allow the public the opportunity to comment on a Draft EIS.

The notice of availability initiated a 45-day public comment period for the Draft EIS. The comment period closed on February 22, 2021.

This appendix describes the Draft EIS public comment processing methodology and definitions, and also includes responses to the substantive comments received on the Draft EIS, and/or describes where specific updates to the Final EIS can be found in the document.

OBJECTIVE

BOEM reviewed and considered all written and oral public submissions received during the Draft EIS public review and comment period. BOEM's goal was to identify substantive comments to be addressed in this Final EIS, and to categorize those comments based on the applicable resource areas or NEPA topics. This categorization scheme allowed subject matter experts to review comments directly related to their areas of expertise and allowed BOEM to generate statistics based on the resource areas or NEPA topics addressed in each of the comments.

All public comment submissions received can be viewed online at http://www.regulations.gov by typing "BOEM-2020-0066" in the search field.

METHODOLOGY

Terminology

The following terminology is used throughout this appendix:

- *Submission*: The entire content submitted by a single person or group at a single time. For example, a 10-page letter from a citizen, an email with a portable document format (PDF) attachment, and a transcript of an oral comment given at a public hearing were each considered to be a submission.
- *Comment*: A specific statement within a submission that expresses a sender's specific point of view, concern, question, or suggestion. A comment can consist of more than once sentence, as long as those grouped sentences express a single idea. One submission may contain many comments.
- *Substantive comment*: Draft EIS submissions were reviewed to identify and categorize "substantive" comments. To be substantive, a comment must meet both of the following criteria:
    - Related to the proposed Project: To be substantive, a comment must first relate to reasonably foreseeable impacts of the Proposed Action, connected actions, or cumulative actions.

[1] Notice of Public Meetings and of Availability of a Draft Environmental Impact Statement for Deepwater South Fork LLC's Proposed Wind Energy Facility Offshore Rhode Island, 86 *Federal Register* 5 [January 8, 2021].

- Consisting of more than opinion: This criterion requires that substantive comments provide information to help BOEM prepare the Final EIS by providing some level of support or basis for the commenter's position, reasoning, data, factual correction or some indication of issues the commenter believes are significant and why the Draft EIS did or did not analyze them adequately. As a hypothetical example, a statement that "BOEM should reject the Project" would not be considered substantive, but a statement that "The South Fork Wind Project should not be approved because it would harm commercial fisheries by blocking fishing access" would be considered substantive.

Substantive comments include those that suggest revisions to the Draft EIS analysis or suggest alternate information than what is presented in the Draft EIS. These comments challenge or question the accuracy of information presented, the adequacy, methodology or assumptions of the analysis presented in the Draft EIS (with supporting rationale), present new information relevant to the analysis, present reasonable alternatives (including mitigation) other than those analyzed in the document, and/or corrects factual errors in the content of the Draft EIS. Substantive comments could also provide information in support of the analysis presented in the Draft EIS.

Comment Submittal

Federal agencies, state/local/Tribal governments, and the general public had the opportunity to provide comments on the Draft EIS via the following mechanisms:

- Electronic submissions via www.Regulations.gov on docket number BOEM-20208-0066
- Electronic submissions via email to a BOEM representative
- Hard-copy comment letters submitted to BOEM via traditional mail
- Comments submitted verbally at each of the public hearings

BOEM held three online public hearings via Zoom to solicit feedback and identify issues for consideration in updating the Final EIS. The hearings were free and open to the public with no reservations required. Locations and dates of these hearings are outlined in Table I-1.

Table I-1. Public Hearings

Date	Time	Location
2/9/2021	1:00 p.m. ET	Zoom Webinar
2/11/2021	5:00 p.m. ET	Zoom Webinar
2/16/2021	5:00 p.m. ET	Zoom Webinar

All submissions initially provided by methods other than www.Regulations.gov, including text from the transcripts recorded at each public hearing listed in Table I-1, were uploaded to the docket. Each submission, including testimony by individual speakers at the public hearings listed in Table I-1, was assigned a unique identification number by www.Regulations.gov. That unique Submission ID was retained throughout the comment management process, for both submissions and the individual comments within those submissions.

Comment Processing

Compilation of Submissions

BOEM downloaded and reviewed all submissions from Regulations.gov. These submissions were provided in Hypertext Markup Language (html) format, while attachments provided by stakeholders as part of their Regulations.gov submission were typically provided in PDF or Microsoft Word format. Text from the html, as well as PDF, Word, and other text formats were copied from the original format into a single Microsoft Excel file that served as the primary submission database. In cases where an attachment did not contain codable text, the attachment was retained separately for BOEM reference as applicable, linked to the main body of the submission through the unique Submission ID. The submission database also included information about each submission, including the submitter's contact information, submission date, and whether the submitter was a government entity or agency.

Two organizations provided comments on behalf of their members. The first submission contained a total of 2,812 individually submitted comments from members of the National Wildlife Federation Action Fund. The second submission from the Sierra Club of New York contained 1,401 member signatures, of which 485 signatories provided additional unique comment. Both submissions generally offered broad support for offshore wind and are captured by the comment themes discussed below. Additionally, each submission was also recorded as a single entry in Table I-3 under comment 325-1 and 331-1.

BOEM received comments from the Mashantucket Pequot Tribal Nation through the government to government process on March 31, 2021. The comments were addressed by modifications to Appendix A and Section 3.5.4 of the final EIS to add information about Tribal cultural and subsistence practices and to change the way the final EIS referred to BOEM's consultations with federally recognized Tribes.

Identification of Substantive Comments

Each submission and all oral testimony were read to identify substantive comments (as defined under Terminology). Each substantive comment was entered into a spreadsheet that served as the master substantive comment database. Each substantive comment then received a unique comment ID number, tied to the Submission ID. For example, the fourth substantive comment identified in Regulations.gov submission 301 was identified as Comment 301-04. Each substantive comment was extracted from the submission text and assigned to one section of the Draft EIS, based on the document's table of contents. The extracted substantive comments consisted of exact quotes taken from the individual submissions.

Anonymous comments were not included in the comment database. As noted in the NOA, "BOEM does not consider anonymous comments. Please include your name and address as part of your submittal. BOEM makes all comments, including the names and addresses of respondents, available for public review."

DRAFT EIS SUBMISSION AND COMMENT SUMMARY

During the 45-day comment period, BOEM received 388 submissions (including individual letters and emails, letters submitted by multiple signatories, and form-letter submissions). In addition, BOEM convened a series of three hearings, in which over 400 people participated and/or submitted verbal comments. Transcripts from these meetings are available on regulations.gov. All of these comments were reviewed and considered. BOEM has synthesized most public comments into major themes below. BOEM responses to these comment themes include clarifications and explanations of instances where the EIS was modified in response to the comments.

Due to the technical complexity of NMFS's submitted technical letter, all comments and responses to that letter are provided in a separate table in this appendix.

General Comments

Comment theme: General Project opposition.

Associated comments

Table I-2 provides the full list of comments received as part of this comment theme.

Table I-2. General Project opposition comments.

Comment Number	Comment
77-1	I am greatly opposed to the wind farm project. With a life expectancy of 20 years, the carbon imprint to make and then remake the next set of windmills will greatly out strip the climate change benefits. Add to that the devastating effects on the birds makes it a disastrously bad idea
84-1	Totally unnecessary project that will wreak havoc on the ocean environment. No studies, no justification except more unicorn gas. Complete Champlaln-Hudson and the gas pipelines. How many birds will this farce of a project kill? Nobody's saying. How about some public disclosure?
152-2	You guys are [expletive] nuts! The noise from the turbines hurt the whales, kill birds! Absolutely asinine! Collateral damage alone without even putting one out there has cost millions let alone once they are in! I thought trump was an idiot but you guys out do him by the distance between earth and mars! You saw what trumps idiots did on the capital, well almost all fishermen voted for trump(I did not, that is y I am here screaming at you to knot do this! You will need around the clock protection like the capital has now and who will end up paying for this, the electric company customers! just look at texas where they are charging $9000 per megawatt, clearly the fix is in! I can only tell you corruption is the only game that is being played here and you all are GUILTY! Do You need anymore? I regurgitate in large volumes cause I can't keep this stuff in me! Once we pass go, there will be no turning back! Just like the gov't lying about wmd's in Iraq, how much did that move cost the taxpayers! trillions! Stop this [expletive] before it starts, is the only way to prevent madness! I would say thank you but more like [expletive] you! Capt Justin A Vyce(vise) My name is an aptronym that fits me commenting here as I feel my head is JUST IN A. VISE, being squeezed by the people who support these wind projects!
154-1	Overall, our assessment is that the information provided by DWSF is inadequate and that the mitigation efforts proposed are insufficient. Wind turbines should not be placed on Cox's Ledge because impacts on commercial and recreational fisheries, on fish populations and on navigation safety are not being adequately addressed. The NO ACTION ALTERNATIVE is the clear best choice.
157-2	For the reasons I will detail herein, upon review of the environmental impacts data and in consideration of the potential for existing users to lose access and use of the area, BOEM must choose the No Action option for the South Fork Wind Farm Construction and Operations Plan (COP) within Lease Area OCS-A 0517.
157-5	In conclusion, now that it is known that the environmental impacts of building over the cold pool, cannot be determined with the degree of certainty necessary to proceed, BOEM must chose the No Action alternative for the South Fork Wind Farm. Now that it is know [sic] that the impacts to fisheries due to loss of access to historical fishing grounds could easily account for high percentages of a fleet's annual effort, BOEM must disapprove of the South Fork Wind Farm. Now that it is known all impacted fisheries will likely lose quota to a sustainable, well managed fisheries, BOEM must disapprove of the South Fork Wind Farm. Now that it is known that fisheries could potentially lose access to historically productive fishing grounds for 30 years, or even indefinitely BOEM must disapprove of the South Fork Wind Farm.
172-1	South Fork Wind, as it currently is seeking approval, is the wrong project for New York and especially for the residents of Suffolk County. This project, with its extensive sea trenching and establishment of an invasive new onshore transmission cable route, is unnecessary.
172-5	There have been recent questions and concerns about Orsted in several states, including New Jersey, Connecticut, and Rhode Island. Significant, construction related cable issues at the Block Island Wind Farm have yet to be repaired. Eversource is under investigation in Connecticut for its massive failure to provide power during and after tropical storm Isaias and for delivery charge rate hikes during the 2020 COVID-19 crisis when consumers could least afford it. Should either of these companies be given approval to construct South Fork Wind? No.

Comment Number	Comment
283-3	Frankly the push to promote windfarms to combat climate change is ridiculous and short sighted . The fact is that wind power is too intermittent to ever allow us to stop using fossil fuels or nuclear power . Geologists and scientist's have concluded that we will run out of the rare earth minerals necessary for power generation and energy storage long before other forms of power creation can be retired . Also the strip mining of these minerals is as environmentally damaging as extracting fossil fuels and is conducted in countries that ignore best practices for waste disposal and often rely on child and slave labor .Small scale wind and solar should be implemented only to supplement the energy needs of industrial manufacturing and agriculture and at the homeowner level. It is my sincere hope that rational minds come to the determination that the well being of our coastal communities should not be risked for a project that will not give our nation any measurable benefit .
288-1	The south fork wind farm is a huge mistake and I do not support it. It does nothing but destroy the ocean, bird life and any and all marine life within the vicinity. The only think green is money in to orsteds pockets. If this was such a great plan they would not have to pay EH town 29 million dollars. Block island wind farm operated at 35% capacity with breakdowns in a regular basis.
339-1	"I am a member of the East Hampton Town Fisheries Advisory Committee (EHTFAC), an advisory board of fishermen and those representing fishing communities within the Town of East Hampton. In discussion with other members, we would like to submit the following comments to Draft Environmental Impact Statement (DEIS) of the South Fork Wind Farm (SFWF) and South Fork Export Cable (SFEC) Project to the Bureau of Energy Management, (BOEM). We are submitting these comments on behalf of the Fisheries Advisory Committee, and not on behalf of the Town of East Hampton, whom I believe is also submitting comments into the written record. A majority of the members of the EHTFAC, who represent the ports of East Hampton, Springs, Amagansett and Montauk, support the “No Action” alternative within the DEIS. Two members of the committee abstained from comment during our internal discussions. We believe the unavoidable adverse impacts of building the SFWF and the SFEC, those that are discussed in Chapter 4 of the DEIS that measure impacts to water quality, benthic habitat, essential fish habitat, invertebrates, finfish, marine mammals, and commercial fisheries, have not been analyzed sufficiently and will all suffer because of the construction of the SFWF. We cannot support any action/project that includes unavoidable adverse impacts to the marine environment and for those whose livelihoods depend on that environment. Further analysis must be done. As a committee, we have numerous concerns.
353-1	The area in question for the proposed SFWF should have never been leased out from the beginning. The BOEM was reckless with its vetting process as the lease area,aka Coxes Ledge, is one of the most fertile and unique spawning grounds and fish habitats in the world not just the northeast. Less productive grounds have been shut down to all fisheries for that exact reason on a seasonal timetable so the fish species has a chance to spawn(Stellwagon Bank). US fishermen and women have adhered to strict regulations since the implementation of the Magnuson-Stevens act to preserve our fisheries and now some foreign entities come around with deep pockets and an unproven business format and just like that our years of suffering and compromise means nothing? In reality ,windmills are difficult enough to maintain on land so adding saltwater and unpredictable weather to the equation seems like a recipe for disaster. Overall i feel the BOEM has not done enough studies on the affects this boondoggle project will have on the centuries old fishing industry of the Northeast USA. Only time will tell but for now i believe alternative 1 is the only way to go.
366-1	We cannot support any action/project that includes unavoidable major adverse impacts to the marine environment and for those whose livelihoods depend not only depend on that environment, but who’s continued safety at sea will be threatened by the project itself. Our concerns are many.

Response to comments: BOEM appreciates public comment on concerns related to the project and offshore wind, and notes the importance of stakeholder input in helping to craft an EIS that improves decision making about our shared ocean resources. BOEM recognizes a desire to properly site leasing areas. BOEM conducted an extensive process that considered a host of factors including other ocean users and that included the preparation of an environmental assessment and engagement with the public prior to leasing. Please see BOEM's website for more information: https://www.boem.gov/renewable-energy/state-activities/commercial-wind-leasing-offshore-rhode-island-and-massachusetts. BOEM also funds the collection of scientific information through the Environmental Studies Program. Information for this area is synthesized in the report “*Habitat Mapping and Assessment of Northeast Wind Energy Areas*.” BOEM is also funding the study “*Movement Patterns of Fish in Southern New England*” which includes the lease area.

Comment theme: General Project support.

Associated comments

Table I-3 provides the full list of comments received as part of this comment theme.

Table I-3. General Project support comments.

Comment Number	Comment
2-1	As a New Yorker, I support this project. Not all offshore wind farms are created equal. The South Fork project is the culmination of more than ten years of exhaustive study and analysis, and extensive public consultation, and collaboration with the local community. Permitting this project will help create a more reliable grid, reduce NY's carbon footprint, and deliver good paying union jobs. Responsible offshore wind development projects like South Fork should be moved forward with urgency that the climate crisis demands.
4-1	General Overview South Fork Wind has a power purchase agreement (PPA) with LIPA for the electricity its produces. South Fork Wind brings significant economic and environmental benefits to Long Island. This offshore wind project will be the first to connect in New York and help the state and Town of East Hampton meet its 100% renewable energy goal. The wind farm will displace millions of tons of carbon emissions, the equivalent of taking approximately 60,000 cars off the road. Power needs on the South Fork are growing faster than anywhere else on Long Island. In 2015, PSEG/LIPA issued a request for proposals to address this specific need, and more than 20 proposals were received. South Fork Wind was selected because it was part of a portfolio that was found to be the most cost-effective solution. South Fork Wind submitted its Construction and Operation Plan to BOEM in 2018 and has continued to work hard to collect data to provide all agencies and stakeholders with information on the benefits and potential environmental impacts of the Project. General Economic Value South Fork Wind has the potential to be the first commercial scale offshore wind farm in the US. While relatively small in scale, the economic benefits from construction and operation of South Fork Wind are illustrative of the tremendous potential the offshore wind industry offers the Northeast region specifically and the country broadly. South Fork Wind is just one of many projects currently working through the federal permitting process. Permitting the first commercial-scale project will send an important signal to the market. To maximize economic development opportunities of both South Fork Wind and other projects, both developers and the supply chain need certainty and confidence that the US offshore wind market and individual projects are moving toward installation. The permitting process must move in a transparent, timely, and reasonable way. This will help projects through the development timeline, which provides clarity to the supply chain that will help unlock significant investments and expenditures related to project development and execution. As we saw in Europe twenty years ago, the building of a domestic supply chain starts with pioneering projects like South Fork Wind. For the US supply chain to grow, be sustainable, and reach its true potential, permitting certainty and clarity is critical. These benefits will extend beyond the Northeast region and will have meaningful impact in other parts of the country, such as the Gulf of Mexico region and the Midwest, where adjacent industries such as oil and gas development provide relevant competencies and opportunities for business diversification. Core Economic Value As New York and other states in the Northeast continue their leadership in offshore wind, projects like South Fork Wind have created economic value for businesses in the region. As a Board Member of the Advanced Energy Research and Technology Center at SUNY Stony Brook and member of the business community, I support offshore wind. Large scale utility development like offshore wind will not only help reduce our massive carbon footprint but will also mean a tremendous amount of economic opportunity in the form of jobs and capital investment. Offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the east coast. As the first commercial-scale offshore wind project in the US, Orsted and Eversource's South Fork Wind Project will play a critical role in establishing a domestic offshore wind industry and realizing the tremendous potential economic benefits of this rapidly emerging industry. We urge BOEM to stick to its published schedule and allow this exciting new industry to revitalize the region's economy when it is so desperately needed. We urge approvals to be as expeditiously as possible to help build back our economy post COVID. Many coastal communities in the region are realizing real economic benefit from South Fork Wind, as well as the potential larger pipeline of projects. This includes communities with median incomes well below their respective state averages (New Bedford, the Town of New London, and the Village of Greenport). But this potential can only be realized with the certainty that comes with timely and reasonable permitting of South Fork Wind and subsequent projects. The work my business is doing for South Fork Wind has both near-term value and helps build my experience to provide the better value to future projects. Given that this is a new industry, work in offshore wind diversifies my client base which increases the sustainability of my business.

Comment Number	Comment
5-1	South Fork Wind has the potential to be the first commercial scale offshore wind farm in the US. For the US supply chain to grow, be sustainable, and reach its true potential, permitting certainty and clarity is critical. While relatively small in scale, the economic benefits from construction and operation of South Fork Wind are illustrative of the tremendous potential the offshore wind industry offers the Northeast region specifically and the country broadly. South Fork Wind is just one of many projects currently working through the federal permitting process. Permitting the first commercial-scale project will send an important signal to the market. To maximize economic development opportunities of both South Fork Wind and other projects, both developers and the supply chain need certainty and confidence that the US offshore wind market and individual projects are moving toward installation. The permitting process must move in a transparent, timely, and reasonable way. This will help projects through the development timeline, which provides clarity to the supply chain that will help unlock significant investments and expenditures related to project development and execution. It will also help US-based businesses make needed investments to scale up operations in preparation for additional opportunities that come with a large and certain pipeline of projects in the coming years. As we saw in Europe twenty years ago, the building of a domestic supply chain starts with pioneering projects like South Fork Wind. AWEA estimates that developing 30,000 megawatts (MW) of offshore wind along the East Coast could support up to 83,000 jobs and deliver $25 billion in annual economic output by 2030. Many of these jobs will be in construction and with local suppliers who enter the offshore wind industry. These benefits will extend beyond the Northeast region and will have meaningful impact in other parts of the country, such as the Gulf of Mexico region and the Midwest, where adjacent industries such as oil and gas development provide relevant competencies and opportunities for business diversification. South Fork Wind has and will continue to utilize businesses located in non-Northeast states such as Florida, Louisiana, and Ohio. Non-core Market Economic Value Often overlooked in the discussion about the tremendous economic potential of a domestic offshore wind industry is the benefit this industry provides businesses in other parts of the country. As a member of the business community, I support offshore wind. Large scale utility development like offshore wind will not only help reduce our massive carbon footprint but will also mean a tremendous amount of economic opportunity in the form of jobs and capital investment. Offshore wind has the potential to drive economic recovery and stimulate economies throughout the U.S. As the first commercial-scale offshore wind project in the US, Orsted and Eversource's South Fork Wind Project will play a critical role in establishing a domestic offshore wind industry and realizing the tremendous potential economic benefits of this rapidly emerging industry. We urge BOEM to stick to its published schedule and allow this exciting new industry to revitalize the region's economy when it is so desperately needed. We urge approvals to be as expeditiously as possible to help build back our economy post COVID. But this potential can only be realized with the certainty that comes with timely and reasonable permitting of South Fork Wind and subsequent projects. Offshore wind has both near-term value and long-term potential for the broader US economy that extends well beyond the region where the projects are being constructed. With offices and operational bases along the Eastern Seaboard [South Carolina, Virginia, Maryland, Rhode Island, Massachusetts and Maine], our Company is uniquely and ideally placed to support Orsted's projects. We see South Fork Wind as an important part of building a domestic supply chain that stretches throughout the country and we are excited to be a part of this. The work my business is doing for South Fork Wind has both near-term value and helps build my experience to provide the better value to future projects.
6-1	I support Deepwater South Fork LLC's and the supply chain that will support its 20 plus years of operations. As a 74 year old boat building business located in Mamaroneck New York, we are standing by to build and service future Crew Transfer Vessels (CTV) and other craft that will transport personnel to and from the offshore wind farms. To maximize economic development opportunities of both South Fork Wind and other projects, both developers and the supply chain need certainty and confidence that the US offshore wind market and individual projects are moving toward installation. We have plans for a multi million dollar upgrade to our facility to support these projects and to hire additional personnel. For our business to grow, be sustainable, and reach its true potential, permitting certainty and clarity is critical.

Comment Number	Comment
7-1	I am writing to express my strong support for the South Fork Offshore Wind Project. My Name is Phillip Risko and my company is Northstar Marine, Inc located in Cape May County, NJ. I founded Northstar in 1990 and began providing a diverse fleet of vessels to support a wide range of marine projects in the mid Atlantic region. Our fleet consists of vessels ranging from 20' to 320' and includes supply boats, crew boats, tugs, utility boats, lift boats, landing craft, barges and more. Our primary work area is the north east coast of the US from North Carolina to Maine. Northstar has been involved in the US offshore wind industry since its inception dating back to 2008 when we provided services to Cape Wind and subsequently Fishermans Energy. In recent years we have been working for several offshore wind developers, most notably Orsted, who has provided us with a significant amount of work and opportunities in the development of offshore wind, much of this work has been on the South Fork project. Northstar's first project on the South Fork site was in supporting the drilling and coring operations in 2018. This project provided significant opportunities for our company as well as many other vessel providers and suppliers from many different locations in the US. The 245' Class liftboat that was utilized came up from its home port in New Iberia, LA, supply boat services came from Norwalk, CT, various supplies were delivered from Montauk, NY, divers and shoreside support from Quonset, RI, drilling services from Utah and Northstar's vessels and support from NJ. From the example above, one can clearly see that the economic impact is quite significant and spread throughout various US states. Many of the services and vessels utilized are those that were once active in supporting the oil and gas industry in the Gulf of Mexico, however, are no longer needed in that industry. Northstar has recently acquired (4) vessels that were former Oil and gas service vessels ranging in size from 42' to 240', all of these vessels were purchased to support the development of sites such as South Fork and have been inspected and approved to work under the high safety and compliance standards set forth by Orsted. The South Fork site is a unique location being that it is centrally located in an area that allows easy access from numerous coastal states in the northeast region. The project will provide significant future opportunities for services from these states during the construction phases as well as the future operational support and maintenance of the site and its supporting infrastructure. In summary, in my 30 years as owner/operator of Northstar Marine I have never seen, nor experienced, an opportunity as significant as a project such as South Fork provides to expand my business in terms of employees, assets and overall income, profit and sustainability. In the past (3) years Northstar has grown from 55 employees to 100 due solely to the work and opportunities provided by Orsted and projects such as South Fork. This same opportunity and growth is being experienced by many companies similiar to mine and is certainly most welcome and needed in the difficult economic times we are all facing. For these reasons and the countless significant environmental benefits of clean offshore wind energy, I fully and enthusiastically support the South Fork project and I urge you to move forward with the approval process to bring this project to its completion. Thank you for your time and consideration.

Comment Number	Comment
9-1	To whom concerned. I am writing in regards to the DEIS (Draft Environmental Impact Statement) comment period. For the South Fork wind project and other wind farm projects like it here off of Long Island N.Y. and the East Coast. I own and operate a privately held work boat company in Port Jefferson N.Y. Since our inception over 35 years ago. Our primary market focus was in meeting the demands of the foreign flag oil tanker industry. Our clients would ship non domestic oil and petroleum products here to the United States East coast. Almost always on foreign flagged oil tanker bottoms. We provided many services to these oil tankers, from delivering ship's stores and provisions, to fresh water transfer, heavy spare parts delivery, ship crew and personnel launch transport, to and from the ships. Along with many other services, commercial dive inspection services, contingent oil boom deployment services And in some cases, oil spill response and clean up services in the event of an oil spill. Approx. 8 years ago, almost overnight, our foreign flag oil tanker market just about vanished. Mainly due to the creation of hydraulic fracturing here in the US. And no longer needing to import foreign oil. At just about the same time, we were starting to engage in some of the early on, first geophysical/hydrographic surveys needed for prospective wind farms in the North East and East coast. The growing wind farm industry has not only allowed our company to hang on and survive, but actually grow and prosper. We adapted some of our marine equipment and added a vessel to our fleet, to meet the needs of the new wind farm industry. For a local commercial maritime company, the emerging wind farm industry has allowed us fruitful opportunity at a time where other opportunity did not exist. There are many other small businesses locally that have benefited from even the early stages of wind generated power. Creating commerce and revenue to small businesses that were and will be needed to provide the services required. As an example, welding fabrication services, equipment rental companies, commercial diving services, wharfage provided by local municipalities and marinas, lodging and restaurant's catering to crews coming from off shore and going out to prepare for the building of the wind farms. Not to mention, commerce that will be created by the actual construction, maintenance and operation of the wind farms once they are built. That will only boost and help our local economy. Adding in the fact that wind powered energy has just about a zero carbon foot print compared to other sources of energy, makes it a great bonus. It will be a loss and mistake for all residents on Long Island, local businesses and stake holders if the South Fork Wind farm project were to be delayed due to bureaucracy, red tape and further time consuming permitting. As a resident of Eastern long Island and a business owner, I only see an up side to the South Fork Wind Farm project and the off shore wind farm industry here off of Long Island N.Y. the North East and East Coast. Thank you for your time in evaluating these important projects.
8-1	The Eastern Seaboard of the United States has one of the most abundant clean energy resources in the country wind. While wind energy is a catalyst for meeting and surpassing New York East Hampton s clean energy goals wind is a catalyst for economic growth. The American Clean Power lso serves as Association forecasts the U.S. Atlantic offshore wind industry to see investment up to $57B with installation of 30GW of wind by 2030 and could support as many as 83,000 jobs. While many of the jobs supporting the South Fork Wind project will be concentrated at the local level the projects impact crosses state lines by utilizing businesses in the Southeast as well. There are a number of companies based in the Southeast and Gulf of Mexico regions of the U.S. that are directly supporting the South Fork Wind project. The economic benefit to regions outside of the Northeast is often overlooked in the discussion of the value of a domestic offshore wind industry. Many established industries in the Southeast are well positioned to play a role in offshore wind development; from oil & gas in the Gulf, to textiles in North Carolina, to power systems in South Carolina. These companies have much to gain from this new industry, particularly given the economic challenges endured due to the COVID pandemic. To maximize economic development opportunities for companies in the southeast, both developers and the supply chain need certainty and confidence that individual projects are moving in a timely manner through the permitting process. Offshore wind has the potential to drive economic recovery and stimulate economies throughout the country. As the first commercial scale offshore wind project in the U.S., Ørsted and Eversources South Fork Wind Project will play a critical role in establishing a domestic offshore wind industry and realizing the tremendous potential economic benefits of this rapidly emerging industry. However, South Fork Wind and other projects permitting plan must be able to advance through the process in a transparent, timely, and reasonable way. This will help projects development timelines and provides clarity throughout the supply chain that will unlock significant investments related to project execution. SEWC urges the Bureau of Ocean Energy Management to act expeditiously to move the South Fork Wind Project forward to ensure that offshore wind power plays a critical role in our nations move toward a clean energy future Thank you for your consideration of our comments..

Comment Number	Comment
15-1	First, I support this project wholeheartedly. Why? Because we are in a climate crisis. There is no other side to that argument. The following is from the NASA Global Climate Change website, "The planet's average surface temperature has risen about 2.12 degrees Fahrenheit (1.18 degrees Celsius) since the late 19th century, a change driven largely by increased carbon dioxide emissions into the atmosphere and other human activities. Most of the warming occurred in the past 40 years, with the seven most recent years being the warmest. The years 2016 and 2020 are tied for the warmest year on record." And while 12 to 15 turbines 35 miles southeast of Montauk will not in one fell swoop solve our climate crisis, it is, nevertheless, an essential first step for the state of New York. We will still need solar, we will still need geothermal, we will still need more efficient appliances, and better insulated houses. And we will need offshore wind. Second, wind power works. A few years ago I visited County Roscommon in Ireland where my grandmother is from. The hills there surrounding Lough Allen are filled with wind turbines. Why? Because they closed the coal mines. I even took a tour of an old coal mine. No one misses the coal mines. Wind works in Ireland, it works in California, it will work here. It is working here now. Look at Block Island. Before the five turbines were installed, Block Island burned one million gallon of diesel fuel every year for their electricity needs. Every single year. This means that one million gallons of burnt fuel was dropped into the ocean every year. Since the turbines went online, the five diesel generators on Block Island have been turned off. That is an incredible success. Finally, I support this project because of my children. They are 9, 7, and 11 months. They will see the tricentennial of the United States. They deserve cleaner oceans and cleaner air. Thank you.
11-1	On behalf of the Edison Chouest Offshore family of companies I wish to offer my strong support for the South Fork Wind Project, a joint venture between Orsted and Eversource. Orsted is the largest offshore wind company in the world and Eversource is the largest power provider in New England and the number one energy efficiency provider in the country. These two companies have the expertise and the knowhow to develop America's offshore wind resources with sensitivity to the environment and with a strong emphasis on helping develop a domestic supply chain to support the offshore wind industry. Edison Chouest was fortunate to be chosen by the Orsted/Eversource team to build and operate the nation's firstJones Act compliant service operation vessel. This vessel, which we hope will be the first of many, will create a significant number of both direct and indirect U.S. jobs in the northeast U.S. region, along the U.S. Gulf Coast and in other states throughout the nation. This opportunity was made possible by the nearly 3GW of projects Orsted and its partners have been awarded. This strong pipeline of projects offers both the project developers and companies like ours the certainty needed to make the investments necessary to develop the domestic supply chain and to further President Biden's "Buy American" initiative. Key to this effort is regulatory certainty and transparency. In this vein we as you to move with all deliberate speed to process and approve the pending application for the South Fork Wind Project. We are ready to get to work.
12-1	The Project: The turbines will be located approximately 35 miles offshore of Montauk, with its famous and historic fishing and tourism economy. Montauk is the most easterly community within the Town of East Hampton. The transmission cable from the turbines to the Cove Hollow distribution center are proposed to come ashore in Wainscott, a small wealthy enclave of mostly second-home owners, on the West end of East Hampton Town, who have organized to oppose the project. The need for an additional energy source on Eastern Long Island is urgent and must not be delayed. South Fork Wind would supply energy to approximately 70 thousand homes in this area which would greatly alleviate the strain on the system. Currently, diesel-burning “peaker plants” provide electricity during high demand periods. East Hampton is projected to exceed our current energy supply due to decades of steady growth now accelerated by the arrival of year-round “COVID refugees” from nearby New York City. The noxious black emissions from these peaker plants are clearly visible during much of the year. This source of local air pollution would be dramatically reduced or eliminated by the South Fork Wind project. The Challenge: Every fundamental change in established systems involves trade-offs. Usually, one side of economic and environmental interests sacrifice more than the other. But remarkably, that does not seem to be the case with the South Fork Wind project. The local economy of Montauk may well benefit greatly: If the Block Island wind farm is any guide, tourism will not suffer at all. In fact the Block Island wind farm has actually become a tourist destination with visitors eager to see and learn about the technology that has long provided electricity to Europeans but is new to us. The local fishing industry which has long suffered under enormous pressures, both environmental and economic, would most certainly benefit in the long run. A major cause of decline in Montauk commericial fisheries is due to the deterioration of the marine environmental and the impact on species migration caused by Climate Change. If we do not begin the long and difficult challenge of slowing, ceasing, and eventually reversing this environmental travesty, commericial fishing as we have known it will cease to exist entirely. The South Fork Wind project would be an important first step toward realizing the ambitious clean energy goals of both New York State, and East Hampton Town. As for Sports Fishing, so important to the tourism economy of Eastern Long Island, the Block Island Example is that the turbines have become the equivalent of “artificial reefs” attracting great numbers and varieties of fish. The turbines have actually benefitted this important marine economy.

Comment Number	Comment
12-4	Urgent Action: The devastating effects of Global Climate Change are familiar to us all now with out-of-control wildfires, increasingly violent coastal storms, drastic changes in weather patterns producing destructive flooding, loss of habitat, and loss of life. The effects of climate change are evident on Eastern Long Island. The Shelter Island Ferry has applied for permission to raise their docking facilities due to rising sea level. The same is happening in Montauk with public docks being replaced at public expense. Thousands of old-growth pine trees have been totally destroyed by the invasion of the Southern Pine Beetle which was never seen here until recently. Our North Eastern weather is becoming much more hospitable to any number of invasive species which, previously, could not survive our winters. A dramatic increase in the incidence and variety of tick-borne diseases as insects and other vectors migrant toward temperatures that are more hospitable due to climate change. The federal government, BOEM, has the opportunity to finally begin to address these climate change consequences, with the approval of South Fork Wind. Failure to do so could signal a fatal blow to the ambitious and much-needed clean-air goals of New York State. I urge you to act favorably and expeditiously. Thank you.
19-1	Please support this issue as it is vital for Virginians such as myself. Thank you.
25-1	I write in full support of the Deepwater South Fork Llc's proposed wind energy facility offshore Rhode Island. This project will provide vitally needed electricity, and jobs. It will be an economic engine help us to deal with our deepening climate crisis. I urge you to approve and support the project.
26-1	Good Morning, I am a Union Member that's resides on Long Island and strongly support this project.I am also a Business Agent with over 3000 members who are in favor of this Project. Thank You
27-1	Dear Sir or Madam: On behalf of the 20,000 members of nine local unions affiliated with the New York City and Vicinity District Council of Carpenters, we write to support the South Fork Wind Project and advancement of the permitting process for it. In addition to representing carpenters who perform work in New York City, we also represent millwrights, dock builders and timbermen, and other trades men and women who are employed on Long Island and in the surrounding offshore territory where this project will be located. This 15-turbine, 132-megawatt project, located offshore 35 miles east of Montauk Point and contracted by the Long Island Power Authority, will meet the demand for energy on the south fork of Long Island to power 70,000 homes and create 1,600 good jobs. Orsted/Eversource, the project developer, is committed to the use of union labor and contractors including those with whom our union has collective bargaining agreements to assure good wages and benefits for family healthcare, retirement security, and training for skill, safety, and career advancement. It is critical that, as we develop renewable energy capacity in our region, we create responsible contracting and employment opportunity for the union members who are trained, experienced, and prepared to deliver these projects at the highest standards in the industry. The South Fork Wind Project will accomplish these goals and more for working men and women in our industry, and we therefore again express our support for it. Thank you.
18-1	The VMA has strongly supported the development of offshore wind energy along the Atlantic Coast as an opportunity to further diversify and strengthen our national maritime and supply chain industry. We have witnessed firsthand this tremendous potential through the construction and installation of the Virginia Coastal Offshore Wind (CVOW) project, with many Virginia-based companies being involved and laying the foundations for our own offshore wind supply chain. However, to fully realize this potential on the Atlantic Coast, project developers, industry suppliers, and our maritime supply chain must have certainty that the permitting process will be transparent, with timelines clearly defined and followed. A recent study by the Special Initiative for Offshore Wind estimates that the nearly 20 GW of offshore wind procurements expected through 2030 will require close to $70 billion in capital investment. The Project is part of this development pipeline and many eyes are focused on how it proceeds through the permitting process as a first-mover. Furthermore, a number of the businesses we represent need to see the permitting of these projects steadily progress prior to committing to any further investments. We thank you for your efforts to date as this new industry progresses and appreciate the challenges of creating new regulatory precedents. We trust you recognize the need to ensure that the rules are known, the timelines are clear, and the permitting process is transparent in order to drive investments.

Comment Number	Comment
20-1	As a member of the Rhode Island business community, I strongly support the development of the offshore wind sector. This new U.S. industry has the potential to revitalize our economy at a time we desperately need it, providing tens of thousands of good-paying jobs and billions of dollars in capital investment, while also helping to reduce our massive carbon footprint. As the designer and executor of the naton's first high school offshore wind high school certification in Rhode Island, the North Kingstown Chamber of Commerce has been instrumental in creating a career pathway system that includes post-secondary education in the offshore wind energy. In addition, we have hosted supply chain summits to ensure that businesses are prepared as well as an upcoming workforce to support this fast-emerging industry. We have worked closely with representatives from ¢rsted and we can attest to their corporate citizenship. They have been a pleasure to work with as we work to create an American offshore wind marketplace. We urge BOEM to approve South Fork Wind, the 132 megawatt offshore wind farm planned 35 miles east of Montauk Point, NY. By sticking to its published schedule, BOEM will enable this exciting new industry to revitalize the region's economy post-COVID, while sending an important message that you intend to follow a transparent and timely process for the many projects in the federal approval pipeline. Developers and the supply chain alike need clarity and confidence that projects can move toward installation in a timely manner if this new industry is to truly reach its potential as a driver of economic growth. As someone concerned for the economic health of both my region and the country as this pandemic comes to an end, I ask you to move as expeditiously as possible to approve South Fork Wind.
22-1	This is a project of major significance to the Long Island labor movement. Moving this offshore wind project forward will have a positive impact on other wind developments in the pipeline and make possible the creation of thousands of new jobs. The South Fork Wind project is vital to the fight against climate change, improving public health, addressing longstanding environmental justice issues, and restarting the economy in the wake of the COVID-19 Pandemic. The South Fork Wind Project is a 132 MW project that will be located more than 35 miles off the coast of Montauk Point. This will be the first offshore wind project to connect into New York and help the state, and the Town of East Hampton meet its 100% renewable energy goal. A joint venture between Orsted and Eversource, the project consists of up to 15 turbines and a state of the art transmission system that will generate enough clean energy to power 70,000 homes. It will displace millions of tons of carbon emissions, the equivalent of taking 60,000 cars off the road. New York State has 4,300 MW worth of projects in the pipeline, with a state mandate to achieve 9,000 MW of Offshore Wind Energy Production by 2035. These projects represent a once in a generation opportunity to establish a new industry with family sustaining careers that support good pay and benefits leading to stronger communities. For the South Fork Wind project, Orsted and Eversource have committed to working with contractors who will employ the members of the Building and Construction Trades Council of Nassau and Suffolk Counties. Offshore wind projects like the South Fork Wind Farm are crucial to helping revitalize the renewable energy industry and providing new and sustainable employment opportunities for the skilled workforce of organized labor. Representing the Long Island Federation of Labor I have personally had the opportunity to participate in the establishment of a National Offshore Wind Training Center with our partners from labor, Suffolk County Community College and Orsted/Eversource. A grant from the developer is making this community benefit possible. This is just one very significant example of the cooperation and diligence exercised by Orsted/Eversource to bring economic benefits to New York's communities. It is the position of our labor movement that Americans should not have to choose between a good job and a clean environment—we can and must have both.
22-3	In addition, the developers have been diligent in their commitments to the host community in East Hampton. The East Hampton Town Board and Trustees have conveyed real estate rights to the preferred route leading to Beach Lane because they believe it minimizes impacts to the whole community. Representatives of the Wainscott community where the cable will be installed participated in ten months of settlement negotiations that led to the extensive permit conditions that have been endorsed by five state regulatory agencies. Among other conditions, the project will adhere to a series of construction restrictions which will minimize disruption to residents and avoid construction on town roads during the peak summer season. South Fork Wind, coupled with two other projects to be sited off Long Island, offers meaningful opportunities for economic development and the creation of good-paying union and green-economy jobs. Long Island can become the center for an offshore wind workforce that rebuilds our economy post-COVID and combats climate change. For the industry and an American supply chain to grow and reach its true potential, permitting certainty and clarity is critical. I want to thank BOEM for moving this process forward.

Comment Number	Comment
28-1	Wind power is perhaps the most crucial piece of establishing a clean energy economy- green, sustainable, and driven by a local labor workforce. The Building and Construction Trades Council of Nassau-Suffolk Counties, which represents over 65,000 highly skilled Tradesmen and Tradeswomen on Long Island, has long supported the South Fork Wind Farm project. I am writing you today for two reasons, one is to congratulate you on your new position as the New Director ofBOEM. Secondly, I wish to express my appreciation and share the sentiment of the affiliates for the tremendous effort you put into the Draft Supplemental Environmental Impact Report for South Fork Wind. We urge to advance this essential project since the South Fork Wind Farm's 132-megawatt turbine energy project, a joint venture of Orsted and Eversource, will produce enough electricity to power some 70,000 homes on Long Island while creating high-quality, wellpaying union construction jobs with good benefits. A coalition oflabor, environmental groups and community leaders support this project as well, which I believe is a model for how to build a clean and sustainable economy. The recent agreement between 0rsted and North America's Building Trades Unions (NABTU), serves as a model for bringing together developers and labor around projects that will help us combat climate change and generate long-term economic investment in our communities. This cooperative agreement will help bring union construction workers into the offshore wind industry and set a high new standard for labor-management cooperation and workforce development. I am confident that Long Island will become a center for an OSW workforce that will be at the heart of a major industry that both helps rebuild our economy post-COVID and combats climate change. Representing the Nassau-Suffolk Building Trades Council, I have personally had the opportunity to participate in the establishment of a National Offshore Wind Training Center with our partners from labor, Suffolk County Community College and Orsted/Eversource. A grant from the developer is making this community benefit possible. This is just one very significant example of the cooperation and diligence exercised by Orsted/Eversource to bring economic benefits to New York's communities. South Fork Wind, to be located 35 miles east ofMontauk, will be New York's the first offshore wind project. Its 15 wind turbines with a maximum output of 132 Megawatts of power will generate enough clean energy to power 70,000 average homes and displace carbon missions equal to taking 60,000 vehicles off our roads. The South Fork project is the end-result of more than 10 years of exhaustive study, extensive public consultation, and dozens of public meetings. 0rsted and its partners have sought great amounts of input from the local community, business leaders and commercial fishing interests. We must continue the process of getting federal permits as quickly as possible. It is with great enthusiasm that the Building Trades Council urges the BOEM to move expeditiously in order to move this project forward to accelerate the day when we start to reap the benefits of this essential project.
30-1	I am writing in support of the South Fork Wind project. The development and implementationof ocean wind energy projects like the South Fork Wind project is essential to reducing ourdependency on fossil fuels, reducing carbon emissions, and slowing global warmingthat isleading to devasting consequences for our ocean environment and especially for coastal communities.This proposed project will supply abundant power at a reasonable price. It will generate much needed stimulus to the battered Covid economy. For those reasons, I urge BOEM to approve South Fork Wind, the 132 megawatt offshore wind farm planned 35 miles east of Montauk Point, NY. By sticking to its published schedule, BOEM will enable thisexciting new industry to revitalize the region's economy post-COVID, while sending an important message that you intend to follow a transparent and timely process for the many projects in the federal approval pipeline. Developers and the supply chain alike need clarity and confidence that projects can move toward installation in a timely manner if this new industry is to truly reach its potential as a driver of economic growth. As someone concerned for the economic health of both my region and the country as this pandemic comes to an end, I ask you to move as expeditiously as possible to approve South Fork Wind.
32-1	We urge the Bureau of Ocean Energy Management (BOEM) to maintain its published schedule for the South Fork Wind Project. The South Fork Wind project will allow an exciting new industry to help revitalize the region’s economy. The Offshore Wind Industry has the potential to drive economic recovery and stimulate coastal economies up and down the U.S. East Coast. As the first commercial-scale offshore wind project in the US, Ørsted and Eversource’s South Fork Wind Project will play a critical role in establishing a domestic offshore wind industry, and realizing the tremendous potential economic benefits of this rapidly emerging industry. By maintaining schedule, BOEM will help accelerate the rebuilding of our economy post COVID. South Fork Wind is just one of many wind projects currently working through the federal permitting process. Permitting the first commercial-scale project will send an important signal to the market. By approving South Fork Wind, it will send a clear message to the industry and clarity to the supply chain which will unlock significant investments and expenditures related to the project development and execution. As a member of the American workforce development community, we support offshore wind. The development of offshore wind as a major energy source, will help reduce the U.S.’s massive carbon footprint, and unleash a tremendous amount of economic opportunity. It will also allow MITAGS to expand its training mission in support of the industry, and employment for U.S. seafarers.
33-1	I support the South Fork wind project that will power 70,000 homes and meet some of the energy needs of local Long Island communities.

Comment Number	Comment
34-1	TRC Companies is writing to show our support for the offshore wind industry here in the U.S. and thank your agency for its work in releasing the draft Environmental Impact Statement for the South Fork Wind Project. This report is a crucial step for this industry to go from plans on paper to steel in the water. As a group currently engaged in supporting engineering and environmental aspects of the offshore wind industry, we are excited about the enormous economic potential the market will bring to our region and country. It's not often that we get to witness an energy delivery revolution, but that's exactly what we are seeing with offshore wind. While this may be a new industry for the U.S., offshore wind is a proven industry across the Atlantic. With thousands of offshore turbines installed across Europe, this industry has created thousands of jobs, revitalized port communities, created a supply chain and invested billions of dollars into local economies. The U.S. East coast offers some of the most promising conditions in the world for offshore wind. There is no doubt, that we can replicate the industry's success right here at home. A study by the American Wind Energy Association estimates that the nearly 30 GW of offshore wind procurements expected through 2030 could support up to 83,000 jobs and deliver $25 billion in annual economic output. These jobs and financial benefits are already starting to trickle in - with port investments, vessel construction and factory announcements - even as this industry remains in its infancy. We are already seeing the growth of a domestic supply chain, as developers and suppliers look to minimize their own costs and logistical risks. This domestic supply chain means good paying jobs, investment in coastal communities and a brand-new economy for Americans to call their own. In sum, offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the east coast. We appreciate BOEM's effort to move this industry forward and the care your agency has taken to ensure this industry can be a success for all. We look forward to seeing this industry's promises come to fruition and urge BOEM to stick to its published schedule and allow this exciting new industry to revitalize the region's economy at a time when it is so desperately needed.
35-1	I favor development of off shore wind energy on the south fork of Long Island.
37-1	I am hopeful for renewable eneregy to overpower coal, gas and especially fracking.
39-1	As a nation we are definitely ready to take the next step in improving the environment.
40-1	The Wind Farm is essential. It is absolutely necessary that you approve.
41-1	Our earth home is in crisis due to environmental challenges mainly caused by fossil fuel use. Developing a wind farm would partially address that issue. I strongly support this development.
43-1	Please support this offshore wind power project. We need to move forward with sustainable energy and wind power is one big way. Thank you.
54-1	The Deepwater South Fork Proposed Wind Energy Facility Offshore Rhode Island is an extremely important initiative and I support it fully. Thank you.
58-1	Please support and accelerate the regulatorty process forwarding the South Fork Wind Project.
61-1	I remember hearing a professor from the University of Maine tell NPR that if we were to implement offshore Wind Energy turbines along all of the Maine Coast we could have all the energy we need to power the whole state 4 times over. Additionally America has thousands of miles of coastline. Let's fund this Rhode Island facility as a prototype for replacing fossil fuels with wind, and of course solar and geothermal energy.
62-1	I support as much clean wind energy as possible. The next objections are misguided and nimby vs setting a tone that will help us address climate change. Thank you
63-1	It is time to take our climate disaster seriously. Wind energy, as long as we properly protect our avian community is the way to go.
64-1	I am a member of the New York League of Conservation Voters and I support the South Fork Wind Farm (SFWF).New energy must be clean energy. Offshore wind power is critical to the renewable energy industry, and this can be a model and will create jobs.
67-1	Offshore wind is the future. We need to do everything we can to combat climate change and the south fork wind project is one of the best things we can do to prevent it. New studies have shown that painting the blades of the turbine different colors can massively decrease the number of birds injured, so there is really no argument against it. Thank you

Comment Number	Comment
68-1	We need renewable energy, rather than polluting fossil fuels. With renewable sources, we don't have to worry about having to buy oil from hostile nations. If we have wind turbines in our offshore waters, boaters can tie up to them in an emergency, and we could have devices on them so that these boaters can call for help from the Coast Guard. The wind turbines could also be cell sites for even more cell phone reception.
69-1	A civilization battling against Mother Nature always loses. Shall we be the cause of our extinction, or the manner in which we return to Universal Laws of careful stewardship of the blessed Earth? If people could tolerate the infernal horrors of coal plants and the threat of nuclear accidents, I think they'll adapt to clean energy technologies.
72-1	Recording my support of the RI offshore wind energy facility.
75-1	Save the environment.
78-1	This project will move us forward in energy conservation.
79-1	I support this wind farm project. We need to make bold changes in order to protect the future. Things can't just continue as they are.
80-1	We must wean ourselves away from fossil fuel. Wind energy will be essential towards this goal. I support the South Fork wind farm.
81-1	We have to use all forms of clean energy we can. Do I think that humans are the only ones responsible for the global warming trend? No as we are finding human villages being exposed as the glaciers recede but this warming is happening at an accelerated rate that wouldn't happen normally. We must stop funding the oil industry who for years knew this was going to happen and did nothing because of PROFITS. Instead of using some of the profits to develop cleaner energy sources which would have increased profit, they chose to destroy the environment. The electric car which has been around for decades is now only being developed because doing so decades ago would have cut into their profits. And the people didn't push hard enough because most didn't know. Oil companies should be held accountable for their actions against the environment the same way the cigarette companies and asbestos companies were held responsible for products they manufactured that caused damage to people. They knew decades before and kept quiet because of profits. They should be forced to pay damages and develop these new forms of energy.
82-1	We are in great need of renewable energy and off-shore wind power off the shore of Long Island is perfect! I hope you will make this important project happen and be a model to all those who will follow your breakthrough lead. Thank you!
86-1	I live on Long Island and fully support clean energy, including wind farms. We must act now.
93-1	Renewable energy now!
94-1	I support the South Fork wind project off of Long Island
95-1	Wind farms are a good choice to create jobs.
96-1	As New York moves toward the clean energy goals established in recent years, this project seems to be a good step forward in meeting these goals. Wind energy can, and should, be part of the solution.
97-1	Please let this green wind project go through!
98-1	This is a good project (even if it is very small scale compared to what is needed). It should be built
99-1	Please support offshore wind, including the proposed South Fork Wind Farm, as a means to create a more sustainable world by reducing the use of fossil fuels.
109-1	I support the South Fork Wind Farm development. This will be a significant asset for New Yorker's clean energy economy. The project will provide great long term benefits to our environment including the fish. This project along with other clean energy projects will create many green jobs and help us achieve our goal of 70% renewables energy by 2030. In addition, wind turbines will help keep the air clean. My daughter suffers from asthma and moved to the Adirondacks for her health. The air is much cleaner there. The use of clean energy in New York State will help all people with health issues such as heart disease. Healthcare is very expensive. Having asthma and heart disease is costly for New Yorkers. The sooner we can get these wind turbine producing clean energy the better.

Comment Number	Comment
114-1	The South Fork Wind Project represents America's most immediate opportunity to deliver much needed future clean energy jobs today. Clean energy jobs are known for paying low wages to non-union workers, but South Fork Wind is changing that reputation by setting a significant new American standard for clean energy wages and career opportunities through strong labor-management cooperation and workforce development in the rapidly expanding offshore wind industry. In another recent landmark partnership, NABTU and Orsted created a national agreement utilizing our world-renowned apprenticeship and apprenticeship readiness programs to train a clean energy workforce for the rigors offshore wind construction. South Fork Wind and the Orsted partnership signify a transformative moment for organized labor and clean energy by demonstrating that we do not have to choose between good jobs and a clean environment—we can, and must, have both. South Fork Wind is commencing/launching what can be a vibrant domestic offshore wind industry employing thousands of union workers to build the domestic supply chains and revitalize our ports and infrastructure to accommodate the massive construction opportunities synonymous with offshore wind. America's energy economy cannot afford to pass up this opportunity, representing an estimated 83,000 jobs and $25 billion in annual economic output within the next decade. After ten plus years of study, public meetings, and extensive community input from residents, business owners, organized labor, and the fishing industry, NABTU strongly urges the Bureau of Ocean Energy Management to quickly move forward with the permitting process to unlock critical economic benefits and employment opportunities for America's energy future. Permitting certainty is a must. I urge you to move this process forward.
116-1	This comment addesses Docket BOEM-2020-0066. I went to school on Long Island and my family lived there for decades. I am pleased to hear that the South Fork Wind Farm is proceediing through the process of permitting and construction. It is hard to get enough power onto Long Island and this Wind Farm is economically efficient. Climate change is encouraging some rise in sea level that is a concern on Long Island. The South Fork Wind Farm will not aggravate and may ameliorate this issue. A decade and more in the past, there was some concern on the Island about the impact of wind turbines on the scenery. These plans show the generation so far out at sea that it does not have a visual nor an auditory impact at the beach. The draft Environmental Impact Statement is encouraging. It includes a finding that the Wind Farm will be a habitat for some fish.
117-1	The future of our economy and environment depends on an infinite source of clean energy such as wind power. We need to begin making the investment necessary to build out the infrastructure to secure our environmental and economic future
119-1	Please accept these comments on behalf of Siemens Gamesa Renewable Energy Inc., ("Siemens Gamesa"). Siemens Gamesa is the world's largest manufacturer of utility-scale offshore wind turbines. With a total capacity of over 15 gigawatts installed offshore, and six times that amount of installed onshore capacity, in over 90 countries and across 5 continents, Siemens Gamesa has the longest track record of all wind turbine suppliers in the offshore industry. The United States represents an important market to our future business operations and the Bureau of Ocean Energy Management (BOEM) has demonstrated substantial leadership in helping to bring the offshore wind energy industry to American shores. Siemens Gamesa is very proud of our relationship with Ørsted and Eversource. Globally, Ørsted and Siemens Gamesa have worked side-by-side to build the foundation of the offshore wind industry, with over 6 GW of Siemens Gamesa turbines currently operating in the Ørsted portfolio. That long-standing relationship helped to launch the first two offshore wind turbines to be commissioned in US federal waters for the Coastal Virginia Offshore Wind (CVOW) Demonstration Project, and includes three upcoming US projects: Revolution Wind, Sunrise Wind, and South Fork Wind. This 1.7 GW conditional supply agreement is an important pillar of Siemens Gamesa's 4.3 GW order book in the US, and the success of these projects is crucial to establishing the commercial certainty and timeline visibility needed to drive our ongoing supply chain and industrial planning activities. The South Fork Wind project is scheduled to become the first offshore wind project serving New York State, and to play a part in ambitious statewide and nationwide commitments to renewable energy is an incredibly exciting challenge. Our planet is warming, and with economic impacts of the COVID-19 pandemic deeply felt in communities across the U.S. the sound and stable frameworks from offshore wind development will provide much-needed sustainable and resilient jobs and economic growth while transforming the future for our children and grandchildren. Further, a robust offshore wind sector will help advance the Biden-Harris Administration's goal to ensure the U.S. is a leader in the new global green economy. America is at a transformative place where offshore renewable energy can help rebuild the economy in an environmentally conscious way while also driving down emissions. Siemens Gamesa looks forward to playing its part in this effort, and I encourage you to approve the permitting for the South Fork Wind farm. This is a project that will not only benefit our economy but will benefit the environment and help create an American offshore wind industry.

Comment Number	Comment
121-1	I am a longtime Montauk resident and have been a mariner for over 3 decades . I support the offshore wind farm not because I relish seeing them on the horizon nor the hazards to navigation they pose nor the threat to wildlife such as pelagic and migratory birds and cetaceans,. The disruption to the local fishing industry is yet to be determined and the potential of negative impact on residents of Wainscott in particular where the cable will most likely come ashore is no small thing. However each of us have brought us to this moment in time. The future is here leaving us between a rock and a hard place. I have long advocated for energy conservation and societal changes to reduce our need for fossil fuels but yet that sentiment falls largely on deaf ears. We have had decades to turn this around and instead of reducing consumption and becoming more energy efficient we continue to exploit our natural resources to satisfy our insatiable energy demands . We have to start somewhere and this seems to be the best way forward. My regret is that 99% of the people benefiting from this wind farm will never see it. Out of sight out of mind. If the wind turbines were on the average beachgoers horizon there would be more awareness of how energy is created, how it is used and more importantly how energy is wasted.
121-3	For the past 12 years my husband and I on our own sailboat , have relied on solar panels for the majority of our energy needs onboard. Granted we use very little diesel fuel being under sail the majority of the time, but virtually all of our energy is converted to 12v from the solar panels. We have just upgraded to a new boat and are in the process now of integrating an even larger solar panel array . Being energy independent allows us to rarely plug in dockside for electricity. We also have the option to add a wind generator but so far we have not needed the additional energy as the solar provides enough. As you can tell I am a big proponent of renewable energy . It is not going to change the world overnight but little by little and working together we can make a dent in reducing carbon emissions. Which we must.
123-1	I support the permitting of South Fork Wind because of the fierce urgency of transitioning to clean energy. We have but a small window to save our shoreline communities from the worst impacts of climate change. Scientists estimate that we must transition to 100% clean energy by 2035 and go entirely fossil free by 2050. Wind energy is key to accomplishing this. Offshore wind is the swiftest and most cost-effective way to make a major shift toward clean energy. We cannot wait for solar panel installations roof by single roof. Offshore wind can supply clean energy to millions of homes in one fell swoop, of which the South Fork Wind Farm will play a part.
123-3	Recently, we on the East End have seen the devastating impact on our shellfish industry of ocean warming and acidification: the total loss of our scallop harvest two years in a row. For example, our traditional eel grass forests, which used to supply critical habitat for many marine species, have been unable to regenerate due to ocean heating, despite the efforts of marine scientists to regenerate them. These are just two of the many impacts of climate change that are beginning to devastate our communities. This is not to mention the increased risk of severe storms and the impact of sea level rise on our homes and roads. Finally, we are in the midst of an economic depression due to the COVID19 pandemic. We need the hundreds to thousands of good jobs that the wind power industry will provide our community, including job expansion through the multiplier effect. These are the reasons why we need to move forward with permitting the SFWF as soon as possible. Any delay would be short-sighted and devastating in the long term.
130-1	I am writing you today to demonstrate my support for the South Fork Wind offshore wind farm. This project will further the revitalization of the maritime industry in the New York area creating lifelong jobs and help to reinvigorate port communities on Long Island. Perhaps as importantly, it will generate much needed clean electricity. As one of the first utility scale projects of its kind in the US, the South Fork Wind project will bring enough electricity to power 70,000 homes. This will set the stage for Long Island Power Authority (LIPA) to integrate increasing amounts of wind energy into Long Island, decreasing the overall importation and consumption of fossil fuels for local electricity production. In turn, this will ensure much of the revenue generated by the Power Purchase Agreement (PPA) and the corresponding jobs created to build and operate the wind farm, is kept local. With New York poised to play a leading role in the development of this industry and perhaps because of its modest size, the South Fork Wind project is uniquely positioned as an ideal next step between the Block Island project and some of the much larger projects in the area now working their way through the permitting process. For our part, as a leading offshore cable installation and maintenance company, should Global Marine Group be fortunate enough to win some of the work on South Fork Wind, it would allow us to collaborate with local electrical contractors to train and develop personnel to carry out these tasks safely and efficiently. Further, we would utilize local ports and nearby facilities for the various tasks required to do our work such as cable storage, staging and crew transfer. This type of economic activity will be needed during construction and throughout the maintenance life of the field. It is not often that we have the opportunity to be involved in the creation of an entirely new, billion-dollar industry, especially one which will develop and keep many of its jobs local, but with its well-developed plans and its PPA with LIPA in place, that’s exactly what South Fork brings – a first entry in New York for an entirely new maritime industrial and economic engine. Offshore wind is the kind of economic engine the US can benefit from, especially now. As Global Marine Group experienced in Europe more than two decades ago, the building of a domestic supply chain starts with pioneering projects like South Fork Wind.

Comment Number	Comment
131-1	On behalf of approximately 140,000 International Brotherhood of Electrical Workers (IBEW) members and retirees residing in New York, New Jersey, Delaware and Pennsylvania, I submit general support for the Draft Environmental Impact Statement Proposed Action for the South Fork Wind Farm and South Fork Export Cable Project located in BOEM Renewable Energy Lease Number OCSA 0517 (The Project). We believe the Proposed Action alternative provides a meaningful balance between various interests and supports the needed adoption of clean energy generation. The purpose of the Project is to develop a commercial-scale offshore wind energy facility in the Lease with wind turbine generators (WTGs), an offshore substation, and one transmission cable making landfall in Suffolk County, New York. The Project would contribute to New York's renewable energy requirements, particularly the state's goal of 9,000 MW of offshore wind energy generation by 2030. In addition, DWSF's goal is to fulfill its contractual commitments to Long Island Power Authority (LIPA) pursuant to a power purchase agreement executed in 2017 resulting from LIPA's technology neutral competitive bidding process. The proposed project's positive environmental impacts are critical to achieve a meaningful reduction in harmful greenhouse gases, such as carbon, and to improve overall environmental health.
133-1	The DEIS is specifically identifies impacts of the South Fork Wind Farm, however BOEM's decision with this project will have lasting implications for New York's energy future and our nation's climate policies. New York State is a leader in the fight against climate change and national champion for offshore wind, having passed the strongest climate change law in the nation in 2019. The state is working towards achieving mandates of 70% renewable energy by 2030, carbon neutral electricity by 2040, and a net zero carbon economy by 2050. We cannot achieve these goals, particularly in downstate New York, without also achieving or exceeding our target of 9,000 mw of offshore wind. The Biden administration has announced plans to tackle climate change and put forth a goal of reaching a net-zero carbon economy by 2050. We must work aggressively to support well-sited, responsible renewable energy projects, like the South Fork Wind Farm, to meet these critical state and federal goals. CCE thanks BOEM for compiling a thorough and rigorous DEIS for this project. CCE supports the proposed action and urges the agency to move forward with an FEIS and approval of the project by the end of this year. Impacts to fish, birds and marine species need to be assessed and mitigated to the greatest extent possible for each offshore wind farm built in the United States. However, the more substantive impact to these species is climate change. The real danger facing our beaches, fisheries, and coastal communities is not a wind farm, it is rising sea levels, ocean acidification, warming waters and extreme weather events. These events are a significant threat to Long Island and already impacting our estuaries and our coastal communities. The environmental benefits of advancing offshore wind farms to reduce climate impacts needs to be weighed against any potential impacts associate with construction of offshore wind farms. CCE believes that offshore wind is one significant part of the antidote in fighting climate change. We can not and should not put the antidote on pause allowing impacts of climate change to intensify.

Comment Number	Comment
133-2	Climate Change Impacts on Long Island Long Island is already experiencing the negative ecological and economic impacts of climate change. We need to be at the forefront of the transition to renewable energy and of offshore wind development in the US. • The National Ocean and Atmospheric Administration (NOAA) predicts under a worst-case scenario a 6 ft sea level rise will cause most of the barrier islands and Long Island homes south of Merrick Road (route 27A) to be flooded or under water, with more than 150 municipalities impacted. Homes and infrastructure are already being raised, including roads in Freeport, Lindenhurst, Smithtown, and Southampton, as well as the Shelter Island ferry, while residents in the most vulnerable communities are facing managed retreat and home buyouts. These communities are in an exceptionally vulnerable position to extreme weather events. • Superstorm Sandy destroyed or damaged 95,000 buildings on Long Island and caused billions of dollars in damages. We are experiencing the increasing occurrence of “hundred-year storms” and increased precipitation during rain and snow events, and the problem will only get worse. NOAA predicts that in a worst-case sea level rise scenario, the average high tide in NYC will be 2 feet higher than the storm surge during Superstorm Sandy. Costs of repairing damage from extreme weather events like Superstorm Sandy and Hurricane Irene coupled with the need to raise homes and pay increased flood insurance premiums are impacting struggling homeowners in coastal communities. In addition to major storms, south shore communities are already experiencing “sunny day flooding” due to higher tides. This means on sunny day there is still street flooding and property damage. • Extreme weather events are not our only challenge. Warmer winters coupled with longer, hotter summers are creating more hospitable conditions for invasive species, deer ticks and mosquitos that carry diseases and reduced agricultural yields. Increased summer temperatures and more severe heat waves also degrade air quality, increase health care costs, and put lives at risk. • In the US, air pollution from burning fossil fuels leads to annual losses of $600 billion and the loss of 230,000 lives. In NYC, approximately 130 residents die each year just from heat waves, with the number expected to rise over the coming century. Both Suffolk County and NYC regularly receive an “F” for air quality by the American Lung Association and experience disproportionately high rates of asthma, heart disease, and other chronic health issues in disadvantaged communities. Transitioning to offshore wind will significantly curb air pollution and provide quantifiable health benefits for New Yorkers. Air pollution reductions from the first 2,400 MW of offshore wind in New York would be valued at roughly $1 billion and would avoid an estimated 100 premature deaths each year. • Ocean acidity has increased 30% since the industrial revolution and there are documented negative impacts to sea scallops, squid, clams, oysters, and other species in the northeast. • The lobster die off in the Long Island Sound is catastrophic is mainly attributed to warmer waters. The native lobster species and its historic maritime industry declined 90%. The industry used to account for tens of millions of dollars annually. We are not winning the war to save this planet. In fact, we are losing it. Climate change is altering ecosystems faster than species can adjust. World Wildlife Federation scientists have estimated that most species on this planet (including plants) will have to "move" faster than 1,000 meters (3280 feet) per year if they are to keep within the climate zone which they need for survival. Many species will not be able to redistribute themselves fast enough to keep up with the coming changes. These species may well become extinct. It is CCE’s strong position that if we are to make decisions that protect birds, shellfish, finfish, and other marine species, then we must support siting offshore wind and we must move forward with the proposed action. Long Island is faced with the decision whether to lead on renewable energy and embrace wind power, or to stall and remain shackled to fossil fuels. This project, including the construction, operation, and maintenance of the infrastructure associated with it, underwent rigorous environment review. It will set an important precedent for how offshore wind projects are developed in NY, including extensive surveys of marine mammals, consistent and meaningful stakeholder engagement, mitigation plans for commercial fisheries, and a 1 x 1 mile grid system for turbines to minimize impacts to fishing and shipping. We must ensure that future offshore wind projects undergo the same intense study to mitigate environmental and community impacts. But now is the time to act.
133-11	It is our responsibility to choose the infrastructure with the least impact and the greatest benefit -and that is the proposed action, South Fork Wind Farm . CCE urges BOEM to move forward with the Proposed Action and issue an FEIS and subsequent approval of the project by the end of this year.
135-1	I am writing on behalf of Crowley New Energy Services, Inc. to express our support for the South Fork offshore wind project. Crowley is a privately held, U.S.-owned and operated logistics, government, marine and energy solutions company. Crowley has significant experience in the development of offshore energy projects in some of the most challenging environments in the world including Alaska, Sakhalin Island, and the U.S. Gulf of Mexico. The development of offshore wind resources in the U.S. can benefit from this expertise. Crowley will benefit from our collaboration with South Fork through expanding Crowley’s existing capabilities in the region and assisting us in developing the local supply chain which will bring valuable jobs and increased economic opportunity to New York and the surrounding region. The offshore renewable wind market is a rare opportunity to develop an entire industry which can bring both economic rewards to the region while at the same time combat the problem of climate change which impacts us all. For this development to happen the industry requires transparency in the permitting process and timely permitting decisions. Significant investments in U.S. vessels and infrastructure to support the development of this industry are required and industry needs this certainty to proceed with this investment. This investment will benefit local businesses as well as the broader U.S. economy and assist in the recovery from the COVID-19 recession. Crowley welcomes the opportunity to help the domestic offshore wind industry and the U.S. achieve its renewable energy goals.

Comment Number	Comment
137-1	On behalf of Consumer Energy Alliance, I write to express our strong support for the South Fork Wind project and the Draft Environmental Impact Statement (DEIS). Consumer Energy Alliance and its members believe that timely, consistent permitting of modern energy infrastructure projects is essential to ensuring affordable, reliable sources of energy for Americans across our country. The offshore wind industry is a tremendous example of the power of innovation and technology to meet modern energy and environmental challenges. Rapid advancements in the efficiency of wind turbines have increased the ability to produce more power while also driving down the costs. Additionally, continued advancements in energy storage technologies provide a similar path towards affordably addressing the challenge of harnessing intermittent sources of power. One of the major stumbling blocks facing this new industry is permitting. As with other energy infrastructure projects Consumer Energy Alliance has supported, we want to ensure that the environment is protected and all affected stakeholders are able to weigh in on the development. However, ensuring environmental protection and public engagement should not be abused to needlessly delay projects. We have seen how this process could be used to slow the development of the offshore wind sector over the last few years, and we are pleased that the Biden Administration has chosen to prioritize moving these energy infrastructure projects forward as a way of creating jobs and addressing emissions. For Consumer Energy Alliance, which was formed to create and advance constructive dialogue between energy consumers and energy producers, the offshore wind sector and its supply chain represent a unique mixture of both. The projects themselves will create affordable, low-emissions power, while the industries providing the materials and services such as steel, concrete, turbines, transmission cables, data management, as well as vessel construction and maintenance, all require substantial amounts of affordable, reliable power. Moving projects like South Fork Wind along will have multiple benefits for consumers and manufacturers throughout the United States. Again, we strongly support the South Fork Wind project and the Draft Environmental Impact Statement. We urge the Bureau of Ocean Energy Management and the Department of Interior to move this project forward without delay and proceed to advancing the other projects currently awaiting regulatory approval. We appreciate your time and careful consideration of these projects, and we look forward to working with you to advance policies and projects that benefit energy consumers throughout our country.
140-1	I am writing you today on behalf of the 10,000 skilled tradesmen and women represented by the Rhode Island Building and Construction Trades Council to thank your agency for its work in releasing the Draft Supplemental Environmental Impact Report for South Fork Wind. We are excited about the enormous economic that the offshore wind industry brings to the entire East Coast and we strongly voice our support for the South Fork Wind farm, a joint venture of Ørsted and Eversource, which will create hundreds of well-paying union construction jobs with benefits for skilled craftsmen and women. May I proudly remind you that 300 union members from the Rhode Island Building and Construction Trades Council constructed the first commercial offshore wind farm in the United States off the coast of Block Island in 2015 and 2016. These are real jobs that provide good paychecks and benefits. As you may be aware, North America’s Building Trades Unions (NABTU) and it’s local Building Trades Councils, recently reached a breakthrough deal with Ørsted that will bring thousands of union construction workers into the offshore wind industry, while creating a high new standard for labor-management cooperation and workforce development. At the same time, the Rhode Island Building and Construction Trades Council and Ørsted will develop long-term strategic plans for the balanced and sustainable development of Ørsted’s projects, guarantee good-paying union jobs, and demonstrate how we can successfully combine workforce training and middle-class labor standards with family-sustaining wages, healthcare benefits and pension security. South Fork Wind Farm’s 132-megawatt turbine energy project will produce enough clean, renewable electricity to power 70,000 homes on Long Island while creating high-quality, well-paying union construction jobs with good benefits. It also will displace millions of tons of carbon emissions power – the equivalent of taking 60,000 cars off the road, create jobs, boost the local economy, and improve the quality of life for all residents. The economic benefits of the South Fork project are not limited to New York. Indeed, the project will support employment opportunities for union members across the region, including Rhode Island. The South Fork project has broad-based support among labor, green energy groups, and the local community and is a model for how to build a clean and sustainable economy. It will enable New York State and the Town of East Hampton to meet their ambitious renewable energy targets over the next decade. It is important that we keep this project on track and will help our economy recover from the ravages of the COVID-19 pandemic. While offshore wind is a new industry in the U.S., it is a proven industry all across Europe, where its has created thousands of jobs and revitalized port communities. South Fork is a first big step for New York and residents along the South Shore. After 10 years of meetings, community gatherings and public outreach, the project is a big step closer to reality. All that remains is the federal permitting process. We strongly urge the BOEM to move forward and not allow any more barriers to block development. Climate change is real – and so are the jobs South Fork Wind will create.

Comment Number	Comment
142-1	Burns & McDonnell is a company that is both part of the economy and the community. We believe in being active partners, and have the following comments in response to the DEIS for the South Fork Wind Farm and South Fork Export Cable Project: • We are in support of the offshore wind industry. In addition to reducing our carbon footprint, offshore wind has the potential of providing hundreds of millions of dollars in economic impact by form of job creation and capital investment. • To maximize economic development opportunities of both South Fork Wind and other offshore wind projects, the supply chain needs certainty and confidence that the U.S. offshore wind market and individual projects are moving toward installation. • This will help U.S.-based businesses, such as employee-owned Burns & McDonnell, make needed investments to scale up operations in preparation for additional opportunities that comes with having a large and certain pipeline of projects in the coming years. • We urge BOEM to adhere to its published schedule. This exciting new industry can help revitalize the region's economy when it is so desperately needed. • The work our firm is doing for South Fork Wind has both near-term value to the local region and helps build our experience to provide better value to future projects to meet New York State's (and other states in the region) ambitious offshore wind initiatives. • A sustainable offshore wind business with permitting transparency diversifies our client base which increases the sustainability of our business, along with our investment in the communities we live and work in. • Burns & McDonnell is an active participant in advancing the community by way of partnerships with regional small and diverse businesses. The South Fork project moving into the construction phase will provide opportunities to these businesses when they need them during/after the global pandemic.
143-1	I want to add my voice to other U.S. manufacturers and constructors urging your approval of the South Fork Wind Farm environmental impact statement and final permitting for the project's COP plan, which was submitted in 2018. Under BOEM's published timeline, final approval for the project is due by January 2022, and I urge BOEM to complete its important work by that date or sooner, if possible. As the first fully permitted commercial offshore wind farm in the United States, South Fork Wind will produce hundreds of construction and turbine service jobs that will help New York State meet its nation-leading clean energy goals while delivering 132MW of clean energy — enough to power 70,000 homes — and take the equivalent of 60,000 cars off the road. The launch of commercial-scale offshore wind production also means significant opportunities for businesses throughout the Gulf Coast region and the Midwest, as well as along the East Coast, where it is expected that some 30GW of offshore wind power can be developed by 2030. But for a U.S. supply chain to develop for the offshore wind industry, manufacturers, suppliers, and constructors need a predictable level of permitting approvals and sufficient development scale to justify their investment in equipment and manufacturing facilities that will drive development of this new and exciting renewable energy industry. This new industry will benefit dozens of communities that have suffered economic harm during the COVID-19 pandemic. I urge your approval of permitting for South Fork Wind, which is a relatively small project with enormous potential to jump-start the establishment of a U.S. supply chain that will help transform the nation's economy and aid us in our efforts to reduce and eliminate the burning of fossil fuels for power generation— so long as permitting and construction proceeds promptly and predictably so that manufacturers and suppliers can justify their investment in new equipment and new manufacturing facilities.
146-1	As BOEM responds to and determines next steps regarding the South Fork Wind Construction and Operations Plan, Manora Logistics is writing to express our support for this project. Manora Logistics is excited to contribute to the future of US offshore wind, but recognizes our participation in project logistics and construction activity can only be realized if the necessary permitting occurs in a timely and reasonable manner. Given Manora Logistics' decade of experience with European offshore wind, we understand the critical role early projects such as South Fork play in developing a new market. When a transparent, reasonable, and timely permitting process is followed, these early projects serve as a stepping stone to future development by offering regulatory certainty, investor confidence, and supply chain advancement. Manora is eager to support the construction 30,000 MW of offshore wind along the East Coast, and the $25 billion in annual economic output that will come with this build out by 2030; and we see early projects such as South Fork Wind as a critical first step in sustainably building the US offshore wind industry. We are committed to supporting the US offshore wind market by lending our logistics and transport expertise. However, clear project timelines and permitting certainty is needed in order for Manora to appropriately staff our US team, invest resources, and focus our business efforts. Manora strives to hire local employees and enter contracts with local partners in support of all projects. As the offshore wind industry grows, we expect the supply chain to fully mature. While often overlooked, the growth of a sustainable, national supply chain will bring economic benefits to many different parts of the country – not just the Northeast. With regulatory certainty, projects can progress as planned, leading to a national supply chain fully supporting the renewable energy transition and post-COVID economic recovery. Manora Logistics is ready to get to work in support of US offshore wind. However, the potential for US offshore wind can only be realized with the certainty that comes with a timely and reasonable permitting process for South Fork Wind and subsequent projects. We hope BOEM takes these comments of support and enthusiasm into account when reviewing South Fork Wind's Construction and Operations Plan.

Comment Number	Comment
147-1	Win With Wind supports the Project's approval because of the contribution that the Project will make to reducing greenhouse gas emissions, meeting New York State's offshore wind capacity goal, and laying the groundwork for offshore wind development along the Eastern Seaboard. As the DEIS recognizes, offshore wind serves the nation's goal of producing electricity that is affordable, reliable, safe, secure, and clean, and the project would contribute to "slowing/arresting global warming and climate change-related impacts[.]"Indeed, climate change linked to greenhouse gas emissions is contributing to "widespread loss of shoreline habitat[,]" altering species distributions, and causing ecological reductions and "other permanent changes of unknown intensity." Ushering in deep decarbonization of the U.S. economy through renewable energy expansion will require the development of approximately 200 gigawatts ("GW") of offshore wind by 2050, according to one recent estimate. Additionally, the deployment of offshore wind facilities in New York is particularly critical to meeting the State's requirement of 9 GW of offshore wind energy generation by 2030. According to a 2020 study prepared for the New York Independent System Operator, New York will need approximately 21 GW of offshore wind capacity by 2040 in order to meet the requirements of the Climate Leadership and Community Protection Act. As residents of Long Island, Win With Wind members are aware that coastal communities are uniquely threatened by the climate change impacts wrought by greenhouse gas emissions. According to the Intergovernmental Panel on Climate Change ("IPCC") Fifth Assessment Report, coasts will increasingly experience adverse impacts such as submergence, flooding, and coastal erosion due to sea level rise caused by climate change. The Fourth National Climate Assessment (NCA4) similarly found that "[c]oasts will confront a more diverse and, to a great extent, unique range of climate stressors and impacts compared with the rest of the country. Rising sea levels will force many more coastal communities to grapple with chronic high tide flooding, higher storm surges, and associated emergency response costs over the next few decades." According to the NCA4, heavy precipitation coupled with sea level rise will produce higher storm surges that exacerbate the risks to coastal communities. Moreover, as the SEIS notes, carbon dioxide emissions causing ocean acidification may threaten species that are important for commercial fishing, and climate change caused by such emissions will lead to property and infrastructure damage. The South Fork of Long Island is especially vulnerable to climate change impacts because it is located in a hotspot along the mid-Atlantic coast that is experiencing sea The South Fork of Long Island is especially vulnerable to climate change impacts because it is located in a hotspot along the mid-Atlantic coast that is experiencing sea level rise at three to four times the average global rate. Sea level is rising more quickly here because of land subsidence, or sinking, caused by vertical land movement related to the melting of glaciers from the last ice age. The intermediate warming scenarios considered by the NCA4 project sea level rise of two to 4.5 feet in the region by 2100. However, the worst case scenarios include sea level rise upwards of 11 feet on average by the end of the century. It bears noting that on Long Island, large portions of the coast are less than ten feet above average sea level, particularly on the south shore. Long Island is also particularly vulnerable to the effects of coastal erosion given that it is largely formed of sand and gravel deposits left by retreating glaciers. To avoid further exacerbating these impacts it is imperative that Long Island, the State of New York, this country, and the global community take advantage of every possible opportunity to develop renewable energy (such as offshore wind) as a serious alternative to fossil fuels.
147-4	Finally, the Project has been proposed to be as flexible as possible in order to minimize any negative environmental impacts. Specifically, there is a maximum number of turbines (up to 15) as opposed to a set number, and the capacity of each turbine will be in a range (6 to 12 MW) as opposed to a pre-determined size. Most notably, the grid configuration will "allow for micrositing of WTGs [wind turbine generators] to avoid sensitive cultural resources and marine habitats." BOEM also found the potential impacts from the Project to be negligible or minor. Win With Wind agrees with BOEM's conclusion based on the organization's knowledge of the area and understanding of how the Project will be constructed and operated. By incorporating micrositing and being so flexible on the number and capacity of WTGs, the Project provides an excellent example of an environmentally responsible way to propose and develop offshore wind facilities. The Project represents an opportunity for the federal government to signal its support for such development. For these reasons, Win With Wind urges BOEM to approve the Facility's COP without imposing new requirements such as those in the dismissed alternatives.
148-1	I am writing to you today in support of the South Fork Wihd project. As America grows its offshore wind industry, we have the opportunity to shape lthe future of the energy market in the United States. In the port and maritime logistics industry, we have the unique opportunity to build the future of the energy industry in our country. As the economy attempts to rebuild following the COVID-9 shutdowns, we are positioned to create the kind of green economy that can save our planet and deliver our children a better country than we inherited from our parents. In our industry, we can create the kind of good-paying jobs that will make green energy jobs the kind of professions you seek out when starting a family or buying a home. There are so few opportunities to get in on the ground floor of an economic revolution and we have that opportunity here. This is an opportunity to build a domestic supply chain, create new markets, and provide economic value to local communities. With our involvement in offshore wind development, dating back to the Block Island Wind Farm construction, we have worked closely with representatives from 0rsted and Eversource. They have been a pleasure to work with as we work to create an American offshore wind marketplace. In closing, I believe the South Fork Wind project will provide a future not just for the port and maritime logistics industry, but for the country and the planet as a whole. We have the opportunity to build a better economy and a better planet, and we should seize it. I ask you to approve the permitting for South Fork Wind.

Comment Number	Comment
149-1	I am writing you today to express support by NIC Holding Corp. ("Northville") for South Fork Wind, which will deliver enough clean power for more than 70,000 homes annually on Long Island, NY. Large scale utility developments like South Fork Wind will not only help reduce New York's carbon footprint, but will also galvanize economic activity in the form of good jobs and substantial investments into our communities, including in Long Island's industrial port facilities like Northville's. In March and April of 2020, more than 20,000 New Yorkers who worked in the clean energy sector lost their jobs, with those trends continuing in subsequent months. As we continue to recover economically from the unprecedented social and economic impact of the Covid-19 pandemic, the approval of this project will directly lead to the creation of good jobs and critical long-term investment for our region. Offshore wind projects like South Fork Wind are crucial to revitalizing the industry and providing new and sustainable employment opportunities for a skilled workforce. Offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the east coast. As the second commercial-scale offshore wind project in the US, South Fork Wind will play a critical role in establishing a domestic offshore wind industry and realizing the tremendous potential economic benefits of this rapidly emerging industry. The South Fork Wind project is an opportunity to not only drive the nation's clean energy future, but create quality, family-sustaining jobs and economic benefits at the same time. This project is supported by a broad group of stakeholders representing the business community, environmental advocates and the community members most impacted by this project. Delay and uncertainty increase costs. We urge BOEM to stick to its published schedule and allow this important new industry to revitalize the region's economy and strengthen our environment when it is so desperately needed.
151-1	The South Fork Wind Farm project will benefit the affected regions in New York and Rhode Island. It will provide benefits in energy and economy at a time they are needed most. Offshore wind is increasingly becoming a source of renewable energy generation, distribution, and use as well as job creation in utilities, construction, and maintenance. These industries are largely unionized and sustain the middle class. As a tax-paying resident of New York, I support projects like the South Fork Wind Farm to fulfill climate action goals set by the Legislature, Governor, and state agencies. We must lower carbon emissions and end the use of fossil-fuel infrastructure, transportation, and technology. We can do this by growing the renewable-energy sector, building sustainable infrastructure, and investing in the good-paying unions jobs and technical training to get it done. It is my understanding that the Draft Environmental Impact Statement provides evidence for this view in its findings that environmental impacts in the affected region will be negligible to minor, and positive economic and energy impacts will far outweigh any negatives. There may be slight alterations to the final construction and operations plan for the sake of efficiency and minimizing local impacts, particularly the cable length and installation route, but overall, residents, labor, and industry here agree that this project should move forward.
153-1	Smultea Environmental Sciences LLC welcomes the opportunity to voice our overwhelming support to BOEM for the responsible development of the proposed South Fork Wind Farm. Smultea Sciences is a woman-owned small business, certified as a Disadvantaged Business Enterprise (DBE)/Women’s Business Enterprise (WBE) in nine East Coast states, including the State of New York. We have been actively involved in the U.S. Atlantic Ocean offshore wind industry since 2016, including participation on numerous South Fork projects. For us, Atlantic offshore wind development is closely connected to future economic opportunities and to our corporate values. We cannot overstate how strongly we believe the U.S. must carefully expedite our transition to an economy fueled by clean, renewable energy. We believe the U.S. offshore wind industry is uniquely poised at this early stage to provide immense economic opportunity, both in the long term as well as immediately. This nearterm potential is of paramount importance as countless U.S. economic sectors search for opportunities to aid in fiscal recovery from the Covid-19 crisis. Smultea Sciences has provided jobs to hundreds of maritime professionals in support of U.S. offshore wind development. We view BOEM’s approval of the South Fork COP as a critical next step to continue providing employment opportunities to our team in 2021 and beyond. For Smultea Sciences, support for resource development of any kind is predicated on the insistence that it be done responsibly – socially, environmentally, fiscally, etc. We have witnessed firsthand the evolution of federal offshore leasing and management in the U.S. for over two decades. This includes the many success stories and, most critically, the adaptive improvements made along the way as lessons were learned. We believe in the process, including the many aspects of responsibility that are integral to each step along the way. We believe – through the tested framework established by BOEM – the South Fork COP meets all criteria deemed necessary to be granted approval by BOEM. Smultea Sciences recognizes the countless complexities that contribute to dynamic, often unpredictable business environments and project schedules. We also recognize that, when done correctly and responsibly, a predictable permitting process can provide significant stabilization to supply chains and schedules. We appreciate the opportunity to participate in this process through submission of our comments in support of the South Fork Wind Farm COP, and we hope you consider these comments when making your determination.
155-1	We write in support of South Fork Wind in its application to the Bureau of Ocean Energy Management for approval to construct New York's first offshore wind farm. As residents of coastal Long Island, in the West Dublin neighborhood of the Village of Greenport, we are experiencing firsthand the reality of sea level rise and the global warming that is causing it. We recognize the scientific imperative to transition to renewable forms of energy production to help address the crisis. As one of the first offshore wind projects to be constructed in the United States, the success of South Fork Wind will be an important harbinger for the future of this essential component of the transition away from fossil fuel generation.

Comment Number	Comment
155-2	Given the controversy caused by a handful of neighbors over the proposed landfall of the export cable in Wainscott, and the fears those neighbors have over the perceived impacts the project will have on their neighborhood, we believe we have a unique perspective to offer. In 2017, PSE&G Long Island undertook a project nearly identical to the proposed South Fork cable landing to eliminate a severe seasonal power constraint on Shelter Island that had previously been addressed with high-polluting portable diesel generators. The project involved running an underground transmission cable from the Long Island Power Authority substation in Southold for two miles through our quiet neighborhood, under our village beach, and then 120 feet below Greenport Harbor for a distance of 3,328 feet to a landing on Shelter Island using horizontal directional drilling. This is precisely the same technology proposed to be used in Wainscott. To mitigate the impacts of short-term disruption during construction, PSE&G pledged significant infrastructure improvements to the Greenport Municipal Electric System, along with cash access payments of $1.3 million to the Village of Greenport and $1.02 million to the Shelter Island Heights Property Owners Association. PSE&G also pledged to build the project over the off-season winter months, beginning in October 2017 and successfully completing it the following May. https://www.newsday.com/long-isla nd/suffol k/pseg-she lter-isl and-power-cable- 1.18574605#:"":text=PSE G%20Long%20I sla nd%20sa id%20it. End' s%20N orth%20a nd%20South% 20Forks A visit to the site today will reveal only repaved streets and the occasional manhole cover. We believe all parties came out as winners. Shelter Island gained the power it needed while eliminating the pollution and cost of portable generators. Greenport and Shelter Island were properly compensated for their part in facilitating the project. Most importantly, together as a community, we were able to take a small but important step to address the existential threat of climate change. The same will be true of South Fork Wind and we urge you to approve it. In addition to ours, these neighbors have lent their names to this letter. We all live directly on or closely adjacent to the PSE&G cable route.
156-1	After reviewing the potential impacts and consequences of the Project, we believe that BOEM has taken the appropriate actions to satisfy the NEPA process and has listed an appropriate number of viable alternatives to the Proposed Action. Additionally, we believe that this project will have an overall positive impact on the local economy and that it will be a step in the right direction in terms of moving towards becoming carbon neutral as a country.
158-1	On behalf of the Center for Economic Growth, I am writing in support of the South Fork Wind Farm and South Fork Export Cable Project. The project is a 50/50 joint venture between Ørsted, the global leader in offshore wind, and Eversource, New England's largest and premier energy delivery company. The projects continued advancement is necessary to maximize economic development opportunities for New York and the US offshore wind market. As the nonprofit, regional economic and business development organization for the Capital Region, the Center for Economic Growth serves as the primary point of contact for businesses interested in growing in or moving to New York’s Capital Region. With over 250 investors in business, government, education, and the not-for-profit sectors, we market the Capital Region to be more competitive in the global marketplace and promote collaboration and enhance partnerships among the region’s stakeholders. Offshore wind is a critical industry to the Capital Region of New York. The permitting process for South Fork Wind Project must move forward in a transparent, timely, and reasonable way. These actions provide needed clarity to the supply chain and will help unlock significant investments and expenditures related to project development and execution associated with developing this emerging industry. Included in this development are several local manufacturers seeking to enter the industry and grow their businesses and the need for high paying manufacturing jobs. I look forward to seeing this exciting projects approval and how it will shape the growth of the entire US offshore wind industry.
160-1	On behalf of EEW American Offshore Structures, I am pleased to provide this Letter of Support to BOEM related to the South Fork Wind Energy Facility. EEW has a longstanding partnership with Ørsted and has supplied over 976 monopiles to numerous Ørsted projects. EEW is a clear example of the Tier 1 manufacturing supply chain for offshore wind which is coming to the shores of the United States. This is not a rumor or promise, rather EEW is currently building our monopile factory in the US and along with the associate construction related jobs and spending. This project will bring hundreds of long-term manufacturing jobs. We are just one example of the burgeoning offshore wind industry that is about to change the landscape of US manufacturing and ports. The job creation is real and EEW is currently hiring as quickly as possible including engineering, construction, and manufacturing positions. In addition to our direct hiring, EEW will create a significant manufacturing sub-tier supply chain that will have a positive impact up and down the eastern United States. Our investment, growth and job creation are throttled by project and permitting certainty in the US. A clear pathway for permitting and development for offshore wind projects, including South Fork, has a direct impact on our investment. We are certain this is true for other similar manufacturing companies who are on the sidelines watching as this industry develops. We look forward to a successful outcome of the South Fork project.

Comment Number	Comment
164-1	We look forward to working with the developers of the new U.S. offshore wind industry and are urging you to issue final approval of the South Fork Wind Farm environmental impact statement and construction-and-operations plan, which was submitted in 2018. Under BOEM’s published timeline, final approval for the project is due by January 2022, and I urge BOEM to complete its work and issue all approvals by that date or sooner. As the first fully permitted commercial offshore wind farm in the United States, South Fork Wind will produce hundreds of construction and turbine service jobs that also will help New York State meet its nation-leading clean energy goals. This new industry, which will deliver enormous amounts of clean energy, will also mean significant opportunities for businesses along the entire East Coast, which could see 30,000MW of power from offshore wind by 2030. But for a U.S. supply chain to develop alongside the offshore wind industry, as has occurred in Europe - thanks to their 20-year head start - manufacturers and suppliers will need a predictable timeline and sufficient scale to justify their investment in this exciting new American energy industry. In return, they will deliver good jobs and good wages in communities that have been badly hurt by the pandemic over the past 12 months. As an aside, I was born and raised on Long Island and my entire extended family of almost 100 who reside there, will benefit from the jobs and energy provided to Long Island residences. I lived through the debacle of the Shoreham Nuclear Site – let’s erase that bad memory and move NY, and LI, ahead swiftly, smartly, and efficiently in developing this new energy source. I urge your prompt approval of permitting for South Fork Wind, which is a relatively small project with enormous potential to help establish a US supply chain that will help transform the nation’s economy and generate huge amounts of clean energy to help us fight successfully against rising carbon dioxide levels.
165-1	I write to you today, to express my support for the new era of offshore wind on Long Island, and for South Fork Wind specifically. In Suffolk County, the risk to our communities from climate change is tremendous. Superstorm Sandy devastated homes, livelihoods, and the environment for many of our residents. And we have been experiencing more "once every 100 years" storms regularly in all seasons. After the damage and the devastation we have experienced from storm events, and now COVID, there would be no better sign of renewal than to host the interconnection ofNew York's first offshore wind project -- South Fork Wind -- in East Hampton. Our communities on the south fork and throughout Suffolk County have committed to ambitious clean energy goals, and our Governor has a set a nation-leading renewable energy vision for the state with the Climate Leadership and Community Protection Act. Given its location, Long Island is ideally positioned to be at the center of the new offshore wind industry. We are preparing job training programs because we know that it will provide the kind of good-paying jobs that will help to rebuild our economy in addition to protecting our environment. Long Islanders recognize that the environment is the economy for our region - particularly in Suffolk County. Clean air, clean water, and a commitment to a better future for our children are top priorities for our residents. I write to you not just as a County Executive, but as a member of the Long Island community. We are in support of this project and proud to lead the state and the nation forward in advancing offshore wind through the South Fork Wind project.

Comment Number	Comment
167-1	As an organization, NOIA strongly supports ongoing attempts to build new offshore wind resources in federal waters. Projects like the 132 megawatt South Fork Wind Farm—with its potential to bring clean, affordable energy to 70,000 homes on Long Island—are vital to the economic growth of this country and efforts to meet environmental goals for the 21st century. According to recent estimates, we have a $70 billion1 market off America's coasts for wind in the next 10 years. That means clean, reliable energy in places like New England and New York where building infrastructure onshore is famously difficult and industrial growth has sometimes been hard to come by. Indeed, this project's consideration comes at a vital time for the United States. In recent weeks, President Joseph R. Biden came into office with a promise to reduce the carbon-intensity of the American economy and meet our country's goals to avert the worst impacts of climate change. As part of this, in the president's first days in office he signed an Executive Order in which he declared a goal of "doubling offshore wind by 2030".2 Representative Deb Haaland, who has been nominated to the position of Interior Secretary, and will have her first confirmation the day after comments on South Fork's Draft Environmental Impact Statement (DEIS) are due, has been equally vocal on her belief that by replacing "carbon-polluting energy with wind, solar and other clean energy sources… we can improve public health, resilience and economic outcomes for the communities that have historically borne the burden of pollution.."3 Quite simply, neither the goals set by President Biden and Representative Haaland, nor the vital mission behind them, can be met without the timely approval of projects like South Fork. Critically, the local community is also fighting to have these goals met. The community of East Hampton—a key recipient of the power from South Fork—has set goals to reach 100% renewable energy.4 It is also clear that the debate around fossil fuels in Long Island remains a topic of interest for both local officials and the public.56 In essence, the community agrees with national leadership that now is the time to move towards renewable energy sources. For an area rich in wind resources like the East Coast and the Atlantic Ocean between Rhode Island and Long Island, that means offshore wind. As expected and discussed in the DEIS, these projects effectively minimize adverse impacts and avoid undue burden on local communities. In almost every area reviewed in the DEIS, the impacts for the area are inconsequential. Potential impacts mentioned by BOEM would be temporary, such as the impacts that would only occur during construction. The long-term benefit are tremendous for the region with decades of clean energy on the horizon. Furthermore, marine related impacts, such as the potential for impacts on North Atlantic right whales or other vulnerable species, will be effectively mitigated so that these species remain protected. While moderate impacts may occur during construction, the focused efforts of the companies to minimize or prevent impacts are impressive. As we mentioned in the Vineyard Wind docket, our member company Ørsted, a key partner in the South Fork project, has joined with the Woods Hole Oceanographic Institution and a group of universities to launch the Ecosystem and Passive Acoustic Monitoring project—explicitly designed to better understand the presence of key mammals.7 Further, their planned Rhode Island innovation hub is being touted as a potential launching point for novel technologies dedicated to marine mammal protection.8 Given all of this, the impact on marine mammals in the area will not only be manageable and minimized, but those impacts will be lessened in the future as new technologies and techniques are developed to further protect species.
167-6	In sum, the South Fork project will be an economic and environmental win for the region. We hope that BOEM continues to recognize this fact and explores and memorializes the positive aspects of offshore wind that are missing from the DEIS, while also avoiding unnecessary hindrances such as the Transit Lane Alternative concept.
170-1	I fully support this project. Clean energy is the future and this would be great for Suffolk county.
173-1	As a Long Island resident for my entire life and a union member since the age of 18 years old (for the past 36 years) I would like to state that I am in full support of offshore wind turbine development. Not only will we reduce carbon emissions for generations to come, but we will secure good paying jobs right here in Long Island.
174-1	I am a Long Island resident who is also a supporter of strong local unions. I believe large-scale environmentally friendly utility development projects built with union labor, like the South Fork Offshore Wind Project, are essential to the future of Long Island for many reasons. First, offshore wind projects are an important way we can reduce the carbon footprint of electricity creation on Long Island by utilizing one of our greatest natural resources, the wind. Second, investment in offshore wind projects will pay dividends for generations to come as the turbines will harness the nearly endless power of our offshore winds for decades. Third, this project will bring tremendous economic opportunity to Long Island as it will support many well-paying union jobs that will stimulate the Long Island economy in many ways, including supporting local businesses and stimulating the housing economy. For these, and many other reasons, I urge you to approve the South Fork Offshore Wind Project as quickly as possible so we can begin creating clean energy while getting the men and women in the labor movement to work.

Comment Number	Comment
175-1	I am writing today to express my support for the South Fork Wind Farm, and specifically the Proposed Action alternative set forward in the Draft Environmental Impact Statement (DEIS) by the Bureau of Ocean Energy Management (BOEM). I look forward to seeing this project coming to fruition as the first commercial scale offshore wind farm to provide electricity into New York state, serving both our clean energy needs at a competitive cost, as well as proving economic benefits to New York residents. After years of delay, I look forward to seeing this project approved in a timely way so that I can restore confidence in the U.S. offshore wind market and demonstrate our deep commitment to accelerating clean energy in the U.S. The project has been a model for cooperation between the developer and all levels of government and stakeholders. Project developers Ørsted and Eversource have worked with each level of government and taken in advice and commentary on how to be the kind of corporate neighbors the Town of East Hampton, Long Island, and the State of New York demands of them. They have provided a hosting agreement to the East Hampton government in return for easements allowing burial of the onshore cables connecting the windfarm to the Long Island grid. They have held hearings and meetings with stakeholders on the ground and have worked to incorporate that feedback into their work. BOEM's review of this project has shown that the majority of the impacts in the DEIS are moderate or below. I expect that the higher rated impacts can and will be addressed by mitigation, through ongoing stakeholder discussion and outreach before the EIS becomes final. For example, I am pleased to know that the developers are in active conversations with regulators and NGOs to agree to using technology to mitigate any impacts to the North American Right Whale. In summation, I urge you to approve the permitting for South Fork Wind Farm as it helps our nation move toward the job-producing, green energy goals necessary in order to rebound our economy from COVID-19 and combat climate change.
177-1	As a resident of Long Island, I need the shores to be clean and the flora and fauna be robust. To do this, We need to switch to green energy. Pollution takes the whole world down one community at a time
178-1	I support this off shore wind project that will help New York lead the way for a clean energy future and create clean green jobs. We must mitigate climate change by continuing to invest in the green energy future. Our children and grandchildren will thank us.
179-1	I strongly support the development of offshore wind.
182-1	Clean energy is way overdue.
187-1	Please help NYS convert to clean energy wherever possible! Our planet us clearly distressed after decades of disregard for pollution and its consequences. This project will provide long term benefits to the environment by promoting clean energy and green jobs, increasing habitats for certain fish species, and mitigating climate change. Please support this project!
191-1	NY State needs to develop as much renewable energy as possible as quickly as possible. This is an excellent opportunity to generate electricity in relative proximity to the highest electricity usage in NY State.
192-1	I write regarding docket number BOEM-2020-0066. I am a member of the New York League of Conservation Voters and I support the South Fork Wind Farm (SFWF). SFWF is a precedent-setting project for the U.S. offshore wind industry and a significant asset for New York's clean energy economy. The draft Environmental Impact Statement for SFWF has made it clear that the project will provide great long-term benefits for the environment while closely managing its impacts through every stage of development. I appreciate the careful measures that will be taken to protect the environment and marine life in surrounding areas and mitigate any highly-ranked impacts of SFWF. Critically, SFWF will help combat climate change by promoting clean energy, increasing habitats for certain fish species, and providing renewable electricity.
192-3	Offshore wind power is critical to the renewable energy industry, which has been hit hard during the economic downturn caused by COVID-19. In March and April, more than 20,000 New Yorkers in the clean energy sector lost their jobs, with those trends continuing in subsequent months. The SFWF, along with two other wind projects with State contracts being developed, will help revitalize the clean energy industry by creating green jobs, and helping to achieve our goal of 70% renewable energy by 2030. It is estimated that these 3 projects will create more than 1,600 new jobs and generate $3.2 billion in private investment, in addition to many more created by additional projects recently approved by NYS. For these reasons, I support your Environmental Impact Statement and the advancement of this critical project.
194-1	Time to go 100% green.
195-1	I support this ambitious endeavor!

Comment Number	Comment
199-1	I'm in favor of the wind energy project. I want folks not to confuse environmentalism with NIMBY protection of a "view."
200-1	The South Fork offshore wind farm will combat climate change, create clean energy jobs, and contribute to the local economy. The U.S Bureau of Ocean Energy Management's (BOEM) draft Environmental Impact Statement shows that the project will provide long term benefits to the environment by promoting clean energy and green jobs, increasing habitats for certain fish species, and mitigating climate change. The SFWF, along with two other already-approved wind projects, will help achieve our goal of 70% renewable energy by 2030. It is estimated that these three projects will create more than 1,600 new jobs and generate $3.2 billion in private investment with more clean energy from offshore wind to come from two more projects just approved last month. -And with avian radar technology, wind turbines are able to be made safe for birds. (Though the newly discovered simple technique of painting one turbine blade black helps 70%, the use of the avian radar technology will give a much higher percentage of avian safety) Therefore, I hope this will be approved, to make a better future for all.
202-1	We live within a mile of at least 10-12 Windmills. They do not interfere in any way with our life. I can see several from my yard. I think they are pretty. We do not benefit in any way from them except our taxes are minimally les because of the wind energy's payment to our town. We do not receive any of the energy from them. the energy is transferred vial lines to some other part of New York State.
206-1	I fully support the Deepwater South Fork LLCs proposed wind energy facility offshore Rhode Island. It is exactly what we need to help to combat climate change and get away from fossil fuels. It is also economically the right way to go also. Thank you.
207-1	I support the off shore wind power project.
209-1	I am in favor of this project! Get it done ASAP!!
210-1	We need this clean energy.
213-1	As a resident of Eastern Long Island I fully support the South Fork Wind Project. It's contribution to the reduction of fossil fuel emissions and the creation of new Green jobs will benefit us, the nation, and our grandchildren.
214-1	The fantastic resource that is available to New York and Long Island, of strong steady winds off the South Shore and to the east, is most important to develop and expand, to allow us to gradually wean the country from the use of fossil fuels. This project has made strong efforts to minimize disruption to the community during the installation phase that will require connection to the power grid on Long Island from the wind farm at sea. Directional drilling under the beach is an excellent choice for installing this transition that is necessary to utilize the power available. The world has been burning in a few hundred years the carbon that has been taken from the atmosphere for millions of years and deposited as coal, petroleum and natural gas. Putting this carbon back into the atmosphere is raising the temperature of the earth because the CO2 acts as a "blanket" that does not allow the earth to radiate infrared radiation out to space as much as it would have without the increased CO2. Climate change is an existential problem for this Earth. This project is a small step toward solving the problem, and it is important that all of us who live on Long Island support this step forward toward solving the problem.
216-1	We need all the Green energy production we can get, wind is great
218-1	Offshore Wind (well out of sight of land) is essential to liberating our nation from fossil fuel's grip. Let's move ahead with dispatch!!!
219-1	I am in full support of the South Fork wind farm. it is way past time that we start addressing climate change in a serious way and this will be a wonderful way to do that. Thank you. I know you will do the right thing for the people and the planet, which is to approve this wind farm.
220-1	The south shore of Long Island is a perfect location for wind farms. As long as they are located with attention to environmental conditions, and the locations of the turbines are NOT influenced by the wealth of the communities that will see them, then this is an idea that needs to get done!
222-1	I can't wait until this new wind energy project goes online. I am so proud that the east coast is moving forward with visionary wind energy. The approval process has been fair and thorough. Now let's get the project online!
226-1	I'm a long island resident and I seriously support the building of the wind farm.
228-1	We need everything we can get to fight climate change. Period.

Comment Number	Comment
230-1	WHAT ARE YOU WAITING FOR! APPROVE THIS WITHOUT DELAY
232-1	I used to live in Amherst in upstate New York and was very active in the League of Conservation Voters as well as the Sierra Club on the Niagara Frontier. We've now moved to Chapel Hill in North Carolina in retirement. I am so proud of this wind farm project in New York and will use it as an example of what can be done here.
238-1	This project is important in the fight against climate change. We don't have time to waste, this is the future. As a country we are already very behind in green energy sources, we need this project
242-1	As a longtime New York resident (born Cattaraugus County 1939) I strongly support sourcing electricity from solar and wind energy. I urge your approval of the South Fork Offshore Wind Facility. Thank You.
244-1	We need this project to battle climate change and make a clean energy future!
248-1	I support the development of this offshore wind energy facility. It will create new green jobs, transition us away from fossil fuels, and help the U.S. lead in the global production of the associated technologies.
249-1	I support this and look forward to seeing more renewable energy projects in NY!
251-1	We need more renewable energy sources in order to combat climate change.
255-1	I support wind power. We should be doing everything we can to move away from fossil fuels, and especially, to shut down Indian Point. Let's finally bring it here.
259-1	I write to urge BOEM to approve the permitting of South Fork Wind, the 132 megawatt offshore wind farm to be located 35 miles east of Montauk Point, NY. NGI's US entity is based in Houston Texas, with 25 employees engaged in the Offshore Energy sector. We are part of the global NGI business with over 300 employees and a track record in offshore wind dating back over 20 years. We support Ørsted and Eversource's vision to create clean energy and US jobs, to stimulate the economy and help to secure a sustainable future for the coming generations. NGI is excited to be part of this vision. Southfork Wind, as part of the emerging US offshore wind industry, presents a massive opportunity for the country. The planned development of 30 GW of offshore wind energy generation along the East Coast can support tens of thousands of important jobs and lead to $25 billion in annual economic output by 2030. Offshore wind will transform the country's energy supply. The states along the East Coast are major population centres, with a desperate need for energy. As part of meeting the Paris Agreement goals, this energy needs to be clean. New York and neighboring states can be at the forefront of this green energy transition. Offshore Wind is also cost effective, as has been seen in Europe when compared to other types of electricity generation. Southfork Wind will generate renewable energy to power 70,000 average homes and displace millions of tons of carbon emissions. Permitting Southfork Wind by no later than January 2022 as the first commercial-scale project will send a vital message to the market that BOEM is committed to a timely and reasonable process.
265-1	We need to build a power infrastructure that best supports energy independence and is renewable for the environmental security of this country.
266-1	With the high cost of electricity on long island we need an alternative to fossil fuel electric generation I support the south wind generation program, it will bring Long Island lasting sustainable ,clean electricity in the future.
269-1	This offshore wind facility will provide green energy, good jobs building it, and good jobs maintaining that facility.
271-1	Without massive development of offshore wind, development of a low carbon economy will not be possible. Renewable energy is diffuse energy and the scale of the buildout must be great. Jobs created will be good jobs, high-paying and highly rewarding.

Comment Number	Comment
274-1	I am writing you today to show support for the offshore wind industry here in the U.S. and specifically to discuss the anticipated positive impact of the offshore wind industry on Rhode Island's economy. In January 2020, Governor Gina Raimondo signed an executive order committing the State of Rhode Island to be powered by I 00% renewable electricity by the year 2030. As part of this order, Governor Raimondo called for a "diverse combination of responsibly-developed resources," including offshore wind. The Quonset Development Corporation (QOC) operates Rhode Island's only public port, the Port of Davisville, which lies within the Quonset Business Park on the west shore of Narragansett Bay. The Port of Davisville is uniquely suited to service the offshore wind industry, as it is centrally located between the NY and MA offshore wind lease areas. Additionally, the Port of Davisville has experience with the needs of the offshore wind industry, having provided port services for both construction, operations and maintenance of the nation's only existing offshore wind farm, the Block Island Wind Farm. QDC has been in discussions with several offshore wind developers, including 0rsted North America, regarding use of the Port of Davisville for construction, long-term operations and maintenance activities, including activities related to the Southfork Wind project. Given the anticipated amount of offshore wind turbine construction and the long-term operations and maintenance needs of the industry, QDC is planning significant improvements to the Port of Davisville, including a new pier, floating docks, and additional cargo laydown areas. These new investments and activities will generate new construction jobs and long-term employment opportunities for Rhode Islanders for many years to come. This significant, positive economic impact is only achievable if offshore wind permitting moves forward unhindered. As the Managing Director for the Quonset Development Corporation, I urge BOEM to consider the significant, negative economic impacts of delay while assessing the other environmental impacts that may be of concern.
276-1	I am strongly in favor of this and any other renewable energy initiative that helps eliminate our reliance on fossil fuels!
278-1	I am writing to support the adoption of the South Fork Wind Farm and South Fork Export Cable Project Draft Environmental Impact Statement (DEIS). As chair of the Suffolk County Legislature's Public Works, Transportation and Energy Committee, I have followed the progress of offshore wind development by attending community meetings, both virtually and in person. I have reviewed the draft, which was developed over many years, and with the input and guidance of many community stakeholders, scientists and profressionals. I believe due diligence was done, and the findings in DEIS are sound. My legislative district encompasses the North Fork including Riverhead and Southold, as well as a portion of eastern Brookhaven. Climate change has impacted our region in numerous ways: sea level rise and coastal erosion, more frequent and devastating storms, impacts to the agricultural community, the proliferation of invasive species, salt water intrusion in to our ground water, and threats to an important resource, the scallop industry. As a farmer, as a former Southold Town Trustee and Councilman, and in my current roles as chair fo the Public Works, Transportation and Energy Committee, and Vice Chair of the Environment, Parks and Agriculture Committee, I have witnessed and negative effects the changing climate has had on Long Island, and I understand all too well the challenges we face. It is well past the time to address this crisis with the seriousness the for which this crisis calls. If we are to achieve the benchmarks put forth by New York State and NY's Climate Leadership and Community Protection Act, offshore wind must be part of the mix. Not only will this project supply the Town of East Hampton with needed power, it will do so in a sustainable way, providing good jobs and boosting Suffolk County's economy. I write to you not just as a Suffolk County Legislator, but as a member of the Long Island community. If we are to achieve the goal of energy sustainability, we must produce more of the energy we use as a region. I support this project and hope it will lead NYS, and the nation, forward on the development offshore wind.
280-1	I am writing in support of the proposed offshore wind project. I am a proud unionist and environmentalist who sees this as a great opportunity not only to address the ongoing climate crisis, but also too provide good, union jobs that sustain communities. There are several offshore wind projects proposed in New York and across the east coast. South Fork could provide a shining example of how to do wind energy right, driving much-needed momentum elsewhere. I understand the concerns some people have, especially around obstructed views and fisheries issues. South Fork wind will have minimal, if any, effect on visibility. This is a non-issue to me, as whatever minimal aesthetic impact will be outweighed by environmental benefits. More pressing is the need to develop offshore win in a sustainable manner that doesn't hurt fishing communities. Orsted has done a great job, not only on this project, but on others, of involving fishing communities. In the end, this ongoing conversation will be critical to achieving offshore wind development in a sustainable fashion. There is nothing to indicate that Orsted will abandon these conversations. In the end, we face an existential crisis in climate change. We are also sputtering along in our economic recovery after COVID. This project provides an opportunity to address both concerns in a meaningful way. Of course there should be proper mitigation efforts for any issues that arise from the project. But we cannot let "NIMBY" attitudes prevent us from seizing this moment and creating a green future.

Comment Number	Comment
281-1	I am a Long Islander acutely aware of the impacts climate change has and continues to have globally and here in my community, so I enthusiastically support the South Fork Wind Project, which clearly demonstrates responsible offshore wind development. I commend the Bureau of Ocean Energy Management (BOEM) for completing the Draft Environmental Impact Statement (DEIS) during the COVID-19 pandemic. As we fight to address this public health crisis, BOEM is doing the necessary work to move offshore wind forward. We are undeniably addressing intersectional crises - public health, the economy, environmental justice, and climate change are interwoven with offshore wind development. At a moment when we must make large-scale investments to restart our economy, we should take action on clean energy at the level we know we need to take on climate change. We have a once-in-a-generation opportunity to put ourselves on the path to a low-carbon future while creating new quality careers that provide family-sustaining wages and benefits for communities across the nation. South Fork Wind is slated to be New York's inaugural offshore wind project. This is a 15 turbine, 132MW, project contracted by the Long Island Power authority (LIPA) to serve a local demand for energy on the South Fork that will be located 35 miles east of Montauk Point, New York. The project will power 70,000 homes, create hundreds of family-sustaining union jobs, and help the state and Town of East Hampton meet their 100% renewable energy goal. As noted in the DEIS, the majority of the impacts for the South Fork project are negligible to moderate, and the higher rated impacts can and must be addressed by mitigation through ongoing stakeholder discussion and outreach. In the following paragraphs, I will detail the developers' engagement and outreach with local labor and the local community as well as the importance of the Beach Lane cable route and the 1X1 nautical mile compromise signed off by the Coast Guard.
281-6	The Importance of South Fork Wind to U.S. Offshore Wind Development To maximize the economic development and job opportunities in offshore wind, the industry and its potential workforce needs confidence that demand in the U.S. offshore wind market is real. This means we need to move forward promptly in the permitting process to set the stage for this nascent industry. By launching this industry now, the potential for additional jobs multiplies exponentially, with the potential for hundreds of thousands of good-paying jobs across the United States. For example, the American Wind Energy Association's U.S. Offshore Wind Power Economic Impact Assessment Report finds that the United States offshore wind industry will invest \$28 to \$57 billion into the nation's economy by 2030 depending on the scale of installations and supply chain growth. In addition, the study concludes that "offshore wind project development, construction, and operations will support 19,000 to 45,000 jobs by 2025 and 45,000 to 83,000 jobs by 2030" (U.S. Offshore Wind Power Economic Impact Assessment Report, 1). This potential all starts now with South Fork. I urge BOEM to follow the current permitting schedule for this project and to move forward expeditiously on this and other offshore wind projects. The only way to achieve 9GW of offshore wind energy by 2035 -- New York State's goal, enshrined last year in legislation -- is to advance permitting in a timely manner and develop safe and fair conditions with community stakeholders, as was done with South Fork Wind. We can provide long-term sustainability, economic development, and create a skilled green-economy workforce for a consequential new industry. In this time of bold transformation, smart investments in a clean-energy future can simultaneously put people back to work, build infrastructure to address climate change, and spur economic development in our communities.
282-1	I write to you today, to express my support for the new era of offshore wind on Long Island. In Port Jefferson and on Long Island, we have had to bear the brunt of the.growing climate change issue. Superstorm Sandy devastated our homes, our livelihoods, our beaches and our environment. After the damage and the devastation done to Long Island, there would be no better sign of rebirth and renewal, than to support the development green energy projects such as the offshore wind to power Long Island. Port Jefferson is proud to take a leading role in this effort by partnering with the Town of Brookhaven and Orsted & Eversource on the development of the Sunrise Wind project. Generating wind power and bringing it ashore at Smith Point Park to connect to the Holtsville substation strengthens the grid. Likewise the development of an Operations and Maintenance Hub in Port Jefferson Harbor to support Orsted & Eversource's northeast cluster of wind farms creates a new economic engine with hundreds of new jobs for this area and help to rebuild in the wake of the COVID-19 outbreaks and shutdowns. I support starting this process with the siting of the South Fork Wind Farm in the Town ofEast Hampton. Like Port Jefferson, communities in the South Fork area have comniitted to clean energy goals and are able to realize them thanks to the backing and the leadership of New York State under the Climate Leadership and Community Protection Act. For Long Island to hold the unique position to house the first offshore wind farm in New York State puts us in the driver'.s seat to change the future ofour community and the State of New York. Our comri:mnity recognizes the role they will play in determining the future of our state and of our nation and we are proud to play this. role. it will also continue to showcase the comniitment we have to union lab.or as we push the renewable energy promise forward, A prevailing wage and union commitment mean a strong middle class for Long Island. I write to you, not just as the Mayor of Port Jefferson, but as a member of the Long Island community. We are in support of this project and want to help lead the state and the nation forward on.offshore wind through the Smith Fork Wind and Sunrise Wind projects.

Comment Number	Comment
286-1	The Long Island Association (LIA), which is the leading business organization in the region, and the Long Island Builders Institute (LIBI), which represents residential real estate developers in the region, supports South Fork Wind. This project will deliver clean power for more than 70,000 homes annually to Long Island in New York, reduce our carbon footprint and spur economic growth in the form good jobs and critical investments into our communities. As we continue to recover economically from the unprecedented social and economic impact of the Covid-19 pandemic, the approval of this project will directly lead to the creation of jobs and critical long-term investments in our region. This project is supported by a broad group of stakeholders representing the business community, environmental advocates and the community members most impacted by this project. As it relates to the business community, based on a New York State 2019 Clean Energy Industry Report, the state's clean energy industry employed more than 158,000 New Yorkers, approximately 123,000 in energy efficiency and 22,000 in renewable electric power generation (a nearly 9% increase from 2016-2018, which is more than double the average job growth in New York). But in March and April, more than 20,000 New Yorkers who worked in the clean energy sector lost their jobs, with those trends continuing in subsequent months. Offshore wind projects like South Fork Wind are crucial to revitalizing the industry and providing new and sustainable employment opportunities for a skilled workforce. Offshore wind has the potential to help drive economic recovery and stimulate coastal economies up and down the east coast. As the second commercial-scale offshore wind project in the United States, South Fork Wind could play a critical role in establishing a domestic offshore wind industry and realizing that industry's tremendous potential economic benefits. Accordingly, the LIA and LIBI urge BOEM to stick to its published schedule and allow this important new industry to revitalize the region's economy and strengthen our environment when it is so desperately needed. Thank you for your consideration.
289-1	On behalf of Hitachi ABB Power Grids, a global leader in providing best-in-class solutions for electrical infrastructure used for offshore wind projects, we are pleased to provide this Letter of Support for Ørsted in relation to the South Fork Wind Farm project as it relates to the construction and operation of an offshore wind farm in the waters off the State of New York. Hitachi ABB Power Grids has worked with developers such as Ørsted on offshore wind projects for many years, providing products, systems, software and services necessary to conceive, design, procure, connect, and maintain offshore wind facilities and interconnections to grids around the world. Our experience and international presence give us a unique perspective on the impacts of such projects that include labor, local economic impact, and community engagement. These projects bring significant environmental and economic benefits to coastal communities. Hitachi ABB Power Grids is offering this Letter of Support in recognition of Ørsted's strong track-record implementing successful projects in a wide variety of locations worldwide, including many projects on which Hitachi ABB Power Grids has collaborated. We believe the benefits of the project are clear – the South Fork Wind Farm will generate enough energy to power 70,000 homes, and offset millions of tons of carbon emissions, roughly equivalent to taking 60,000 cars off the road. More generally, this Letter of Support to Ørsted is an indication of our belief in the benefits of the rapid development of the offshore wind industry in the state of New York. We are confident that Ørsted and its suppliers can play a critical role in building and fostering a domestic supply chain, which can also serve the offshore wind energy industry in the Northeast and the rest of the state. We therefore urge the BOEM to move expeditiously with needed approvals to enable this emerging industry to reach its potential in terms of contributions to the economy, as well as regional and national greenhouse gas emission reduction goals. Hitachi ABB Power Grids looks forward to Ørsted's success in the South Fork Wind Farm project and welcomes the opportunity for future collaborations to help develop New York's bountiful offshore wind resources.
291-1	Offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the east coast. As the first commercial-scale offshore wind project in the US, Orsted and Eversource's South Fork Wind Project will play a critical role in establishing a domestic offshore wind industry and will realize the tremendous potential economic benefits of this rapidly emerging industry. For a minority, woman-owned, small business such as CARIAN, offshore wind represents an opportunity to be a part of the future. Given that this is a new industry, work in offshore wind diversifies our client base which increases the sustainability of our business. As we grow and offshore wind grows as an industry, opportunities like this will allow CARIAN and other businesses like us, to further grow and prosper into the next generation of critical clean energy resources. CARIAN fully supports the offshore wind industry and the launch of the South Fork Wind Project.

Comment Number	Comment
292-1	Haugland Group and its subsidiaries and affiliates fully support the emerging offshore wind industry in the United States. While the exploration into cleaner, reliable, more efficient renewable energy sources is prudent for our climate and preservation of natural resources, it also brings enormous potential for economic growth, job creation and education opportunities. Skilled laborers, engineers and project managers, among other workforce opportunities in various disciplines are needed to support and shape the industry. Manufacturing, supply chain, and contracting industries at the small business and enterprise level will emerge or expand as a result of offshore wind. Haugland Group was involved in the first offshore wind project in the United States in Block Island, Rhode Island, and is invested in continuing its involvement within the industry. Since its contributions on the project, the organization has continued to analyze industry trends, and hone its competencies as they relate to the offshore wind sector of the energy market. The organization is headquartered on Long Island, New York, a coastal region immersed in offshore wind opportunities, and welcomes the industry to its community, as we better and strengthen our energy environment for generations to come. The Southfork Wind project will not only strengthen the ageing energy infrastructure system of Long Island,but infuse the economy in a region which is largely dependent upon summer travelers. This project will provide energy grid stabilization and create multiple job opportunities for local contractors the labor community. Students from several of Long Island's higher education institutions can benefit from researching and learning about the emerging industry, while potentially getting hands-on experience developing and executing the project. Haugland Group welcomes the Southfork Wind project to its home landscape, and is eager to watch the progression of its development.
293-1	As a union carpenter, I make my living by building Long Island's future. More and more, the buildings I work on are expected to be energy efficient. But reducing energy use is only part of the equation. To protect the future of our families and our country, we need to develop sustainable energy production. The South Fork Wind project would do that and I urge you to support it in the permitting process.
297-1	This offshore wind project jointly developed by Ørsted and Eversource will be the first to connect in New York and is a critical component of the State's plan to meet its 100% renewable energy goals. New York State has established one of the more aggressive renewable power generation goals in the US, and a significant portion of this goal is planned to be met with thoughtfully designed offshore wind projects such as the SFWF. Also, the US recently rejoined the Paris Climate Accord, signaling a renewed focus by the current Administration on reducing our economy's carbon footprint. The Power Sector will undoubtedly play an important part in that effort. As we witnessed in Europe in SLR's beginnings there, the development of a domestic support network skilled in offshore wind development will accelerate as projects such as SFWF are approved. We see the SFWF as an important early step in this regard. The thoughtful design, construction and operation of offshore wind power facilities can ensure that environmental impacts be minimized. BOEM's DEIS is providing a thorough review of the environmental impacts of the construction and operation plan for the project. This review will ensure that the public's interest in environmental protection is served while also allowing renewable power to thrive and grow and help the US achieve its carbon reduction goals in a costeffective manner.
298-1	The successful development of an offshore renewable industry in the United States that is sensitive to, and supportive of, existing uses of the ocean is critical for our region for several reasons. First, the northeast region has relied upon our maritime economy throughout our collective history for food and transportation. Second, the supply of carbon neutral energy, sustainable seafood and efficient marine transportation are closely linked. Third, the resources and expertise to jump start a successful marine renewable energy supply for the United States are concentrated in this region. INSPIRE Environmental represents one small component of this critical supply chain. Our history and success mirror the development of offshore energy. We began supporting the development of the pilot scale Block Island Wind Farm by working with a wide range of fishermen and scientists to site the project in an optimal location to preserve critical seafloor habitats. We continued by developing a collaborative model of data collection with commercial and recreational fishermen to produce the most extensive data on fish and shellfish interactions with offshore wind in the world. This innovative research has helped to demonstrate that fishing and offshore wind can co-exist providing careful assessment and care is given to science and local knowledge. The development of this research also helped INSPIRE grow from 7 to 20 employees in five years with high paying jobs and supported fishermen with reliable income. From this base, INSPIRE, the offshore wind industry, regulators and ocean users have learned that assessment, design, and construction of utility scale offshore wind is a complex process. To ensure that the construction and operation of South Fork Wind is conducted in an environmentally sound and economically sustainable fashion, the subject DEIS represents thousands of hours of effort, listening and local expenditure. This likely first step in federal permitting offshore wind is based on sound science as our work can attest, but it is also critical to move forward carefully to support all our maritime industries. Fishing, ports and harbors, shipbuilding, construction, transportation, science, operations, and maintenance are closely interrelated, and they will develop successfully over the next two decades if we get the first few projects right. INSPIRE is part of this surge in job development, investment, innovation, and awareness of competing uses of the ocean space. The successful development of offshore wind as a sustainable partner in this region will benefit INSPIRE and the entire maritime industry with jobs, support for coastal economies and infrastructure and reliable carbon neutral electricity. We view the permitting of South Fork Wind as a critical first step in development of that sustainable growth of our collective industries and an important driver for future economic opportunity.

Comment Number	Comment
299-2	The Network supports BOEM's diligent effort in preparing the DEIS. The cumulative impact analysis of SFW's DEIS considered 132 megawatts (MW) of OSW buildout and considers cumulative impacts of development of approximately 22 gigawatts (GW) of Atlantic OSW capacity as reasonably foreseeable. This reflects the significant escalation in demand for U.S. OSW energy. SFW is amongst the first utility-scale OSW projects in U.S. waters, and the Network supports BOEM's deliberate consideration and commitment to environmental protection as it approves this vanguard offshore renewable energy installation. Before delving into the substance of the DEIS, the Network would like to highlight the resilience of the OSW industry despite the ongoing COVID-19 pandemic. During 2020, Europe committed a record $31.8 billion in investments in OSW. As of the end of 2020, 10 GW of OSW capacity was under construction worldwide. The 12 MW Coastal Virginia Offshore Wind (CVOW) project located off Virginia Beach, was constructed in late May and early June 2020. CVOW's turbines are now operating. In addition, a U.S.-built OSW crew transfer vessel (CTV) launched in midJuly 2020 is servicing the project. It is clear that OSW is an energy technology that is eminently capable of shrugging off the challenges imposed by COVID. This solidifies OSW's role in an infrastructure sector that is well-positioned to spur America's economic recovery and green energy transition. As a result, approving the SFW is consistent with the spirit of the Executive Order dated January 27, 2021 (EO).. The Department of the Interior's approval of SFW's Construction and Operations Plan (COP) will unleash a wave of private sector investment. More importantly, this approval will begin a domino effect that will ultimately put tens of thousands of hard-working Americans from across the economic spectrum and from all walks of life – including the building trades, vessel captains and deckhands, dockworkers, accountants, economists, attorneys, welders, divers, aircraft pilots, atmospheric and marine scientists, truck drivers, crane operators, project managers, mechanics, and every imaginable engineering discipline, among many other occupations – back to work. The 132 MW SFW project will also positively enhance Long Island's energy security and air quality. Fossil fuel pollution has been estimated to cause one in five deaths globally, therefore, reducing these emissions must be a public health priority.
299-4	"The DEIS considers buildout of approximately 22 GW of U.S. Atlantic OSW capacity to be reasonably foreseeable. A pipeline of projects is generally considered sufficient to trigger large manufacturing investments, and provides clear market signals that the U.S. OSW pipeline is advancing. This pipeline has already led to announcements of some manufacturing and building of American-based vessels. However, it cannot be overlooked that OSW is a global market. The U.S. OSW market does not operate in a vacuum. Given that European and Asian OSW markets continue to surge, sophisticated multinational tier 1 suppliers may elect to focus their attentions on those markets rather than the U.S. OSW market. The failure to issue a ROD approving the SFW may well lead investors to conclude that it is unlikely that U.S. OSW projects can complete the permitting process. Seeing this continuing uncertainty, tier one suppliers will elect to continue making manufacturing investments in more certain markets such as Europe and/or to expand Asian manufacturing investments rather than investing in U.S. OSW manufacturing facilities. By approving SFW, the Department of the Interior can send a clear message to the international OSW market and investors that the U.S. is open for business."
300-1	I am a Union Representative with 1100 members and living here on Long Island. Orsted/Eversource's South Wind Project, moving forward makes sense for the all the communities on Long Island and also for the economic growth that will be attained with this development. Good jobs and a clean environment is something we all need to protect our future and our children's future. Through extensive planning and smart growth it will drive the nation's clean energy future.
301-1	Wind Turbine Layout. BOEM should adopt the Proposed Action Alternative, including a 1 nautical mile ("NM") x 1 NM grid layout without the additional requirement for transit lanes, as the preferred alternative in the FEIS, consistent with the conclusions of the United States MARIPARS report.

Comment Number	Comment
301-6	The Project will bring significant economic and environmental benefits to Long Island, the State of New York and other states that will be part of the offshore wind installation and operation supply chain. Development of the Project will support the priorities established by the Biden Administration to double energy production from offshore wind by 2030 and accelerate clean energy siting and permitting in an environmentally sustainable manner. The Project will be the first to interconnect in New York and will help the state meet its renewable energy goals of 70% renewable energy by 2030, 9,000 MW of offshore wind by 2035 and 100% zero-emission electricity by 2040 under the Climate Leadership and Community Protection Act. The Project will also contribute to local climate initiatives, such as the Town of East Hampton's energy sustainability goal of being powered 100% by renewable energy by 2030. The Project will generate enough clean energy to power 72,000 Long Island homes annually. Through displacement of conventional generation, the Project is expected to displace millions of tons of carbon emissions over its operational life, the equivalent of removing 35,000 cars from the road per year, leading to overall cleaner air and water directly because of the Project. In addition to supporting the clean energy goals of New York State and East Hampton, the Project, and other planned offshore wind farms in the Northeast, will also create new high-paying jobs and provide economic and infrastructure improvements to New York and surrounding states. These projects will likely provide additional forms of revenue such as host community or community benefits agreements, payments to real estate owners, and/or new tax receipts for municipalities from infrastructure improvements. For example, auctions for federal leases for offshore wind have generated $473 million, the majority of which came from the most recent auction in 2018, which provided over $400 million in revenue. To interconnect projects to the electric grid, developers may also be required to fund electric grid infrastructure improvement projects that will strengthen the grid for the benefit of all electric customers. To construct, operate and service offshore wind farms in the northeast, improvements to port and harbor infrastructure will also be undertaken. To support development, construction, and operation of offshore wind projects, as well as related infrastructure improvements, it is estimated that the offshore wind industry could create 83,000 new well-paying jobs by 2030.
301-7	the Project, and renewable energy in general, will be a key component of energy security and independence in the United States while combating the effects of climate change. Use of renewable energy technologies will reduce demand for domestic and imported fossil fuels while using clean, renewable domestic energy sources
305-1	On behalf of Bently Nevada, a Baker Hughes business, I am pleased to submit for the record this letter of support for Orsted and Eversource's South Fork Wind Farm and South Fork Export Cable project. BOEM's deliberation on South Fork Wind comes at a critical juncture in the offshore wind market, a time when BOEM can accelerate the deployment of renewable energy in the waters of the United States. Bently Nevada's condition monitoring system would be installed on the wind turbine generators selected for South Fork Wind. Our example illustrates the significant opportunity that South Fork Wind provides to U.S. technology and manufacturing. Bently Nevada has been building condition monitoring systems in Minden, Nevada, for more than 60 years. We are one of the largest employers in the Carson Valley area and one of the largest exporters of industrial products in the state of Nevada. Bently Nevada's condition monitoring and protection systems enjoy a leading position in the global electricity generation market with installations across all fuel categories-wind, hydro, nuclear, geothermal, and fossil fuels. Our systems are installed on more than 30,000 wind turbines worldwide. We would love to add U.S. offshore wind to that count. The American Wind Energy Association estimates that growth in U.S. offshore wind can deliver up to $25 billion per year and 83,000 jobs by 2030. South Fork Wind is a major step towards delivering that promise, and Bently Nevada offers tangible proof that U.S. energy technology companies are ready to step into this growing market. Baker Hughes, our corporate parent, is fully committed to advancing sustainable energy, including by providing products and services to increase the reliability, efficiency and security of renewable energy assets. Establishing a clear and predictable path for offshore wind development will increase confidence for U.S. suppliers as we invest for growth. We appreciate BOEM's commitment to a fulsome but efficient review process for the South Fork Wind project. We support BOEM's January 2022 target date for the conclusion of the permitting process and respectfully urge ever effort to ensure that South Fork Wind is able to proceed.
311-1	On behalf of RENEW, I offer my appreciation to BOEM for its work in creating this DEIS and considering different viewpoints. Approval of offshore wind projects is pivotal for states on the Atlantic Coast to realize their renewable energy development and carbon reduction requirements. SFWF and the several other projects in adjacent lease areas that are now under contract will also provide significant economic development benefits for Atlantic Coast states. At sites located on the Outer Continental Shelf, the Department of Energy estimates offshore wind's technical potential at over 2,000 gigawatts (or double the amount of all existing installed U.S. electricity), 86 gigawatts of which could be developed by 2050. Atlantic Coast states, recognizing the economic and environmental opportunities afforded by the technology, have collectively issued procurement targets for 29 gigawatts of offshore wind. A recent economic development study from American Clean Power (as the former the American Wind Energy Association) reported that offshore wind development off the Atlantic Coast could translate into $57 billion in direct investment, add $25 billion in annual economic output and create 83,000 well-paying jobs by 2030, all while stabilizing retail electricity rates and emitting no climate-altering greenhouse gases. SFWF, along with other wind projects with contracts being developed in the region, will help revitalize the clean energy industry by creating green jobs. It will help New York reach its goal of achieving of 70 percent renewable energy by 2030.

Comment Number	Comment
313-1	We are writing today to express our enthusiasm for the South Fork Wind Farm, and specifically the Proposed Action set forward in the Draft Environmental Impact Statement (DEIS) by the Bureau of Ocean Energy Management (BOEM). We hope to see this project come to fruition as the first commercial scale offshore wind farm to provide electricity into New York State, serving both our clean energy needs at a competitive cost, as well as proving economic benefits to New York residents. After years of delay, we believe this project should be approved in a timely way so that we can restore confidence in the U.S. offshore wind market and demonstrate our deep commitment to accelerating clean energy in the U.S. South Fork Wind is critical for the clean, reliable power it will provide. The wind farm will use up to 15 turbines and a state-of-the-art transmission system that will generate enough clean energy to power 70,000 Long Island homes. The wind farm will displace millions of tons of carbon emissions, the equivalent of taking approximately 60,000 cars off the road. In fact, power needs on the South Fork are growing faster than anywhere else on Long Island. South Fork is also vital for the jobs and economic benefits it brings. South Fork Wind has committed to hiring union professionals to build and assist in creating the green energy future in New York State. They have committed to paying these workers a prevailing wage, which ensures they are properly compensated for their work. These construction jobs will establish a new market in New York and help to reinvigorate the New York economy following the COVID-19 epidemic. Finally, the project has been a model for cooperation between the developer and all levels of government and stakeholders. Project developers 0rsted and Eversource have worked with each level of government and taken in advice and commentary on how to be the kind of corporate neighbors the Town of East Hampton, Long Island, and the State of New York demands of them. They have made union commitments. They have provided a hosting agreement to the East Hampton government in return for easements allowing burial of the onshore cables connecting the windfarm to the Long Island grid. They have held hearings and meetings with stakeholders on the ground and have worked to incorporate that feedback into their work. BOEM's review of this project has shown that the majority of the impacts in the DEIS are moderate or below.
313-4	In summation, we believe the permit should be approved for South Fork Wind Farm as it helps our nation move toward the job-producing, green energy goals necessary in order to rebound our economy from COVID-19 and combat climate change.
314-1	I SUPPORT THE PROJECT!

Comment Number	Comment
318-1	The South Fork Wind Farm (SFWF), a 132 megawatt (MW) offshore wind farm to be located 35 miles east of Montauk Point New York and 19 miles southeast of Block Island Rhode Island, has the potential to be the nation's first commercial scale offshore wind farm. The SFWF is sited in BOEM Lease Area OCS-A 0486 (the Lease Area) and within the Massachusetts-Rhode Island Wind Energy Area, an area that was studied extensively by BOEM and the State of Rhode Island prior to the establishment of the Lease block. The Lease Area was acquired by Deepwater Wind LLC in a competitive auction in 2013. Deepwater Wind merged with Orsted in 2018, and Orsted entered a 50|50 joint venture with Eversource about the same time. SFWF has a power purchase agreement (PPA) with the Long Island Power Authority (LIPA) for the electricity its produces. Power needs on the South Fork are growing faster than anywhere else on Long Island. In 2015, PSEG/LIPA issued a request for proposals to address this specific need, and more than 20 proposals were received. SFWF was selected because it was part of a portfolio that was found to be the most cost-effective solution. Power from SFWF is contractually required to be delivered to the East Hampton Substation in East Hampton, NY and is scheduled to become operational in December 2023. South Fork Wind brings significant economic and environmental benefits to Long Island. This offshore wind project will be the first to connect in New York and help the state and Town of East Hampton meet its 100% renewable energy goal. The project will generate enough clean energy to power 70,000 average homes. The wind farm will displace millions of tons of carbon emissions, the equivalent of taking approximately 60,000 cars off the road. Efforts to advance the development of the SFWF design began in 2013 which included extensive offshore and onshore siting investigations which evaluated the project's potential impacts and benefits on a range of natural, societal, and economic factors. Careful consideration was given to avoiding project impacts on these factors, and where potential impacts were identified, extensive mitigating measures were developed by SFWF. SFWF submitted its Construction and Operation Plan (COP) to BOEM in 2018 and has continued to work hard to collect data to provide all agencies and stakeholders with information on the benefits and potential environmental impacts of the Project. While relatively small in scale, the economic benefits from construction and operation of SFWF are illustrative of the tremendous potential the offshore wind industry offers the Northeast region specifically and the country broadly. It will also help US based businesses make needed investments to scale up operations in preparation for additional opportunities that come with a large and certain pipeline of projects in the coming years. For the US supply chain to grow, be sustainable, and reach its true potential, permitting certainty and clarity is critical. The American Wind Energy Association estimates that developing 30,000 MW of offshore wind along the East Coast could support up to 83,000 jobs and deliver $25 billion in annual economic output by 2030. Many of these jobs will be in construction and with local suppliers who enter the offshore wind industry. As a member of the business community, VHB supports offshore wind. Large scale utility development like offshore wind will not only help reduce our massive carbon footprint but will also mean a tremendous amount of economic opportunity in the form of jobs and capital investment. Offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the east coast. As the first commercial scale offshore wind project in the US, SFWF Project will play a critical role in establishing a domestic offshore wind industry and realizing the tremendous potential economic benefits of this rapidly emerging industry. VHB is a proud supporter of studies needed to support SFWF Project. Our scientists and engineers performed many of the onshore development of New York the COP, as well as the Article VII application submitted to the Public Service Commission. SFWF has created opportunity for VHB in New York, New England and the MidAtlantic regions where we are assisting multiple offshore wind projects including Project (Revolution Wind, Sunrise Wind, etc.), as well as many the other port and supply chain clients SFWF /projects The offshore wind industry is a significant part of VHB's energy practice and projects such as SFWF have been integral in supporting this recent growth. We urge BOEM to honor its published Environmental Impact Statement schedule and allow this exciting new industry to revitalize the region's economy when it is so desperately need.
319-1	As I noted in my oral testimony, moving forward on this project is important not only for Long Island but for New York, states up and down the eastern seaboard and the nation. It is critical on many levels: in the fight against climate change, in the national effort to reduce criteria pollutants, to improve public health, to create family-wage jobs, address longstanding environmental justice issues and to help restart the economy in the wake of the COVID-19 pandemic. The history of how this project got started is important. Electricity needs on the South Fork are growing faster than anywhere else on Long Island and in 2015, the Long Island Power Authority issued a technology-neutral, competitive Request for Proposals to address this need. More than 20 proposals were received, and the South Fork Wind Farm was selected as the most cost effective solution. It was, and is, the most environmentally effective solution as well. Importantly, the DEIS recognizes that offshore wind serves the nation's goal of producing electricity that is affordable, reliable, safe, secure, and clean1 and the project would contribute to "slowing/arresting global warming and climate change-related impacts[.]'2 Indeed, climate change linked to greenhouse gas emissions is contributing to "widespread loss of shoreline habitat [,]" altering species distributions, and causing ecological reductions and "other permanent changes of unknown intensity."3 Significantly, the DEIS classifies the majority of the anticipated impacts from the project as either minor or moderate and notes that where higher rated impacts occur, they can be mitigated. In short, there is more than enough information and data in the DEIS for the Bureau of Offshore Energy Management (BOEM) to approve the proposed project.

Comment Number	Comment
319-2	As many of the commenters in your public meetings noted, Long Island, and particularly the South Fork, are uniquely threatened by climate change wrought by greenhouse gas emissions. The Intergovernmental Panel On Climate Change Fifth Assessment Report noted that coasts will increasingly experience adverse impacts such as submergence, flooding, and coastal erosion due to sea level rise caused by climate change. I witnessed all these phenomena firsthand as New York's Commissioner of Environmental Conservation from 2011-2015. It is precisely these concerns that led the Town of East Hampton in 2014 to adopt a goal of 100% renewable energy and the South Fork project is essential to meet that goal. At the state level, the South Fork project is an important and essential step toward achieving New York's nation-leading Climate Leadership and Community Protection Act ("CLCPA") which requires that a minimum of 70% of statewide electric generation be supplied by renewable energy by 2030, and that 100% be derived from zero emission sources by 2040. The CLCPA requires the development of 9,000 MW of offshore wind electricity generation by 2035. Further, recognizing that New York could not possibly achieve these ambitious requirements without overhauling the state's renewable energy siting laws, the NYS Legislature passed and the Governor signed the Accelerated Renewable Energy Growth and Community Benefit Act to streamline the siting of large-scale renewable energy facilities. Currently, New York gets about 28 percent of its total electricity from renewable sources, and the vast majority of this (about 80 percent) comes from large legacy hydropower facilities owned and operated by the New York Power Authority. It is clear from the large gap between the current level of renewable electricity generation and the standards set in the CLCPA that New York cannot meet the law's mandates without a massive and rapid development of offshore wind. According to a 2020 study prepared for the New York Independent System Operator, New York will need approximately 21 gigawatts (GW) of offshore wind capacity by 2040 in order to meet the requirements of the CLCPA. Although New York has contracted for two large-scale offshore wind projects (Sunrise Wind and Empire Wind 1) totaling nearly 1,800 MW of generating capacity and has announced the award of two additional large-scale offshore wind projects (Beacon Wind and Empire Wind 2) totaling nearly 2,500 MW, New York does not have any offshore wind projects under construction. The South Fork project, at 130 MW, is the furthest advanced and will set the stage for all future projects.
319-3	The South Fork project would also further President Biden's ambitious climate goals, as recently outlined in executive order 14008. Notably, if approved, the South Fork project would triple the current offshore wind power generation in the United States and send a clear and decisive message to the offshore wind industry and to the states up and down the east coast that offshore wind is a key and important part of the national climate agenda.
319-6	Finally, BOEM should take note of the strong and consistent local support for this project. As noted earlier, the South Fork project is a critical component of the Town of East Hampton's quest for 100% renewable power. The East Hampton Town Board and Trustees have approved a Joint Proposal ("JP"), which includes extensive mitigation associated with the transmission interconnection. In addition, five NYS agencies have participated in the NYS Public Service Commission proceeding that reviews the project's transmission element in state waters and on land in the Town. All five agencies have approved the JP. Further, the Town of East Hampton Board and Trustees voted overwhelmingly to support the Host Community Agreement and the easement/lease agreements for the local transmission route.
320-1	We are writing you today to show our support for the offshore wind industry here in the U.S. and thank your agency for its work in releasing the Draft Environmental Impact Statement for Deepwater South Fork LLC's proposed Wind Energy Facility offshore Rhode Island. This report is a crucial step for this industry to go from plans on paper, to steel in the water. WindServe Marine is a premier offshore wind support services provider on the U.S. Atlantic Coast. Building upon more than 97 years in the maritime industry, WindServe is committed to providing excellence in all stages of the offshore wind farm lifecycle. With offices and waterfront facility locations in Massachusetts, New York and Rhode Island, WindServe Marine are local experts and trusted solution providers. Our first vessel, WINDSERVE ODYSSEY, was built in North Kingstown, RI at Senesco Marine. This vessel alone, created approximately 35 shipyard jobs, four vessel crew positions, and various shoreside support jobs. Economic growth in the offshore wind farm industry through local job creation and development of local expertise is critically important to WindServe and the Reinauer Group of Companies, and to those who support the creation of US offshore wind infrastructure, as well as those who benefit from its renewable energy output.
320-6	In sum, offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the east coast. We appreciate BOEM's effort to move this industry forward and the care your agency has taken to ensure this industry can be a success for all. We look forward to seeing this industry's promises come to fruition and hope we can be a trusted source of information as BOEM ushers in the American offshore wind era.
321-1	As an electrician and taxpayer in Connecticut, I support the South Fork Wind Project to lower carbon emissions and create good-paying jobs. We can do this by growing the renewable-energy sector, building sustainable infrastructure, and investing in the technical training and local hiring to get it done. The Draft Environmental Impact Statement provides overwhelming evidence for this view.

Comment Number	Comment
323-1	We are writing you today to show our support for the offshore wind industry here in the U.S. and thank your agency for its work in releasing the Draft Environmental Impact Statement for Deepwater South Fork LLC's proposed Wind Energy Facility offshore Rhode Island. This report is a crucial step for this industry to go from plans on paper, to steel in the water.
323-3	A study by the Special Initiative for Offshore Wind estimates that the nearly 20 GW of offshore wind procurements expected through 2030 will require close to $70 billion in capital investment. The jobs and economic opportunities are already starting to trickle in – with port investments, vessel construction and factory announcements – even as this industry remains in its infancy. We are already seeing the growth of a domestic supply chain, as developers and suppliers look to minimize their own costs and logistical risks. This domestic supply chain means good paying jobs, investment in coastal communities and a brand-new economy for Americans to call their own. In sum, offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the east coast. We appreciate BOEM's effort to move this industry forward and the care your agency has taken to ensure his industry can be a success for all. We look forward to seeing this industry's promises come to fruition and hope we can be a trusted source of information as BOEM ushers in the American offshore wind era.
325-1	It is time for America to harness the abundant clean energy potential off our shores and seize the environmental, economic, and public health benefits it can unleash. The nation's only seven offshore wind turbines demonstrate the immediate viability of this resource along the Atlantic Coast, and it is essential that we continue to advance projects through the permitting process and on to responsible development. Offshore wind power can help us rise to the challenges of this moment. Faced with intersecting environmental and economic crises, a clean energy transition and revitalization of U.S. manufacturing are critical components of the long-term resiliency that we need to build. It's time to chart another energy course, and embrace the environmental and economic benefits of responsibly developed offshore wind power. I urge you to act to advance the offshore wind project proposals submitted to the Bureau of Ocean Energy Management and to give each proposal the careful scrutiny this endeavor demands. Please move swiftly forward to ensure responsibly developed offshore wind power plays a major role in our nation's energy future.
327-1	This comment is made in support of the South Fork Wind Farm. My name is Jamie Durand and I am an Environmental Project Manager with POWER Engineers Consulting, PC (POWER). The South Fork Wind Farm will provide another source of renewable energy that will be made available to a general public looking for alternative sources of energy or seeking additional sources of energy. The Construction and Operations Plan (COP) filed with the Bureau of Ocean Energy Management (BOEM) and the Draft Environmental Impact Statement's (DEIS) notice of availability provides the public, federal, state and local agencies and stakeholders the opportunity to review and comment on the COP's comprehensive review of the project benefits and impacts. BOEM and the Bureau of Safety and Environmental Enforcement (BSEE) reviewed and approved the Site Assessment Plan (SAP) for this project, and through the extensive investigations performed for the project, the project proponent seeks to demonstrate that the offshore wind farm and export cable will serve to address federal- and state-mandated requirements to provide a renewable source of energy within the U.S. As a member of POWER, I look forward to participating in the offshore wind industry to resolve the environmental, engineering and stakeholder challenges for offshore wind projects, including those presented in the DEIS for the South Fork Wind Farm.
330-1	Advocating energy sustainability through clean energy and energy conservation remains one of Concerned Citizens of Montauk's (CCOM) key environmental sustainability objectives. New York State is leading the nation in the fight against climate change and has championed offshore wind, having passed the nation's strongest climate change law in 2019, which requires 70% renewable energy by 2030 and 100% by 2040. These goals cannot be achieved without also achieving or exceeding a target of 9,000 MW of offshore wind power. The South Fork Wind Farm (SFW) represents the first important step toward reaching this target, and is expected to generate 130 MW of offshore power to 70,000 homes on the South Fork of Long Island.
331-1	Thank you for the opportunity to provide comments for New York's first offshore wind farm. As a New Yorker, I support the rapid and responsible development of offshore wind, which will help New York meet our carbon reduction goals and the Town of East Hampton meet its 100% renewable energy goals. The South Fork Wind Farm is an important and precedent-setting project for New York and the US offshore wind industry as well as an important part of building a clean energy workforce and domestic supply chain that stretches throughout the country. Across the eastern seaboard, offshore wind will create tens of thousands of family supporting jobs, pump billions in economic growth into coastal communities, protect wildlife, lower climate pollution, and safeguard navigation. Additionally, rapidly scaling offshore wind promotes clean and safe domestic energy sources and will help ensure geopolitical security, combat climate change, and provide electricity that is affordable, reliable, safe, secure, and clean for New Yorkers. Approve the South Fork Wind project, and launch a new offshore wind industry that combats climate change, creates family supporting jobs, and a thriving clean energy economy right here in New York.

Comment Number	Comment
340-1	I want to add my support for 4 nautical mile transit lane proposal, which is necessary to preserve the safety of fishing vessels. Additionally, I would like to see improved science-based analysis of environmental impacts and siting wind turbines away from bottom habitats that are critical to commercial fisheries.
342-1	As a US based maritime company and participant in the installation of the first offshore wind farm in the US, we believe that the offshore wind sector is on the cusp of being a significant economic opportunity for the US. While there have been many challenges in moving this industry from concept to reality, the opportunity is here to see an explosion of offshore wind deployment over the next decade. However, for the economic potential to be realized projects must be able to move in a timely manner through a certain and transparent permitting process. South Fork Wind is just one of many projects currently in various stages of the federal permitting process. This pipeline makes up at least 7,000 megawatts of projects, which constitutes billions of dollars in investment and thousands of jobs. Because South Fork Wind is one of the first projects to have a draft Environmental Impact Statement released, finalizing the EIS will send an important signal to the market that the permitting process is moving forward. We urge BOEM to approve South Fork Wind, the 132-megawatt offshore wind farm planned off Montauk Point, NY. By sticking to its published schedule, BOEM will enable this exciting new industry to revitalize the region’s economy post-COVID, while sending an important message that you intend to follow a transparent and timely process for the many projects in the federal approval pipeline. We ask you to move as expeditiously as possible to approve South Fork Wind.
344-1	As an electrician and taxpayer in New York, I support the South Fork Wind Project to lower carbon emissions and create good-paying jobs. We can do this by growing the renewable-energy sector, building sustainable infrastructure, and investing in the technical training and local hiring to get it done. The Draft Environmental Impact Statement provides overwhelming evidence for this view.
346-1	Offshore wind is critical to meet New York’s renewable energy goals, reduce our reliance on fossil fuels and rebuild around a green energy economy, which will address climate change, provide jobs and improve public health. This is evident in New York’s first offshore wind farm, a joint venture between Ørsted and Eversource consisting of up to 15 turbines that will generate enough clean energy to power 70,000 homes. The wind farm will displace millions of tons of carbon emissions, around the equivalent of taking 60,000 cars off the road. NYLCV is committed to ensuring that developers provide clear and transparent information to communities that will be home to energy infrastructure as is evidenced by our educational programs offered to ensure the public has the opportunity to ask questions of the project developers. South Fork is an important and precedent-setting project for the U.S. offshore wind industry. The comprehensive DEIS assessment outlines this in great detail. The majority of the impacts in the DEIS for the South Fork project are moderate or below, while the higher rated impacts can be addressed through ongoing stakeholder discussion and outreach. An example of this is the ongoing discussion with regulatory agencies and other environmental stakeholders about environmental protection measures for marine mammals and protected marine species including the endangered North Atlantic Right Whale. These programs will mitigate noise impacts during offshore monopile installation and minimize ship strikes during operations. The project will continue to develop these measures, which will be included in the Final EIS assessment.
346-6	The DEIS analyzed short-term use compared to long-term productivity and concluded that South Fork Wind would not result in impacts that significantly narrow the range of future uses of the ocean. The DEIS also states that South Fork Wind provides several long-term benefits including the promotion of clean and safe development of domestic energy sources and the creation of clean jobs. South Fork Wind offers a significant opportunity for economic development and the creation of good-paying union and green-economy jobs. Long Island has the potential to become a center for an Offshore Wind workforce at the center of a major industry that helps rebuild our economy and combats climate change. It is estimated that the three currently awarded Offshore Wind projects, including the SouthFork Wind Farm, will create more than 1,600 new jobs and generate $3.2 billion in private investments. To maximize opportunities to rapidly transit to a clean energy economy including a strong offshore wind program including South Fork Wind and other wind projects currently in process and to come in the future, both developers and the supply chain need certainty that the U.S. offshore wind market and individual projects are moving toward installation. The permitting process must move in an environmentally responsible, transparent, timely, and reasonable way. This will help projects through the development timeline, which provides clarity to the supply chain that will help unlock significant investments and expenditures related to project development and execution. It will also help US-based businesses make needed investments to scale up operations in preparation for additional opportunities that come with a large and certain pipeline of projects in the coming years. Offshore wind has the potential to drive economic recovery post the Covid-19 pandemic and stimulate economies up and down the East Coast. Additionally, there is deep and diverse stakeholder support for this project. Below is a list of the most prominent local community, environmental advocacy and labor union support groups behind the project, including NYLCV. These groups have been supportive in helping drive the process from the start, and have deep networks locally, statewide and nationally that they have engaged to build support around the project and promote it as a key example of clean energy development. Wind Works Long Island (WWLI) Win With Wind (WWW) Citizens Campaign for the Environment (CCE) NY League of Conservation Voters (NYLCV) Climate Jobs NY NY Offshore Wind Alliance (NYOWA) Natural Resources Defense Council (NRDC) Sierra Club Renewable Energy Long Island Students for Climate Action LI Federation of Labor Building & Construction Trades Council of Nassau & Suffolka New York Climate Reality Chapters Coalition NYS Laborers’ Union All Our Energy National Wildlife Federation Mothers Out Front Long Island Group for the East End. We urge you to adopt the DEIS and enable the South Fork Wind project to move forward expeditiously.

Comment Number	Comment
349-2	The Project, if responsibly developed to avoid, minimize, and mitigate potential environmental and economic impacts, will provide substantial benefits to society and the environment. The Project is part of the urgent transition away from dirty, climate-altering fossil fuels to the clean energy economy envisioned by the Biden Administration that is necessary to avoid catastrophic warming. When built, the Project is expected to provide enough electricity to power approximately 70,000 homes.
350-1	Bringing clean energy online is of unparalleled importance. The South Fork Wind Farm project will offset millions of tons of carbon emissions and provide much needed clean and renewable energy supply working toward the goal of meeting future clean energy mandates.
354-1	We are writing you today to express our support for South Fork Wind, which will deliver clean power for more than 70,000 homes annually to Long Island, NY. Our company employs hundreds of merchant mariners in New York. In the Port of New York, we have operated cargo vessels, tugboats and barges since my great great grandfather emigrated in 1864. In Port Jefferson, NY, generations of our employees have helped connect Long Island to Connecticut at the Bridgeport and Port Jefferson Steamship Company since its founding in 1883. Over the decades, we have seen the transition in energy from wind, to coal, to petroleum. Today, we are evaluating the sustainable energy sources that will power our transportation solutions in the future. Large scale renewable energy developments like South Fork Wind, will not only help reduce our massive carbon footprint, but will also mean a tremendous amount of economic opportunity in the form good jobs and critical investments into our communities and badly needed investment in underutilized Long Island port facilities As we continue to recover economically from the unprecedented social and economic impact of the Covid-19 pandemic, the approval of this project will directly lead to the creation of good jobs and critical long-term investment for our region. This project is supported by a broad group of stakeholders representing the business community, environmental advocates and the community members most impacted by this project. As it relates to the business community, based on a NYS 2019 Clean Energy Industry Report, the state's clean energy industry employed over 158,000 New Yorkers, approximately 123,000 in energy efficiency and 22,000 in renewable electric power generation (a nearly 9% increase from 2016-2018, which is more than double the average job growth in NY). But in March and April, more than 20,000 New Yorkers who worked in the clean energy sector lost their jobs, with those trends continuing in subsequent months. Offshore wind projects like South Fork Wind are crucial to revitalizing the industry and providing new and sustainable employment opportunities for a skilled workforce. Offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the east coast. As the second commercial-scale offshore wind project in the US, South Fork Wind will play a critical role in establishing a domestic offshore wind industry and realizing the tremendous potential economic benefits of this rapidly emerging industry. There are countless examples to point to like South Fork Wind Project that show we do not need to choose between a healthy economy and a clean environment—we can and must have both. The South Fork Wind project is an opportunity to not only drive the nation's clean energy future, but create quality, family sustaining jobs and economic benefits at the same time. We urge BOEM to stick to its published schedule and allow this important new industry to revitalize the region's economy and strengthen our environment when it is so desperately needed.

Comment Number	Comment
356-1	Thank you to the entire team at the Bureau of Ocean Energy Management for the timely release of the Draft Environmental Impact Statement (DEIS) for Southfork Wind Offshore Wind Farm. As a company with a financial interest in the growth of the US offshore wind market, we believe the DEIS is an important milestone for the entire industry and the many businesses that support it. Advancing the Southfork Wind Project forward would significantly contribute to building the US Domestic Supply Chain, generating jobs and opportunities for individuals both local and regional. Linxon combines Hitachi ABB Power Grids' deep technological knowledge with SNC-Lavalin's project management expertise to create a company dedicated to turnkey electrical AC substations. We deliver sustainable energy solutions and act as a true partner to facilitate the digital transformation for those who depend on consistent reliability. Our substation application experience includes interacting and interconnecting cleaner energy, while helping to maintain grid reliability and secure power supplies for the renewable energy sector. We have completed several onshore and offshore wind substation projects, drawing on our worldwide experience in this area. In August 2020, Linxon was selected to deliver the turnkey 220/115 kV onshore substation connecting the renewable energy into the ISO New England grid, so we know first-hand the economic development benefits of executing a project of this magnitude. On a broader scale, South Fork Wind has the potential to be the first commercial scale offshore wind farm in the US, positioning the State of New York as a leader in this growing market. Power from South Fork Wind is contractually required to be delivered to the East Hampton Substation in East Hampton, NY and is scheduled to become operational in December 2023. Linxon is a global leader in delivering large substation projects for the offshore wind market we would make it a priority to find local and regional suppliers and contractors to further promote economic development in the state of New York. From the substation equipment to the civil and electrical contractors, Linxon prides itself in accelerating the economic development goals of the state and region to promote local business and ensure the maximum amount of local content possible. These benefits will extend beyond the Northeast region and will have meaningful impact in other parts of the country, such as the Gulf of Mexico region and the Midwest, where adjacent industries such as oil and gas development provide relevant competencies and opportunities for business diversification. However, for the US supply chain to grow, be sustainable, and reach its true potential, permitting certainty and clarity is critical. AWEA estimates that developing 30,000 megawatts (MW) of offshore wind along the East Coast could support up to 83,000 jobs and deliver $25 billion in annual economic output by 2030. Many of these jobs will be in construction and with local suppliers who enter the offshore wind industry. Offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the east coast. We urge BOEM to stick to its published schedule and allow this exciting new industry to revitalize the region's economy when it is so desperately needed to help build back our economy post-COVID. As a member of the business community, Linxon supports offshore wind. Large scale utility development like offshore wind will not only help reduce our massive carbon footprint but will also mean a tremendous amount of economic opportunity in the form of jobs and capital investment.
358-1	We are grateful for the timely release of the Draft Environmental Impact Statement (DEIS) for the South Fork Wind Farm (SFWF) by the Bureau of Ocean Energy Management (BOEM). Thank you for the opportunity to provide these comments. SFWF represents one of the first utility scale offshore wind projects in the United States, and a key project for the nascent U.S. offshore wind industry. The release of this DEIS and its subsequent timely approval are key milestones for offshore wind on our shores. We hope BOEM will be able to adhere to the published schedule for issuance of the Final Environmental Impact Statement and Record of Decision on SFWF's Construction and Operations Plan. Along with many others, WSP recognizes the tremendous benefits a US-based offshore wind industry provides for local jobs and economic growth as well as future sustainability in our energy sector. WSP and its member companies have been active in offshore wind in the US since 2010, providing engineering and environmental consulting services to clients such as Ørsted, Vineyard Wind, Mayflower Wind, BOEM, NYSERDA, and others. We are one of the leading US-based service providers in this market and are proud to be taking a key role in developing this industry through supporting our clients. One of the major factors in supporting any emerging market is regulatory certainty, which has often been missing in the US offshore wind business. Consequently, the US lags far behind Europe in developing this critical domestic energy resource.
358-3	Our economy faces significant and unprecedented challenges as a result of the spread of COVID-19. In light of this, WSP is pleased to see that the offshore wind sector remains strong. We believe that offshore wind can be a contributor to sustaining and growing employment as we manage and emerge from this pandemic to re-build our economy. Timely approval of SFWF is essential for that to continue.

Comment Number	Comment
359-1	Nexans submits the following comments to the Bureau of Ocean Energy Management (BOEM) in support of BOEM's Draft Environmental Impact Statement for the Construction and Operations Plan permit for Lease OCS-A 0517, South Fork Wind Farm and South Fork Export Cable Project. Nexans respectfully requests BOEM to (i) adopt the Draft Environmental Impact Statement (EIS) as currently written but to increase from negligible/minor/moderate to major the (a) positive environmental impact of such a project as it will generate energy without any harmful emissions and (b) the positive economic benefits for the US, to (ii) reject the Vessel Transit Lane alternative, and to (iii) proceed with all appropriate speed to issue the Environmental Impact Statement and the associated Construction and Operations Plan for the project based on the Proposed Action alternative. These comments are submitted under 43 CFR §46.435 for that purpose. We would like first to thank your agency for its leadership in the development of offshore wind as a source of clean renewable energy for the United States, for the work it has performed to balance the interest of all stakeholders in this process, and for the release of the draft Environmental Impact Statement (EIS). Issuance of this document is another crucial milestone for the entire offshore wind industry in this country as this project seeks to move from the planning and permitting stage to actual construction in the water. The decisions that will be made in the coming months by regulatory agencies are key to the future and the economic viability of the offshore wind industry in the US. When all externalities are considered, this industry will be one of the major components for a durable, sustainable, and economic energy mix that will be needed to power our economy into the future.
359-4	By approving the full South Fork Wind and South Fork Export Cable project configuration conform to the Joint Developer Agreement Layout which the project will follow and the USCG MARIPA study's recommendations, the Department of Interior will send a clear message to the offshore wind industry, the firms that support it, and investors that the United States of America is supportive of this industry and intends to be a central player in the global energy market. Investment in offshore wind is expected to expand up to $ 1 trillion by 2040 (https://www.iea.org/reports/offshore-wind-outlook-2019).
359-6	Finally, the offshore wind industry has demonstrated its resilience to economic shocks such as the one caused by the COVID-19 pandemic. In addition to the economic benefits that supporting this industry will provide to the US, it will also serve as a counter-cycle industry that will strengthen the resilience of the US economy and therefore its national security. For decades, the United States of America has lost industrial jobs that were sent abroad and never came back. If allowed to succeed, the offshore wind industry will do its part to create well paid high-skills technical and industrial jobs here. The ability to onshore the manufacture of Made in America durable goods is something that our country should support. The failure to issue timely permits with reasonable and predictable requirements would allow others in China or APACs countries to develop preeminence in this sector which is one in which the United State should play a leading role. We, Nexans, therefore ask BOEM to adopt without delay the Draft Environmental Impact Statement with our recommendations listed above and to issue the associated Construction and Operation Plan for the South Fork Wind Farm and South Fork Export Cable Project.
360-1	ACP and the wind industry appreciate the careful, detailed analysis BOEM has undertaken in the DEIS. The release of the document is a significant development for the U.S. offshore wind industry and for the country. South Fork will be one of the first utility-scale offshore wind projects in U.S. federal waters, and the cumulative impacts analysis included in the DEIS will play an important role in assessing impacts for other U.S. East Coast offshore wind development. The South Fork project and the other projects analyzed in the DEIS will create thousands of jobs and help pump significant investment into the nation's economy, as well as helping meet the nation's growing appetite for clean energy. ACP encourages BOEM to timely approve this important offshore wind project and help pave the way for other projects.

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360-3	Wind energy is now the top source of renewable electricity generation in the country, according to the U.S. Energy Information Administration. In fact, wind projects were able to deliver 7.29 percent of the nation's electricity in 2019. That means U.S. wind farms can power over 32 million homes from close to 60,000 wind turbines spinning across 41 states. Wind development ultimately pays for itself in reliability and economic benefits, and supports thousands of jobs. Even though virtually all of today's wind energy is from onshore facilities, the U.S. has a vast offshore wind energy resource with a technical potential of more than 2,000 gigawatts (GW), or nearly double the nation's current electricity use. If tapped, this resource will incent tens of billions of dollars in investment and economic benefits, create tens of thousands of jobs, and forge a clear path to a clean energy economy. The offshore wind industry is poised to begin to fulfill its promise to bring substantial benefits to the nation. Offshore wind projects will significantly contribute to the nation's economy, energy security, and environmental protection. U.S. offshore wind projects in general are predicted to provide about $78 billion in capital spending this decade. These projects create high-quality, high-wage jobs in construction, and permanent jobs for the operation and maintenance of the wind facilities over their expected life. Offshore wind has the potential to drive $57 billion in investment and create over 80,000 jobs. It also raises considerable revenue for all levels of government and taxpayers. The latest offshore wind lease auction alone raised $405 million alone—from bidders for three lease areas that totaled 390,000 acres. In comparison, the most recent region-wide sale of oil leases in the Gulf of Mexico raised only $93 million for 397,000 acres. This demonstrates the viability of investment in the U.S. offshore wind industry. But sustaining this level of investment and interest is dependent on BOEM promptly processing pending applications. Many of the companies pursuing offshore wind projects in the U.S. invest dollars globally, so the U.S. needs to provide an attractive regulatory environment in order to attract these dollars. Providing a more certain and efficient path forward will assist in this regard. Issuance of the final EIS by August 20, 2021, and a Record of Decision by October 20, 2021, approving South Fork, consistent with the BOEM's permitting timetable, will help pave the way for future responsibly developed offshore projects and create tens of thousands of jobs and other economic benefits. On the other hand, not meeting these deadlines, or imposing conditions on project approval that are uneconomical, unnecessary, and impracticable would have a direct negative impact on investor confidence in the U.S. offshore wind energy market and, in turn, job and economic creation therein. The U.S. offshore wind industry, like any large infrastructure undertaking, needs consistent, efficient, and clear permitting processes and timelines to attract and sustain billions in private sector investment that will support the development of the industry. In light of regulatory uncertainty and the challenges associated with federal permitting processes, among other factors, the U.S. has fallen behind Europe and Asia in offshore wind deployment. As of February 2021, the U.S. has a total of just 42 MW (seven turbines) of operational offshore wind capacity, compared to Europe's 21,900 MW and China's 6,800 MW installed through the end of 2019. Finalizing this EIS will help narrow this gap.
364-1	Save the Sound appreciates the opportunity present these comments on the South Fork Offshore Wind proposal and to express our long-standing support for responsibly sited and operated offshore wind projects. Offshore wind is poised to play an essential role in the ability of New York, and the region, to meet its greenhouse gas reduction and clean energy goals. Accordingly, we encourage a robust procurement of offshore wind that maximizes the deployment of these resources consistent with satisfying stringent environmental mitigation standards.
368-1	I am writing to you today in support of the South Fork Wind project. As America grows its offshore wind industry, we have the opportunity to shape the future of the energy market in the United States. In the Wind Industry, we have the unique opportunity to build the future of the energy industry in our country. As the economy attempts to rebuild following the COVID-9 shutdowns, we are positioned to create the kind of green economy that can save our planet and deliver our children a better country than we inherited from our parents. In the Wind Industry, we can create the kind of good-paying jobs that will make green energy jobs the kind of professions you seek out when starting a family or buying a home. There are so few opportunities to get in on the ground floor of economic revolution and we have that opportunity here. To establish new supply lines. To build new relationships, and to create new markets. In our industry, we have worked closely with representatives from Ørsted and Eversource and we can attest to their corporate citizenship. They have been a pleasure to work with as we work to create an American offshore wind marketplace. In closing, I believe the South Fork Wind project will provide a future not just for our industry but for the country and the planet as a whole. We have the opportunity to build a better economy and a better planet, and we should seize it. I ask you to approve the permitting for South Fork Wind. As a member of the Rhode Island business community, I vigorously support the development of the offshore wind sector. This new U.S. industry has the potential to revitalize our economy at a time we desperately need it, providing tens of thousand s of good paying jobs and billions of doll ars in capital investment, while also helping to reduce our massive carbon footprint. Furthermore, it will supply abundant power at a reasonable price, which we need to run our homes and businesses. For those reasons, I urge BOEM to approve South Fork W ind, the 132 megawatt offshore wind farm planned 35 miles east of Montauk Point, NY. By sticking to its published schedule, BOEM will enable this exciting new industry to revitalize the region's economy post COVID, while sending an important message that y ou intend to follow a transparent and timely process for the many projects in the federal approval pipeline. Developers and the supply chain alike need clarity and confidence that projects can move toward installation in a timely manner if this new indust ry is to truly reach its potential as a driver of economic growth. As someone concerned for the economic health of both my region and the country as this pandemic comes to an end, I ask you to move as expeditiously as possible to approve South Fork Wind.

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370-1	New York is poised to be a global leader in the fight against climate change, with the statewide goal of achieving 70% renewable energy by 2030 and 9,000MW of offshore wind by 2035. New York has some of the strongest and most consistent winds in the country – we must not delay in tapping our offshore wind resources and transitioning away from fossil fuels. BOEM has completed a thorough draft Environmental Impact Statement and finds the project would create mostly negligible to minor impacts. Environmental stakeholders have been working with all levels of government and the wind developer to significantly minimize impacts to wildlife and coastal communities while bringing clean, renewable energy to tens of thousands of South Fork homes. I support the South Fork Wind Farm and urge BOEM to issue an approval of this project in 2021. The South Fork is facing increasing energy demand and LIPA had a choice between an offshore wind farm and a new fossil fuel power plant. Thanks to overwhelming support for renewable power, LIPA chose wind. Now we need the federal government to take the next step and approve the proposed action. Environmental and community groups have been fighting for over five years to ensure the project is responsibly developed, mitigates potential impacts on wildlife, and protects the coastline. Climate change is an existential threat to our way of life on Long Island and we cannot afford to keep stalling and delaying. BOEM should quickly issue a final EIS and approval for South Fork Wind Project.
373-1	I write to you today, to express my support for South Fork Wind and the new era of offshore wind on Long Island. On Long Island, we have had to bear the brunt of the growing climate change issue. Superstorm Sandy devastated our homes, our livelihoods, and our environment. As New York's first offshore wind farm, South Fork Wind will generate enough clean energy to power 70,000 average homes. It will displace millions of tons of carbon emissions, the equivalent of taking approximately 60,000 cars off the road. This massive reduction in emissions will help to achieve New York State's climate targets, start changing the trajectory of global warming, and allow a new industry, and the jobs it will require, to replace the hazardous fossil fuels that put us in this situation. Towards this end, Suffolk Community College is partnering with Orsted & Eversource, and leaders of organized labor, to establish a National Offshore Wind Training Center at Suffolk County Community College to begin the critical process of training the workers and technicians needed to construct and operate offshore wind farms, including South Fork Wind. We view this economic opportunity, and the good paying jobs it will produce, as central to our goal of preparing Long Islanders for the jobs of the future. South Fork Wind is an important and precedent-setting project for the U.S. offshore wind industry at large, and will provide many long-term benefits: promotion of clean and safe development of domestic energy sources and clean energy job creation; promotion of renewable energy to help ensure geopolitical security, combat climate change, and provide electricity that is affordable, reliable, safe, secure, and clean; delivery of power to the South Fork of Suffolk County, Long Island, to contribute to New York's renewable energy requirements; and increased habitat for certain fish species. Not all offshore wind farms are created equal. South Fork Wind is the culmination of more than ten years of exhaustive study and analysis, extensive public consultation, and collaboration with the local community. Permitting this project will help create a more reliable grid, reduce New York's carbon footprint, and deliver good paying union jobs. Responsible offshore wind development projects like South Fork should be moved forward with the urgency that the climate crisis demands. Coupled with the other two currently awarded offshore wind projects to be sited on Long Island, South Fork Wind offers significant opportunity for economic development and the creation of goodpaying union and green-economy jobs. Long Island can become a center for an offshore wind workforce that will be at the center of a major industry that both helps rebuild our economy postCOVID and combats climate change. I support starting this process with the siting of the South Fork Wind Farm in the Town of East Hampton. Long Island wants and needs to be at the center of the green energy revolution and providing the kind of good-paying jobs that will help to rebuild our economy following the COVID- 19 outbreaks and shutdowns. I write to you not just as the Interim President of Suffolk County Community College, but as a member of the Long Island community. We are in support of this project and want to help lead the state and the nation forward on offshore wind starting with South Fork Wind.
374-1	The more than 4500 proud members of the International Brotherhood of Electrical Workers Local Union 1049 respectfully support the Draft Environmental Impact Statement Proposed Action for the South Fork Wind Farm and South Fork Export Cable Project located inn BOEM Renewable Energy lease number OCSA 0517. IBEW Local Union 1049 believes that the proposed action will provide the underpinning and foundation for important clean electric generation while addressing concerns for all intervening parties. The advancement of this project will provide New York State with many economic and environmental benefits including construction work, operations and maintenance careers and will move us closer to the State's goal of nine thousand megawatts of clean off shore wind energy generation by the end of the decade. Hundreds of construction jobs will be created, and new careers will be launched in the exciting field of off shore renewable energy. We are confident that the BOEM will agree with us that this project should move forward. Not only will it provide important economic growth for the region, but also positive environmental impacts to improve our health and the communities we inhabit.

Comment Number	Comment
375-1	The Officers and members of the International Brotherhood of Electrical Workers Local Union 25 respectfully support the Draft Environmental Impact Statement Proposed Action for the South Fork Wind Farm and South Fork Export Cable Project located in BOEM Renewable Energy lease number OCSA 0517. IBEW Local Union 25 believes that the proposed action will provide the underpinning and foundation for important clean electric generation while addressing concerns for all intervening parties. I.B.E.W. Local 25 feels that this project will provide New York State with much needed economic and environmental benefits. It will contribute to New York's renewable energy requirements as well as fulfill the contractual commitment to LIPA (Long Island Power Authority). Hundreds of construction jobs will be created, and new careers will be launched in the exciting field of offshore renewable energy. The proposed project's positive environmental impacts are critical in order to achieve a meaningful reduction in harmful greenhouse gasses and improve the overall environment.
376-1	We are writing you today to express our support for South Fork Wind, which will deliver clean power for more than 70,000 homes annually to Long Island, NY. Our company employs hundreds of merchant mariners in New York. In the Port of New York, we have operated cargo vessels, tugboats and barges since my great grandfather emigrated in 1864. In Port Jefferson, NY, generations of our employees have helped connect Long Island to Connecticut at the Bridgeport and Port Jefferson Steamship Company since its founding in 1883 . Over the decades, we have seen the transition in energy from wind, to coal, to petroleum. Today, we are evaluating the sustainable energy sources that will power our transportation solutions in the future. Large scale renewable energy developments like South Fork Wind, will not only help reduce our massive carbon footprint, but will also mean a tremendous amount of economic opportunity in the form good jobs and critical investments into our communities and badly needed investment in underutilized Long Island port facilities As we continue to recover economically from the unprecedented social and economic impact of the Covid-19 pandemic, the approval of this project will directly lead to the creation of good jobs and critical long-term investment for our region. This project is supported by a broad group of stakeholders representing the business community, environmental advocates and the community members most impacted by this project. As it relates to the business community, based on a NYS 2019 Clean Energy Industry Report, the state's clean energy industry employed over 158,000 New Yorkers, approximately 123,000 in energy efficiency and 22,000 in renewable electric power generation (a nearly 9% increase from 2016-2018, which is more than double the average job growth in NY). But in March and April, more than 20,000 New Yorkers who worked in the clean energy sector lost their jobs, with those trends continuing in subsequent months. Offshore wind projects like South Fork Wind are crucial to revitalizing the industry and providing new and sustainable employment opportunities for a skilled workforce. Offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the east coast. As the second commercial-scale offshore wind project in the US, South Fork Wind will play a critical role in establishing a domestic offshore wind industry and realizing the tremendous potential economic benefits of this rapidly emerging industry. There are countless examples to point to like South Fork Wind Project that show we do not need to choose between a healthy economy and a clean environment-we can and must have both. The South Fork Wind project is an opportunity to not only drive the nation's clean energy future, but create quality, family sustaining jobs and economic benefits at the same time. We urge BOEM to stick to its published schedule and allow this important new industry to revitalize the region's economy and strengthen our environment when it is so desperately needed.
377-1	The potential economic benefit of the South Fork Wind project extends to GLOD, as a US based company, its US citizen union employees, its US rock supply base in the East Coast (quarries, transportation, etc.), and even nationally as the shipyard that will be fabricating the first Subsea Rock Installation vessel built will also be a US shipyard. We also note GLOD has worked for several years with the NE Federal delegation including Senator Whitehouse on revenue sharing programs that most developers including Orsted also endorse. Such revenue sharing arrangements help states like Rhode Island share in the benefits of projects like South Fork and are common in other parts of the country, particularly in the Gulf, where we have worked to get Senator Whitehouse and Senator Cassidy of Louisiana together to push for a national approach to offshore development revenue sharing. We are currently in communication with Orsted on the South Fork Wind project and their other offshore wind developments in the East Coast. We are part of their effort to build a domestic supply chain, and we are excited to be part of the growing US offshore wind market and support the US transition to renewable sources of energy. Approval of the South Fork Wind project, the first commercial scale offshore wind farm in the US, will allow Orsted to provide the commercial pre-commitments required to develop and scale up the domestic supply chain. Specifically for GLOD, volume pre-commitment and a steady pipeline of offshore wind projects, will lead to a timely Final Investment Decision for building the first Subsea Rock Installation vessel in the US, to support installation of South Fork Wind and other East Coast Wind Farm developments, starting in 2024.

Comment Number	Comment
378-1	Mariah Dignan: Thank you. My name is Mariah Dignan. M-A-R-I-A-H D-I-G-N as in Nancy-A-N as in Nancy. And I'm the Long Island organizer for Climate Jobs New York. We're a growing coalition of Labor unions representing 2.6 million working New Yorkers united to combat climate change and reverse inequality. We are educating our fellow workers, building alliances, and advocating for policy solutions, demonstrating that we don't have to choose between a healthy planet and good jobs. I'm a Long Islander acutely aware of the impacts climate change has and continues to have globally and here in my community. I enthusiastically support the South Fork Wind project and the DEIS, which clearly demonstrates how to responsibly develop an offshore wind project. I'd like to take a moment to thank BOEM for completing this DEIS during the COVID-19 pandemic. We are undeniably addressing intersectional crises: public health, the economy, environmental justice, and climate change, all of which are interwoven with offshore wind development. South Fork Wind is slated to be New York's inaugural offshore wind project. This project will propel the United States' offshore wind industry and deliver clean, renewable, and cost-effective power to the South Fork of Long Island. In addition, this project will provide thousands of good union jobs and attract global supply chain manufacturers to the Northeast. Orsted and Eversource has committed to working with Long Island labor by using contractors who have project Labor agreements with the Nassau Suffolk building trades and investing in our local workforce with the $10 million dollar off-shore wind training center. This project has truly set the stage for offshore wind developers to work in conjunction with organized Labor. Labor unions offer world-class training programs through apprenticeships, and by coordinating with industry, we will continue to lead and train the offshore wind workforce of the very near future. In addition to working with Long Island Labor, the developers have listened, engaged, and altered construction plans based on local community feedback. This is something we must replicate in other projects. Orsted Eversource has worked tirelessly with the local East Hampton community. After working hand-in-hand for four years with East Hampton electees and representatives, there are additional mitigation efforts that include construction, environmental, and fishery concerns of local residents, businesses, and mariners. It is worth highlighting that the East Hampton trustees have unanimously approved a joint proposal, and five New York state agencies have invested extensive time and expertise in this process, and have also signed on to the agreement. This clearly demonstrates a methodical and thoughtful approach to working with the community to actualize New York's first offshore wind project. And not only have the developers worked with local community stakeholders on construction-related and community benefit agreements, but they have thoroughly vetted and studied cable-ending options, which has resulted in the best onshore cable route. The Beach Lane route for the South Fork export cable mitigates community environmental impacts, as demonstrated in numerous geotechnical field surveys samplings and studies, both on land and in the water. The necessary easements and leases for this route were passed with overwhelming support by both the East Hampton Town Board and Trustees last month. Climate Jobs New York also supports the one-by-one nautical mile layout compromise. Not only does the Coast Guard approve of this mitigation effort, but adding additional mileage to the layout would only take away from the efficiency in carbon reduction potential the project is meant to address. I urge BOEM to reject the transatlantic alternative in the final EIS. To maximize the economic development and job potential of this industry, I urge BOEM to move forward expeditiously on this and other offshore wind projects and stick to the timeline that was just outlined during this presentation. Focusing on New York, the nation's leader in offshore wind energy standards, the only way to achieve 9 gigawatts of offshore wind by 2035 is to advance permitting in a timely manner and develop safe and fair conditions with community stakeholders, as was done with South Fork. We can provide long-term sustainability, economic development, and create a skilled green economy workforce for a consequential new industry. And this time of bold transformation, smart investments and clean energy future can simultaneously put people back to work, build infrastructure to address climate change and spur development in our communities. I will also submit written comments that provide for the details on these general overview. Thank you for your time and consideration.

Comment Number	Comment
378-9	Gordian Raacke: Great. Good afternoon, my name is Gordian Raacke. I'll spell that G-O-R-D-I-A-N R-A-A-C-K-E. I'm the executive director of Renewable Energy Long Island, a regional-not-for profit organization. Thank you for the opportunity to provide comments and for compiling such a comprehensive draft environmental impact statement on the South Fork Wind Farm. The South Fork Wind Farm is of great significance, not only here in East Hampton and the South Fork of Long Island but statewide because it will be the first offshore wind project and the State of New York, and as such, is instrumental in building an offshore wind industry in our region. Well, this industry is just emerging in the U.S., the offshore wind industry is fully developed in Europe. The first offshore wind events in Europe were built in 1991 and they now have 22 gigawatts for more than 5,000 turbines over there and they continue the rapid growth of offshore wind development. And tapping into our large offshore wind resources here will deliver significant benefits, including climate environmental and health benefits, as well as important economic benefits, such as the creations of tens of thousands of well-paying jobs, establishing a new industry and related supply chain activity, and benefits for utility customers. Now, in order to obtain these benefits, we need to not only catch up with the European industry, but we need to demonstrate that responsibly developed offshore wind projects will be able to obtain the required permits with reasonable regulatory restrictions, as appropriate, and within reasonable time frames. But, time is of the essence, for another much more existential reason. We are facing a climate crisis of immense proportions and must quickly deploy solutions to reduce our greenhouse gas emissions. And, as we speak, I was just listening in on the East Hampton Town Board session here found in East Hampton out on the east end of Long Island, the town board is considering adopting a climate emergency declaration. Now we have waited far too long to act, and now we need to act decisively and quickly to reduce carbon emissions to net zero essentially by mid-century. The window of opportunity to bend our emissions curve downward is now very small and closing quickly. So, moving responsibly developed offshore wind projects like the South Fork project through the regulatory review and permitting without undue delay is now more important than ever. The good news is that the EIS finds that expected impacts of the project are in most cases at moderate level or below that. The negative impacts of this and also finds that in any impacts that are rated at higher impact level can likely be, and should be, mitigated, I think. So it, as it is also important to note that we need to weigh any negative impacts, not only against the benefits of the project, but the fact that negative impacts from climate change would of course be many magnitudes greater. The EIS lists many of the long-term benefits of the project, including the safe development of domestic and clean energy and job creation, the geopolitical security and climate benefits, and the electricity needs on the South Fork here, as well as the New York's renewable energy needs. And another important benefit is that the project will enable the town of East Hampton, which I just mentioned, to meet its communitywide 100% renewable energy goals, a goal set back in 2014 by the town board. To sum up, I thank you for your diligent work and urge you to move forward as expeditiously as possible to ensure that our region and the State of New York and the country will be able to harness our offshore wind resource and the environmental and economic benefits that come with it. Thank you very much.

Comment Number	Comment
378-10	Kathryn Lustig: Yes. Okay, my name is Kathryn or Kay K-A-Y Lustig L-U-S as in Sam-T-I-G. I've lived in Great Neck in Nassau County since 1978. I'm a member of Sierra Club and a concerned citizen of Long Island. Thank you for this opportunity to comment on the South Fork Wind project. New York State, under Governor Cuomo and after years of hard work by many organizations, passed the Climate Leadership and Community Protection Act in 2019. That act codifies the nation-leading goal that at least 70% of New York's electricity will come from renewable energy sources, such as wind and solar, by 2030. I may not be around in 2040 when New York state's goal is to have its electric sector 100% free of carbon missions with resulting cleaner, healthier air, water, environment, and communities, but my children, all of our children and our grandchildren, will likely be here, and it's for them, for the future of our communities and our environment that I'm most concerned. I'm concerned too, about the need for remaking the energy economy to providing good jobs and training and clean energy production and transmission. So, today I joined with concerned people throughout Nassau and Suffolk Counties and throughout New York state in urging that BOEM go forward with the South Fork Wind project. Thank you.
378-12	Michael Hansen: My name is Michael Hansen, H-A-N-S-E-N, and I live in Wainscott, New York, with my wife and my three small children. First, I support this project wholeheartedly. Why? Because we are in a climate crisis. There's really no other side to this argument, this is, this is from, the following's from the NASA global change website, quote, the planet's average surface temperature has risen 2.12 degrees Fahrenheit, 1.18 degrees Celsius, since the late 19th century, a change, driven by, largely by increased carbon dioxide emissions into the atmosphere and other human activities. Most of the warming occurred in the past 40 years with the seven most recent years, being the warmest. The years 2016 and 2020 are tied for the warmest year on record, unquote. And while 12 to 15 turbines 35 miles southeast of Montauk will not in one fell swoop solve our climate crisis, it is nevertheless an essential first step for the State of New York. We will still need solar, we will still need geothermal, we will still need more efficient appliances and better insulated houses, and we will need offshore wind. Second, wind power works. A few years ago, I visited County Roscommon in Ireland, where my grandmother is from. The hills there surrounding Lough Allen are filled with wind turbines, and why did they have wind turbines? Because they closed down the coal mines. I even took a tour of an old coal mine. No one in Roscommon misses the coal mines. Wind works in Ireland, it works in California, it will work here. It is working here now; look at Block Island. Before the five turbines were installed, Block Island burned 1 million gallons of diesel fuel every year for their electricity needs. Every single year, this means that 1 million gallons of burnt fuel was dropped into the ocean every year. Since the five turbines went online off of Block Island, the five diesel generators have been turned off. That is an incredible success. Finally, I support this project because of my children. They are 9 years old, 7 years old, and 11 months. They will live to see the tricentennial of the United States, they deserve cleaner oceans and cleaner air. Thank you very much.
378-14	Linda James: Linda James, Renewable Energy Long Island associate, a resident for 50 years in East Hampton, and a climate change activist, a colleague of Gordian Raacke, whom you've heard from earlier. My colleague and I have been performing promoting the offshore wind farm as the most effective way to fight climate change. No one will be ultimately safe from the consequences of runaway global warming, according to a new study from Harvard School of Engineering and Applied Sciences, the burning of fossil fuels kills an estimated 350,000 people alone in the United States. The contribution of the South Fork Wind Farm's success also in meeting the town's 100% goal, not just in terms of the power but the benefits that it will provide in raising awareness in this community and on Long Island and, consequently, as we have been in the leadership of speaking out about renewable energy. It will raise awareness of renewable energy resources, replacing fossil fuel dependence. 350 years ago, our pilgrims here in East Hampton used the windmill for their source of power. I like to think that these windmills have floated out to sea and are now the turbines that we are talking about today. I firmly support their renewable energy replacement. Thank you very much.
378-15	Luciano Sabatini: Hi, my name is Luciano Sabatini. I am a member of the Sierra Club. I support the South Fork Wind Farm, for the following reasons. On October 29, 2012, I was in my home when Hurricane Sandy flooded my home and my entire community. It was a devastating experience, and there are still people today who are still not in their homes because of the destruction that was created by Hurricane Sandy. Just this past season, this past storm season, hurricane season, we ran out of names for storms, so the frequency and the destruction of storms is just getting worse each year. We know about other extreme weather events, the wildfires in California, the droughts in Africa and so forth. These are all red flags that of the future that we are about to inherit if we don't do something quickly. Climate scientists have told us we have about 10 years. We wasted four years of the Trump Administration, that we have 10 years to curb carbon emissions. If we don't act on wind farm projects like this one, to begin that process of curbing carbon emissions, so we are, we are headed for a future that is going to be terrible for our children and grandchildren. That's all I have to say.

Comment Number	Comment
378-20	Adrienne Esposito: So, my name is Adrienne Esposito. I'm the executive director of Citizens Campaign for the Environment. Thank you very much for the opportunity to comment. It's A-D-R-I-E-N-N-E E-S-P-O-S-T-O. And the name of the group is Citizens Campaign for the Environment. And thank you for the opportunity to comment and we will be submitting more detailed comments in writing to BOEM. I'd like to address some specific concerns and topics that we heard today. For one is, I think we need to remember that this wind farm is result of a competitive bid process put out by the local electricity company PSE&G because of the increase in electricity demand on the East End. So it's not a wind farm or nothing, it's a wind farm or a fossil fuel plant. We are choosing the wind farm. The second thing is, I think it's to remember is that it's very important for people to understand climate change, I don't know if some of the speakers do. One of the speakers is very upset about a cable going in their road. I'm upset about the 95,000 homes that would [audio cut out] Superstorm Sandy. I'm upset about all of us who live by the coast, who are told by FEMA you have to raise your house up five feet. That's pretty inconvenient. Many of us are upset about what's called rainy outside, I'm sorry, sunny-day flooding, where it's a beautiful day, it's a sunny day. Only our homes and our streets are being flooded because the tides and the winds have a certain reach, a certain threshold, where the sea now overtakes the land. So, climate change on Long Island is real. I would be thrilled if the only thing I had to sacrifice was having a cable go in on my road. That would be wonderful. Rather than having people's homes flooded and people's streets torn up and destroyed because of more frequent nor'easters and more frequent hurricanes and sunny-day flooding. I think we need to be very realistic here on Long Island. We are an island, we are at ground zero for climate change impacts, and we are experiencing them right now. And if we have concerns about birds, for instance, then we should address them, you know the red knot. In order to protect that species, we need to protect the horseshoe crabs, not stop, not prevent the answer for climate change from moving forward. If we're concerned about piping plovers, which we are, my organization has worked for 38 years to protect piping plovers. And we do so by protecting the nesting grounds and the breeding grounds and the nursery grounds for that species, so they can nest and breed and then leave in September. You don't protect the bird species by continuing fossil fuels and climate change. You protect bird species and fish species by fighting climate change. And we're asking BOEM to consider that when you do the final EIS that everything is in comparison. It's not just wind or nothing, its wind power and transitioning to renewables or continuing to be addicted to fossil fuels. And the reason in the first place we're looking at the South Fork Wind Farm and the other wind farms that have been proposed is because there is an urgent and, and, and dangerous situation occurring, and that is that we are experiencing climate change impacts. So, as I said, thank you for the opportunity to comment, we will be submitting more detailed comments directly related to the substance of the DEIS.
379-6	Anthony Guerrero: My name is Anthony Guerrero, Local 28 Sheet Metal Workers here in New York and Long Island. As a Union member, I support offshore wind. Large-scale utility development like offshore wind not only will help reduce our massive carbon footprint, it will also mean a tremendous amount of economic opportunity in the form of jobs and community benefits. We have been preparing for this moment for a very long time. We urge approval to be expeditious as possible to get the men and women of the Labor movement to work. Thank you for your time. Thank you for the presentation. Very important. Thank you.
379-20	David Posnett: So, I am David Posnett, P-O-S-N-E-T-T, I'm a retired MD, I live in East Hampton, and I am part of the steering committee of citizens group called Win With Wind. Supporting clean energy and in particular the wind farm off of East Hampton. So, I have a comment regarding all those that are worried about a nefarious cable running under the seabed and coming ashore somewhere. I would like to point out that a larger cable already exists and feeds power into Long Island coming all the way from New Jersey. This dates back to 2007 when this story was written up in the New York Times, so you can go check it. It's like an extension cord and it's a giant extension cord, and this transmission cable was named Neptune stretches 50 miles underwater from Sayreville, New Jersey, and comes ashore in Jones Beach, and has been plugged into Long Island for all these years. That's about 35 years without any nefarious effects on or offshore. It's a 10-inch cable, and it provides 668 megawatts. So, likewise LIPA imports power from New England on the 330-megawatt Cross Sound Cable, which runs underwater from Connecticut. And there are two older cables that I know of: the 600-megawatt Y-49 cable and the 599-megawatt Y-50 cable, and they also run under the Sound to Long Island. Initial concerns about the effects on the shellfish industry in Long Island Sound, were apparently not a problem all over all these years, and, like, I said, that is 35 years. Thank you very much.
379-21	Jennifer Johnson: Hi, I'm Jennifer Johnson. Thank you to BOEM for your good work, and for this opportunity for public comment. I strongly believe that Americans should not have to choose between a good job and a clean environment. We can and we must have both. The South Fork wind project makes economic and environmental sense. Large-scale utility development like offshore wind not only will help reduce our massive carbon footprint, but will also mean a tremendous amount of economic opportunity in the form of good, clean jobs and community benefits. The South Fork wind project will be the first to connect in New York State and will help the local community meet its renewable energy goals. I strongly urge BOEM to move forward with the permitting schedule, and we can and we must build back better. Thank you so much.

Comment Number	Comment
380-4	Caroline Hahn: Great, good evening. My name is Caroline Hahn, that's C-A-R-O-L-I-N-E H-A-H-N, and I'm here today representing the New York League of Conservation Voters, or NYLCV, for short. And NYLCV is committed to renewable energy and a clean energy future for New York. Offshore wind is the top priority for us both statewide and here on Long Island. Thank you for providing this opportunity to comment on this important project today. Offshore wind is critical to meet New York's renewable energy goals, reduce our reliance on fossil fuels, and rebuild around an green energy economy, which will address climate change, provide jobs, and improve public health. This is evident in your first offshore wind farm, a joint venture between Orsted and Eversource, consisting of up to 15 turbines, so it will generate enough clean energy to power 70,000 homes. The wind farm will displace millions of tons of carbon emissions around the equivalent of taking 60,000 cars off the road. And NYLCV is committed to ensuring that developers provide clear and transparent information to communities that will be home to energy infrastructure. As evidenced by our educational programs offered to ensure the public has the opportunity to ask questions of the project developers, South Fork is an important and precedent-setting project to the U.S. offshore wind industry. Comprehensive DEIS assessment outlines this in great detail. The majority of impacts in the DEIS for the South Fork project are moderate or below, while the higher-rated impacts can be addressed through ongoing stakeholder discussion and outreach. An example of this is the ongoing discussion with regulatory agencies and other environmental stakeholders about environmental protection measures for marine mammals and protected species, including the endangered North Atlantic right whale. These programs will mitigate noise impacts during offshore monopile installation and minimize ship strikes during operation. The project will continue to develop these measures, which will be included in the final EIS statement.
380-7	Dave Kapell: Good evening, my name is Dave Kapell, K-A-P-E-L-L. I am a consultant to Orsted, one of the developers of South Fork Wind. I'm also the former mayor of the village of Greenport and I'm joined this evening by my wife Eileen Kapell, E-I-L-E-E-N K-A-P-E-L-L. Together, we would like to submit these comments and we'll follow up with a written submission. We write in support of South Fork Wind in its application to the Bureau of Ocean Energy Management for approval to construct New York's first offshore wind farm. As residents of coastal Long Island in the West Dublin neighborhood in the village of Greenport, we are experiencing firsthand the reality of sea level rise and the global warming that is causing it. We recognize the scientific imperative to transition to renewable forms of energy production to help address this crisis. As one of the first offshore wind projects to be constructed in the United States, the success of South Fork Wind will be an important harbinger for the future of this a central component of the transition away from fossil fuel generation. Given the controversy caused by a handful of neighbors over the proposal over the proposed landfall of the export cable in Wainscott, and the fears those neighbors have over perceived impacts the project will have on their neighborhood, we believe we have a unique perspective to offer. In 2017, PSE&G Long Island undertook a project nearly identical to the proposed South Fork cable landing to eliminate a severe seasonal power constraint on Shelter Island that had previously been addressed with high-polluting portable diesel generators. The project involved running an underground transmission cable from the Long Island Power Authority substation in Southold for two miles through our quiet neighborhood, under our village beach, and then 120 feet below Greenport Harbor for a distance of 3,328 feet to a landing on Shelter Island using horizontal directional drilling. This is precisely the same technology proposed to be used in Wainscott. To mitigate the impact of short-term disruption during construction, PSE&G pledged significant infrastructure improvements to the Greenport municipal electric system, along with cash access payments of $1.3 million to the village of Greenport and $1.02 million to the Shelter Island Heights Property Owners Association. PSE&G also pledged to build the project over the offseason winter months, beginning in October 2017, successfully completing it the following May. A visit to the site today will reveal only repaved streets and the occasional manhole cover. We believe all parties came out as winners. Shelter Island got the power it needed while eliminating the pollution and cost of portable generators. Greenport and Shelter Island were properly compensated for their part in facilitating the project, most importantly, together as a community. We were able to take a small but important step to address the existential threat of climate change. The same will be true of South Fork Wind and we urge you to approve it. In addition to ours, these neighbors have linked their names to this letter. We all live directly on or closely adjacent to PSE&G cable route. Alex and Ju-Lie Bell, Rob Buchanan and Noemi Bonazzi, Sarah Williams and Tom Spackman, John Williams, Nathaniel and Emily Ewing, Hannah and David Walsh, Kenneth Ludacer, Peggy Lauber, and Paul Kreiling, Tim Betancourt and Isabelle Lion, Andrew and Heather Wolf, and Dinni Gordon. We would like to close by sharing this reflection of one of our neighbors: "I had, I had some reservations about the Shelter Island line and the construction. I felt Shelter Island should have paid more and the road construction was annoying. But now that it's done. I barely remember the inconvenience. I'm all for renewable energy." Thank you for the opportunity to be heard. Good evening.

Comment Number	Comment
380-8	Francesca Rheannon: Thank you, thank you for the opportunity to provide comment for this very important project. I'm a resident of East Hampton, a long-term resident, and a member of the East Hampton Energy Sustainability Advisory committee. I support the permitting of the South Fork Wind Project because of the fierce urgency of transitioning to clean energy. We have but a small window to save our shoreline communities from the worst impacts of climate change. Scientists estimate that we must transition to 100% clean energy by 2035 and go entirely fossil free by 2050. Wind energy, especially offshore wind energy, is key to accomplishing this. Offshore wind power is the swiftest and most cost-effective way to make a major transition toward clean energy. We cannot wait for solar panel installations roof by single roof. Offshore wind can supply clean energy to millions of homes in one fell swoop, of which the South Fork Wind Farm will play a part. The farm, the South Fork Wind Farm, has already been delayed due to controversy over its cable route via Wainscott. But that rule would mean the least amount of disruption to the East Hampton community as a whole. The alternative, Hither Hills, would add at least another year to construction. The greater length of the route and its location on the sole major highway, Route 27 between East Hampton and Montauk, would mean terrible disruption to traffic, affecting far more people for far longer than the Wainscott route. It would also mean the loss of badly needed community benefits from Orsted, like burying the electric power cables in Wainscott, which would, if the cable comes to Wainscott, that would make that hamlet more resistant to the effects of storms. The community benefits could also provide discounts and incentives to community members for adopting clean energy, like electric vehicles and battery storage that could make the whole community more resilient in the face of severe weather or other climate change–caused disruptions. Recently, we on the East End have seen the devastating impact on our shellfish industry of ocean warming and acidification, the total loss of our scallop harvest two years in a row. For example, our traditional eelgrass forest, which used to supply critical habitat for many marine species, have been unable to regenerate due to ocean heating. Despite the efforts of marine scientists to regrow them, these are just two of the many impacts of climate change that are beginning to devastate our communities. This is, of course, not to mention the increased risk of severe storms and the impact of sea level rise on our homes and roads. Finally, we're in the midst of an economic depression, due to the COVID-19 pandemic. We need the hundreds to thousands of good jobs that the offshore wind power industry will provide our community, including other kinds of job expansion through the multiplier effect. These are all the reasons why we need to move forward with permitting the South Fork Wind Farm as soon as possible. Any delay would be terribly short sighted and devastating to us in the long term. Thank you so much for the opportunity to be heard.
380-9	Tim McCarthy: My name is Tim McCarthy a Business Representative of Local 25 IBEW. I think I speak for all of organized Labor and especially my members in showing strong support for this project. Orsted-Eversource is committed to working with the building trades, and that's very good news for the working men and women of Long Island. The South Fork Wind project is a critical part of Long Island's energy portfolio and following the governor's clean energy statute. This also is a tremendous opportunity for merging economic development, responsible electrical energy, and generation for filling the needs here on Long Island. I just want to say in closing, that this, this project will impact Long Island. Long Island, there's so many positive aspects, but most important to me and my members, though, are our jobs, good-paying jobs. And these are not so temporary, as this is going to be a new industry for Long Island and it's going, it's going to allow a lot of folks to gain careers. So, again I'm, I'm in favor of this project, and I realized I didn't spell my name at the beginning of this, it's Tim McCarthy, T-I-M M-C-C-A-R-T-H-Y. I appreciate you for letting me speak on this. Have a great day.

Comment Number	Comment
380-14	Jeremiah Mulligan: My name is Jeremiah Mulligan and I'm a resident of East Hampton, New York. I'm a member of Win With Wind, an independent, nonpartisan group of private citizens of the town of East Hampton that is not affiliated with or funded by any wind or energy development company. Win With Wind aims to produce fact-based information regarding the benefits of offshore wind energy and is working to advocate for the South Fork Wind project as an opportunity to place East Hampton at the forefront of clean energy leadership. Win With Wind supports the project because of the contribution it will make to reduce greenhouse gas emissions and because it will lay the groundwork for offshore wind development along the southern shore of Long Island, as well as the eastern seaboard. Currently, our electricity comes from aging fossil fuel plants on Long Island and nearby states, as well as small, local diesel fuel peaker plants such as those found in East Hampton and Southampton. Since our grid infrastructure is at full capacity, additional power cannot be sent from up-island without a very costly replacement of that infrastructure. This is the reason that Long Island Power Authority put out a request for proposals in 2015, six years ago, that required power to be delivered directly to the East Hampton substation. After a year-long process, engaging the private sector for the best ideas, Long Island Power Authority and PSE&G Long Island evaluated 21 proposals, including detailed cost modeling and engineering analysis. In January 2017 LIPA approved a power purchase agreement to buy renewable energy from New York's first offshore wind firm. The 15 South Fork wind turbines will be 35 miles east of Montauk Point and will provide power for 70,000 typical South Fork homes. The project has the support of more than 70% of residents of the South Fork. Climate change is upon us and the dramatic local impacts of CO2 are obvious. As global temperatures rise, more than 90% of the increased heat is absorbed by the ocean. Sea level rise is clear when the ferry docks at Shelter Island and Greenport need to be raised. Storm intensity is flooding local roads more frequently. Beach erosion is increasing. Salt water is invading local water tables. Increased ocean temperature is driving familiar local fish north seeking cooler waters. Shellfish are struggling, Montauk lobstermen have moved on, and as have some Maine lobstermen. Scallops are having a challenging time. After the CO2 becomes airborne, much of it is absorbed by the ocean, which becomes exceedingly acidic, to the detriment of fish and aquatic life. In addition, a significant concern is the impact of CO2 on human beings. These run the gamut from inflammation and reduce cognitive performance, to kidney and bone problems. It is a grim reminder when I see the diesel exhaust pouring out of those peaker plants. The South Fork Wind Project, will reduce CO2 emissions and has the support of the East Hampton Town Board. The East Hampton trustees, a local community, more than 30 environmental organizations and Labor unions, the New York State Department of Environmental Conservation, the Department of Transportation, Department of State, Department of Public Service, and the Office of Parks, Recreation and Historic Preservation. Further, South Fork wind will advance Governor Cuomo his goal for renewable energy and President Biden's executive order to accelerate responsible development for renewable energy on public lands and water. For these reasons, I support BOEM's environmental impact statement and the advancement of this critical project. I leave you with two questions: if we don't act now, when? And if we don't act, who will? Thank you for your time.
380-15	Tina Plesset: Okay, I am Tina Plesset, P-L-E-S-S-E-T. I am a full-time resident of East Hampton. Recently, I have made an effort to learn more about the South Fork Wind Project and the approval process. Needless to say, there has been a lot of controversy, as we are all so well aware. In learning more about the issues though, I quickly saw that many concerns fall into two categories. The first category, in the first category, there are legitimate concerns about environmental impacts, agreements, and procedures. In the second category, there are thinly veiled concerns that are backed by local residents who oppose the transmission cable landing in Wainscott. They say they are for change, but just not in their backyards. There have been many informed comments with important details as to why the cable transmission should line, land in Wainscott, so I won't reiterate them here. I merely want to ask you to address the legitimate procedural concerns and differentiate them from the self-interested concerns voiced by a group of Wainscott residents, backed by wealthy donors. Clean energy is a step forward for the town of East Hampton, the State of New York, and the nation. We are fortunate to have this opportunity to move in the right direction for our future and for future generations to come. I urge you to help us make this move forward by approving the cable line to land at Beach Lane. I thank you very much for all your hard work.

Comment Number	Comment
380-20	Kevin McAllister: Thanks for hearing my comments and holding a very efficient meeting. My name is Kevin McAllister. I'm President of Defend H2O, which is a local clean water advocacy group. As a preface to my comments, I'd like to share my background, which is in marine biological sciences and coastal zone management. For a number of years, I was directly involved in dredge and fill permitting down in South Florida, as well as beach management, so I believe I'm have the qualifications to speak to some of the issues here. Roughly two years ago, an administrative law judge, on behalf of the New York Public Service Commission, held a public hearing in East Hampton and, at the time, I provided some comments. From my perspective, I thought that the impacts from the pile driving jet plow for laying the cable, as well as the beach landing through horizontal directional drilling would have minimal impacts, that long-term would be really inconsequential, that recovery of the benthic zone would, would be quite rapid, and this again, based on experience in the permitting realm and that was of course my prism. In looking at the draft EIS, I thought the scoping comments were very thorough, I thought all areas are being covered and it did not surprise me that ultimately, you know, the draft statement identifies a minimal impact from, from the project itself. I know from the scoping it seemed to be repeated concerns about the cable landing, and again this is where I do have direct experience over many years of managing beaches and being involved in beach restoration projects. My own lifestyle, being out there all the time, I see the changes in beaches, I understand them through, again, my training and coastal processes. I believe the concern about the cable being exposed or misplaced or the hardships of horizontal directional drilling, while I don't have direct experience in the permitting realm, I am familiar with its capability. So, ultimately, with the, the depth that can be achieved, as well as the span from offshore to near shore, we're talking back dune, the concern about exposure in this cable. It will never happen, in, certainly in our lifetime. The last item, speaking to the transition to renewable energy, you know there's urgency and we see the erosion trends, the impacts on ocean acidification, climate change is real, or we have to move into renewable energy sources, and I applaud East Hampton for really taking a lead on this in establishing a project that will bring us into basically a new frontier. And it's not without concerns about long-term impacts, but, as Mr. DeLuca pointed out, I think, through the monitoring over time, we will demonstrate that this is a really positive project. I urge BOEM to move forward with the EIS, adopt the findings, and ultimately permit this project as soon as possible. Thank you for hearing my comments.
380-21	Steven Brustein: Thank you, my name is Steven Brustein, S-T-E-V-E-N B-R-U-S-T-E-I-N, and I am a recreational fisherman living in Rhode Island. I'm a member of the Rhode Island Salt Water Anglers Association, and I am a citizen concerned about the welfare of our oceans and our environment. I believe that the driving force behind development and the search for renewable energy needs to be for the protection of our natural resources and to enhance the lives of everyone. And while commercial fishing industry is certainly important, it's one component. I also believe that renewable wind farm energy, when thoughtfully implemented, can benefit both commercial fishing, recreational fishing, as well as the environment and the needs of people everywhere. As a nation and a society, we need to seek and develop new ways to reduce the negative impact our energy consumption, and that our consumption in general, is having on climate change. And, in addition to the reduction in use of fossil fuels, wind farm development creates a reef effect and structure for fish habitat, which I believe will lead to greater fish populations. Furthermore, wind farms increase awareness of and participation in environmental management by those very consumers who have created the need for change. So, in my opinion, commercial and recreational fishing will benefit, as well as and most importantly, the environment will benefit from this project. My understanding of the studies done in and around European wind farms is that data supports that belief. And in addition to that, that the South Fork Wind Farm development is embracing more detailed research and collaboration, before, during, and after construction to enhance data and better serve us all. It's because of the needs I've expressed here and my confidence in the management of this project that I support this wind farm. And I wanted to come here tonight to share that. Thank you for the opportunity to comment and for your consideration.

Comment Number	Comment
380-24	Tom Barracca: My name is Tom Barracca, spelled B-A-R-R-A-C-C-A, and I'm with ULC Technologies, a technology company based in Hauppauge, New York, on Long Island. And I appreciate the opportunity to comment. I've been a Long Island resident for 30 years, and over those 30 years, I've worked in the energy field here on Long Island. Particularly as a reliability electric manager and a R&D manager for the utilities here on Long Island. Also 25, 20 to 25 years ago, I was involved, supporting the Long Island Power Authority with the first offshore wind study. So, this has been a really long time coming, so I'm really happy to be sitting here tonight to support the project that South Fork Wind has proposed, as proposed. Just speaking from my past experience, before I talk about my role today in offshore wind, is the fact that the East End of Long Island is a load pocket, so power flows from the west through transmission lines, but it's somewhat of a radial system, so the need for this project is huge from two standpoints: from an environmental standpoint as being discussed, and also from serving that load pocket. Currently, LIPA serves that load pocket by using diesel engines, which is a very polluting technology, as we all know. And LIPA and the developers should be commended to delivering power into the load pocket. So, economics and environmental concerns collide in a positive way, because you're at the end of the island, so the way the product has been thought out and engineered by everyone is to be very well commended. It's really been built on the back of 20 years' worth looking at this and solving that problem from an electric reliability standpoint, as well as an environmental standpoint. I'm basically fast forwarding to ULC Technologies. We're a technology company that's been serving the energy industry for 20 years, more in the traditional utility space. In other words, providing robots and unmanned aerial vehicles for the energy industry, but we really are excited about offshore wind. There's a huge opportunity for our company. And we've done a little bit of work with the developer, and they're really to be commended for their diligence both professionally and in the environmental space. You know, we, as the high-tech community on Long Island, really, really believe that technology is a key to the future of renewable energy in the United States, and we really support this project because we've seen it's been really based upon years of study. And just to kind of wrap up, there's always these difficult tradeoffs in doing any, any energy project, and you know the environmental concerns are very important, but I believe the project as proposed makes the most sense for, for the area, for the United States, and for the energy, and the opportunities for employment are tremendous built upon this project and future products. So, thank you again for the opportunity to speak, and we look forward to seeing this product getting built as soon as possible.
FL2-1	The South Fork Wind project represents a significant opportunity. It shows the way forward for offshore wind in coastal states across the country, especially for communities in the Northeast eager to move ahead with offshore wind projects already in the pipeline. The merits of the project are clear. - Support New York's first offshore wind project, part of its nation-leading clean energy vision. - Enable the Town of East Hampton to meet its 100% renewable energy goal. - Power nearly 70,000 homes each year with reliable, clean power. - Avoid millions of tons of carbon emissions, equivalent to taking more than 60,000 cars off the road. - Developers rsted and Eversource demonstrate a commitment to the host community through consistent engagement and a commitment to hiring contractors who have Project Labor Agreements with the Long Island Building and Construction Trades Council. South Fork's Draft Environmental Impact Statement (DEIS) acknowledges that the project can be safely constructed and operated with minimal impact to adjacent industries and the environment. Not only does this project help address broader environmental challenges like local air pollution and climate change, but it is also grounded in support from its host community. In January, two local boards, the East Hampton Town Board and the East Hampton Trustee Board, voted with overwhelming support (4-1 and 9-0, respectively) to approve agreements authorizing the project's underground transmission cable to be routed through a small portion of the town to connect with the local grid. This agreement secured over $28.9 million in revenue for the community over the next 25 years. On top of bringing in new revenue, offshore wind projects like South Fork will stimulate economic activity in communities along the coast. Regions like the Northeast stand to benefit from the responsible development of offshore wind. A 2020 study by the American Wind Energy Association found various benefits from developing up to 30 gigawatts of the U.S. offshore wind resource between now and 2030. - Up to $57 billion of industry investments provide business for domestic supply chains. - Generate up to $25 billion per year in new economic activity. - Support nearly 83,000 well-paying U.S. jobs between projects' development, construction, and operations. South Fork Wind can help usher in the benefits of this new domestic industry! Advancing South Fork Wind will not only benefit communities like Long Island by creating jobs and providing reliable carbon-free energy; it will also demonstrate to the country that the U.S. is competitive in the offshore wind sector. Approving the project would validate the claims that the U.S. is serious about its clean energy future, addressing climate change, and responsive to communities like East Hampton eager to welcome a promising new industry. I ask that BOEM accept the proposed DEIS allowing South Fork to proceed on the path towards realizing this project.

Comment Number	Comment
FL3-1	I am a member of the New York League of Conservation Voters and I support the South Fork Wind Farm (SFWF). SFWF is a precedent-setting project for the U.S. offshore wind industry and a significant asset for New York's clean energy economy. The draft Environmental Impact Statement for SFWF has made it clear that the project will provide great longterm benefits for the environment while closely managing its impacts through every stage of development. I appreciate the careful measures that will be taken to protect the environment and marine life in surrounding areas, and mitigate any highly-ranked impacts of SFWF. Critically, SFWF will help combat climate change by promoting clean energy, increasing habitats for certain fish species, and providing renewable electricity. I believe that the Environmental Justice Section in your statement does not pay due attention to these beneficial impacts and their potential to mitigate climate change. It should include discussion of public input and feedback from local and labor communities. Offshore wind power is critical to the renewable energy industry, which has been hit hard during the economic downturn caused by COVID-19. In March and April, more than 20,000 New Yorkers in the clean energy sector lost their jobs, with those trends continuing in subsequent months. The SFWF, along with two other wind projects with State contracts being developed, will help revitalize the clean energy industry by creating green jobs, and helping to achieve our goal of 70% renewable energy by 2030. It is estimated that these 3 projects will create more than 1,600 new jobs and generate $3.2 billion in private investment, in addition to many more created by additional projects recently approved by NYS. For these reasons, I support your Environmental Impact Statement and the advancement of this critical project.
FL4-1	The South Fork Wind Farm (SFWF) is a precedent-setting project for the entire nation's offshore wind industry and it demonstrates New York's leadership role in the green energy economy. The proposed wind farm off the coast of Long Island will power 70,000 homes with renewable energy. It will combat climate change, create clean energy jobs, and contribute to the local economy. The U.S Bureau of Ocean Energy Management's (BOEM) draft Environmental Impact Statement shows that the project will provide long term benefits to the environment by promoting clean energy and green jobs, increasing habitats for certain fish species, and mitigating climate change. Stand with the 85% of New Yorkers who support offshore wind power and the 70% of local residents who support the project. The SFWF, along with two other already-approved wind projects, will help achieve our goal of 70% renewable energy by 2030. It is estimated that these three projects will create more than 1,600 new jobs and generate $3.2 billion in private investment with more clean energy from offshore wind to come from two more projects just approved last month.
FL7-1	I am a Union Member and I strongly believe that Americans should not have to choose between a good job and a clean environmentwe can and must have both. rsted/Eversource's South Fork Wind project is an opportunity to not only drive the nation's clean energy future, but will create quality, family sustaining union jobs at the same time. I urge BOEM to move forward with South Fork's permitting process. As a union member, I support offshore wind. Large scale utility development like offshore wind not only will help reduce our massive carbon footprint but will also mean a tremendous amount of economic opportunity in the form of jobs and community benefits. We have been preparing for this moment for a very long time. We urge approvals to be as expeditious as possible to get the men and women in the labor movement to work.
381-1	We have worked with Orsted, developers of the South Fork Wind project, providing a vessel for surveying potential near-shore cable routes for carrying power generated by the project, which will be located about 35 miles east of Montauk Point, N.Y. I am writing to ask that BOEM issue final approval of the project's environmental impact statement and construction-and-operations plan, which was submitted in 2018. I urge BOEM to complete its work and issue all approvals within the stated timeline. This new industry, which will deliver enormous amounts of clean energy, will also mean significant opportunities for businesses along the entire East Coast, which could see 30,000M W of power from offshore wind by 2030. But for a U.S. supply chain to develop alongside the offshore wind industry, as has occurred in Europe thanks to their 20-year head start, manufacturers and suppliers will need a predictable timeline and sufficient scale to justify their investment in this exciting new American energy industry. In return, they will deliver good jobs and good wages in communities that have been badly hurt by the pandemic over the past 12 months. I urge your prompt approval of permitting for South Fork Wind, which will help establish a US supply chain that will help transform the nation's economy as we move to a greener, cleaner future.

Response to comments: BOEM appreciates the many positive comments received, and notes the importance of stakeholder input in helping to craft an EIS that improves decision making about our shared ocean resources.

Comment theme: Supplementary documents, such as studies, prior correspondence, or regulatory memos, attached to comments.

Associated comments

Table I-4 provides the full list of comments received as part of this comment theme.

Table I-4. Supplementary documents, such as studies, prior correspondence, or regulatory memos, attached to comments.

Comment Number	Comment
310-45	Attachment includes MA Division of Marine Fisheries letter to USACE
357-3	Attachments include: Cohen-5 South Fork Wind Farm Excel Financial Analysis Sept 2020; Zachary Cohen 2nd Price Analysis; NYSERDA-Presentation BOEM Nov 2018 with comments; Case 18-T-0604 Cohen-8 Submission
322-17	Exhibits A, B, C, D, E. F, G1-G3, H, and I to the Town's comments are set forth in the annexed Attachments 2 through 12
301-105	Attachment includes: a copy of the USCG letter dated 10/27/20 responding to the IQA Request from RODA; this letter is referenced in our comments as Exhibit A
362-7	Attachments are B-1 to B-7, consisting of public testimony to NYS
294-24	Attachments include: DOI legal memo re fisheries interference, Gear Loss Claim Instructions from Orsted; Kingfisher Bulletin to Fisheries November 2017; Power Curve - NOAA Buoy 44017 (2018) V2; Sproul Public Comment Letter-2
157-12	Attachment includes Fishing route analytics final report
162-3	Attachment includes: Rhode Island Ocean Special Area Mgmt Plan; BOEM OCS Study 2015-037
384-1	Attachments to Simon Kinsella letter 343.
385-1	Attachments to Simon Kinsella letter 343.
386-1	Attachments to Simon Kinsella letter 343.
387-1	Attachments to Simon Kinsella letter 343.

Response to comments: Thank you for this information. BOEM has evaluated all this information and incorporated it into the EIS as appropriate.

Decision Process Comments

Comment theme: Northeast Ocean Plan and Mid-Atlantic Regional Ocean Action Plan and ocean data updates.

Associated comments

Table I-5 provides the full list of comments received as part of this comment theme.

Table I-5. Northeast Ocean Plan and Mid-Atlantic Regional Ocean Action Plan and ocean data updates comment.

Comment Number	Comment
145-6	We implore BOEM to continue to work with states, tribes, and stakeholders to implement the actions in the two approved Regional Ocean Plans, and to continue to update and utilize data on the ocean data portals.

Response to comments: Thank you for your comment. The Northeast Ocean Plan and Mid-Atlantic Regional Ocean Action Plan (the Plans) describe a series of collaborative actions and best practices related to the use of data, interjurisdictional coordination, and stakeholder engagement that will inform and guide Federal, State, Tribal, and Northeast and Mid-Atlantic Fishery Management Council activities under existing authorities. The Plans promote healthy ocean ecosystems and sustainable ocean uses. Consistent and within existing statutory authorities, BOEM will use the Plans to inform and guide its actions and decisions in the Northeast and Mid-Atlantic areas and continue engagement with the states, Tribes, and stakeholders as active participants in the Northeast Regional Ocean Council and Mid-Atlantic Committee on the Ocean. The companion Northeast and Mid-Atlantic Ocean Data Portals (Data Portals) present thousands of publicly available maps that represent components of the marine ecosystem and a wide range of human activities. BOEM will consider these data products available from the Data Portals in its decision-making, and encourages lessees and applicants to do so also.

Comment theme: Streamlined offshore wind regulatory system.

Associated comments

Table I-6 provides the full list of comments received as part of this comment theme.

Table I-6. Streamlined offshore wind regulatory system comments.

Comment Number	Comment
150-1	I work for a maritime engineering consulting company. We have heavily invested in the skill set required to plan and design offshore wind port terminals for the US offshore wind industry. The work my business is doing for South Fork Wind has both near-term value and helps build my experience to provide the better value to future projects. Given that this is a new industry, work in offshore wind diversifies my client base which increases the sustainability of my business. Offshore wind has the potential to drive economic recovery and stimulate coastal economies up and down the east coast. As the first commercial-scale offshore wind project in the US, Orsted and Eversource's South Fork Wind Project will play a critical role in establishing a domestic offshore wind industry and realizing the tremendous potential economic benefits of this rapidly emerging industry. We work for multiple clients in the offshore wind industry and while they are committed to bringing green energy to the US, they are also struggling with the uncertain regulatory climate. In our discussions with them, this is one of, if not the largest, obstacle to achieving a thriving US offshore wind industry. Without regulatory certainly they cannot effectively plan out and procure their needs for the proposed projects. The permitting process must move in a transparent, timely, and reasonable way. This will help projects through the development timeline, which provides clarity to the supply chain that will help unlock significant investments and expenditures related to project development and execution. This has a significant trickle down effect on the ability for me to plan and run my business that supports this industry. I strongly urge you to create a streamlined, efficient regulatory system for this important industry and approve the submitted South Fork Wind Farm COP currently under review.
299-5	The OSW industry is exploding globally. This presents both opportunities and risks to the emerging U.S. market. Established markets in Europe and new emerging markets in both Europe and Asia are surging ahead. Globally, there are currently 162 operational OSW projects, with a cumulative operational capacity of 32.5 GW. The U.S. currently has 42 MW operational, representing 0.1 percent of global capacity. Federal permitting approval is required to move the industry forward and unleash private sector investments that are predicated on the demonstration of certainty in the federal permitting process for OSW projects. Ten Construction and Operations Plans (COPs) have been submitted to BOEM but none have been approved. Industry leaders are looking for transparent and clear timelines and guidelines for approval. Without permit approvals, original equipment manufacturers and other tier one manufacturers, which manufacture the large wind turbine generator components, such as the foundations, nacelles, towers, and blades, will not have the market certainty required to invest hundreds of millions of dollars to locate manufacturing facilities in the U.S. The global OSW industry is rapidly expanding, and its value is projected to reach $1 trillion. However, if projects cannot be built because the federal government does not have the resources to move them through the permitting process, the U.S. will not capture the economic benefits of the global OSW industry. The U.S. must take the steps needed to capture OSW market share, which will ensure U.S. projects do not experience even more of a slowdown as developers look to more secure markets in Europe, Asia, and elsewhere. Similar reasoning can be applied to the workforce benefits from the OSW industry. Developing the U.S. workforce to capture the full economic benefits of this industry will require consistent, predictable project timelines that allow workers to gain experience and qualifications necessary to advance within the workforce. A training provider, university, labor union, or non-profit will not invest resources required for OSW curriculum development if there is no certainty of future projects or when those projects will occur. As the DEIS notes, there are 22 GW of projects in the pipeline. Moreover, states have committed to bring 30 GW online by 2035. Without clear actions and the adherence to predictable timetables it becomes difficult to prepare the U.S. workforce for the industry and obtain the full economic benefits of OSW. Those who work in workforce development know all too well that one of the worst things to do is train people for jobs that do not exist. In terms of preparing for the OSW industry, these jobs exist, however the timing for the jobs is unpredictable because there is a lack of regulatory certainty. The State of New York now has 4,300 MW of projects in active development, with a state mandate to achieve 9,000 MW of offshore wind electricity generation by 2035. These projects represent a once-in-a-generation opportunity to establish a new industry with well-paying, family sustaining careers, while bringing a new industry to the U.S. To realize these beneficial impacts, the industry needs certainty. This means that the ten projects in the federal permitting and development pipeline must be permitted in a timely and reasonable manner.

Comment Number	Comment
338-1	New York State ("the State" or "NYS") has a significant interest in the outcome of this project, both for its potential impacts as well as its ability to further Governor Cuomo's commitment to achieving 100% clean and carbon-free power by 2040 and at least 9 gigawatts of offshore wind by 2035 under the Climate Leadership and Community Protection Act (CLCPA). New York's leading clean energy goals are complemented by the State's ongoing commitment to minimizing impacts to ocean uses and resources through the responsible development of offshore wind in the Atlantic Ocean. The State currently has three contracted offshore wind projects and recently selected two additional offshore wind projects that, in total, are anticipated to have a collective capacity to generate at least 4.3 gigawatts. The attached comments support appropriate offshore wind development and timely completion of the NEPA environmental review. The Agencies note that, notwithstanding BOEM's intent to analyze the environmental impacts of the entire project footprint including State waters relevant to the Corps of Engineer's permitting authority and upland transmission components, the State is close to completing a concurrent and parallel process pursuant to Article VII of New York State Public Service Law § 120 et. seq. that will address transmission components that fall within the State's jurisdictional boundary. The State's Article VII review is evaluating environmental impacts as well as State easements issued by the New York State Office of General Services. New York, furthermore, has the nation's most aggressive legislation to support the replacement of harmful fossil-fuel electrical infrastructure with renewable energy under the CLCPA which is designed to directly address environmental injustice issues and provide direct support for disadvantaged communities. Moving forward as we continue to collaborate on offshore wind development, there may be opportunities for efficiencies in the federal review of the export cable by gleaning data, analyses and conditions generated as part of the State's Article VII process. At a minimum, the State encourages continued close federal coordination with New York State Department of Public Service on its Article VII findings. The State also recommends streamlining the federal review in State waters to focus on federally jurisdictional activities (e.g., Clean Water Act Section 404 and 40 CFR 93 [General Conformity]) to avoid duplication of review that could cause confusion and has the potential to invoke further unnecessary development risk, which can translate to higher costs for New York ratepayers.
360-2	In addition, we encourage BOEM to timely process the pending permits of other offshore wind applications, namely through the issuance of notices of intent (NOIs) launching the National Environmental Policy Act (NEPA) review of multiple additional construction and operations plans (COPs) filed by offshore wind developers. ACP and the offshore wind industry look forward to working with BOEM as it begins to process these permits, launching a process that will help support a domestic energy transition, create tens of thousands of jobs, billions in direct, private investments, and dramatically reduce the amount of carbon emissions that are a driving factor of climate change. Any further delay in processing these pending applications puts at risk the ability of the offshore wind industry to have the needed certainty to grow in this nation and jeopardizes the substantial industry-wide investments and benefits that will flow from them.
360-4	In addition, noticeable progress on the reviews for other pending offshore projects, including issuing multiple NOIs in the intervening months before the final EIS is issued for South Fork, is critical for making cost-effective market and supply chain investment decisions. This will impact development and construction activities, as well as the ability to meet project timelines determined by power purchase agreements. Any further delays in conducting the environmental reviews for these other projects risks the creation of thousands of jobs, improvements to ports and other infrastructure development, investments in workforce and supply chains, and deployment of clean energy to meet public policy goals. With continued activity at the state level to procure offshore wind, further delay on issuing these permits will create a bottleneck for offshore wind permit applications that are amassing at BOEM and impede states from achieving their clean energy targets.

Response to comments: BOEM supports a streamlined, efficient regulatory system for the offshore wind industry. On March 29, 2021, the Biden/Harris administration announced a set of actions that will catalyze offshore wind energy, strengthen the domestic supply chain, and create good-paying, union jobs (White House 2021). Appendix A of the FEIS contains a detailed discussion of BOEM's authority and regulatory decision-making process, as well as other permits and authorizations required for the proposed Project.

Comment theme: Consistency with Memorandum M-37059.

Associated comments

Table I-7 provides the full list of comments received as part of this comment theme.

Table I-7. Consistency with Memorandum M-37059 comments.

Comment Number	Comment
166-27	Finally, regarding Memorandum M-37059 released by the Department of the Interior Office of the Solicitor on December 14, 2020, clarification on how BOEM will evaluate the project with respect to "interference with reasonable uses of the exclusive economic zone, the high seas, and the territorial seas" would be helpful.
363-13	On December 14th, 2020 the Department of the Interior (DOI) issued an internal legal memorandum interpreting its statutory mandate to prevent OSW's interference with fishing. Previous DOI guidance on the Outer Continental Shelf Lands Act (OCSLA) statutory language, which requires "prevention of interference with reasonable uses [including fishing] of the exclusive economic zone, the high seas, and the territorial seas," indicated that offshore renewable energy projects could not interfere with the legal right to fish. This new memo explicitly changes that guidance, saying "[n]owhere does the statute indicate that the Secretary is only to prevent interference with the legal right to navigate or fish in an area. It is the Secretary's job to provide for the prevention of interference with those uses." In short, it states: (1) that the Secretary must ensure that offshore wind energy projects do not unreasonably interfere with fishing operations; (2) that fishermen's perspectives are part of what determine whether interference is unreasonable; (3) that such interference is considered on a cumulative instead of project-specific level; and (4) if in question it must err on the side of less interference rather than more. This guidance fundamentally shifts the lens with which projects must be evaluated. The DEIS does not provide public notice or guidance as to how this clarification regarding interpretation of OCSLA will be applied to BOEM's review of the SFWF Construction and Operation Plan (COP). As BOEM has never conducted the planning process for OSW with the goal of preventing unreasonable interference to fishing, current project plans including SFWF have not been designed to do so. The lack of mitigation alternatives in the DEIS for most of the project's impacts is clear and incontrovertible evidence of the failure to prevent such interference in accordance with the law.
157-9	OUTTER [sic] CONTINENTAL SHELF LANDS ACT SUBSECTION 8(p), ALTERNATE ENERGY-RELATED USES ON THE OUTER CONTINENTAL SHELF – REQUIREMENTS OF SUBSECTION (4) ln addition to providing the authority to issue leases, easements, and rights-of way, the EPAct includes requirements that any activity authorized under this authority must be: carried out in a manner that provides for- (H) a fair return to the United States for any lease, easement, or right-of-way under this subsection; An analysis of the energy impacts is not contained in the DEIS making it impossible to make any type of analysis of potential gains or losses that may be made from transitioning to this energy source. A regional energy planning effort including offshore wind, evaluating the benefits, risk, price, demand, and greenhouse gas emission reductions has not been performed. This is regularly done for oil and gas through 5-year plans, why not for offshore wind energy. This leads to a lack of information about social, economic, and environmental impacts necessary to determine if the project provides a fair return to the United States. There is no consideration of environmental impacts of the offshore wind supply chain within the EIS. Wind energy turbine construction uses rare earth components, where and how these will be sourced? Much of the wind energy turbine components are not recyclables, where and how will these be disposed of and at what cost to the consumer and the environment?
157-8	OUTTER [sic] CONTINENTAL SHELF LANDS ACT SUBSECTION 8(p), ALTERNATE ENERGY-RELATED USES ON THE OUTER CONTINENTAL SHELF – REQUIREMENTS OF SUBSECTION (4) ln addition to providing the authority to issue leases, easements, and rights-of way, the EPAct includes requirements that any activity authorized under this authority must be: carried out in a manner that provides for- (A) safety; If any of the alternative are chosen besides the No Action alternative it must be the Vessel Transit Lane Alternative for the sake of vessel safety. If offshore wind energy is permitted to go forward in southern New England waters, dedicated transit lanes will be critical to the safe operation of vessels in the area. This is a matter of common sense when so much structure is being put in the open ocean.
294-22	BOEM does not mention the December 14, 2020 Department of Interior legal memo from entitled "Secretary's Duty to Prevent Interference with Reasonable Uses of the Exclusive Economic Zone, the High Seas, and the territorial Seas in Accordance with Outer Continental Shelf Lands Act Subsection 8(p), Alternate Energy-related Uses on the Outer Continental Shelf" in the DEIS. This memo describes BOEM's duty in analyzing fisheries impacts and what constitutes "unreasonable interference" with fisheries from offshore wind projects. This document details essential considerations for any BOEM fisheries impacts analysis. These considerations cannot be omitted from the BOEM process for the proposed Project and must be included in any DEIS analysis.

Response to comments: The Memorandum M-37059 was revoked in April 2021. A decision that balances these different goals and that does not hold one as controlling all others is consistent with the opinion recently issued by the Solicitor, M-37067, "Secretary's Duties under Subsection 8(p)(4) of the Outer Continental Shelf Lands Act When Authorizing Activities on the Outer Continental Shelf" (M-37067). M-37067 provides that "subsection 8(p)(4) of OCSLA and similar statutes require only that the Secretary consider the relevant portions of the record and strike a rational balance between various congressional goals. In making this determination, the Secretary retains wide discretion to weigh those goals as an application of her technical expertise and policy judgment." M-37067, p. 2.

Comment theme: NEPA compliance.

Associated comments

Table I-8 provides the full list of comments received as part of this comment theme.

Table I-8. NEPA compliance comments.

Comment Number	Comment
169-3	The Draft Environmental Impact Statement ("DEIS") for the South Fork Wind Farm and South Fork Export Cable Project (the "Project"), does not conform to the National Environmental Policy Act ("NEPA"), 42 U.S.C. §§4321-4370h, 36 C.F.R. Part 251, 43 U.S.C. §1761, 43 U.S.C. §15926.
363-16	In July 2020, the Council on Environmental Quality (CEQ) updated the NEPA implementing regulations for the first time in over forty years. A new section at 40 C.F.R. § 1502.16(a)(10) requires consideration of "economic and technical considerations, including the economic benefits of the proposed action" when evaluating the environmental consequences of major federal action under NEPA. CEQ added this language to clarify the statutory authority that "presently unquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations." While congressional intent may have been to ensure that environmental values were not overlooked, in this case it is the economic and technical considerations for which BOEM provides no detail. Regardless, the regulations explicitly require the agency to "identify environmental effects and values in adequate detail so the decision maker can appropriately consider such effects and values alongside economic and technical analyses."6 The regulatory revisions make clear that an agency's obligation under NEPA is to provide the public with comprehensive information regarding the economic and technical details of a project itself, in addition to a full analysis of its potential environmental impacts. Another element of the NEPA regulatory update requires agencies to "review and publish environmental documents and appropriate analyses at the same time as other planning documents" whenever practicable. As described in the next section of these comments, BOEM has not published the relevant documents simultaneously with the DEIS, leading to significant confusion. Important environmental analyses including but not limited to the EFH assessment, Article VII certification, and compensatory mitigation plans (if any are established) are poorly sequenced with the NEPA process and prevent informed comment on the DEIS. Finally—but critically important—last month the Biden Administration revoked Executive Order (EO) 13807 ("One Federal Decision") and announced that the Director of OMB and the Chair of the Council on Environmental Quality are currently considering whether to recommend that a replacement order be issued. Despite this, EO 13807 is cited several times throughout the DEIS as controlling guidance for the document—and that guidance is so prominent as to appear in the second sentence of the DEIS's executive summary. Certain provisions of EO 13807 are now codified in the revised NEPA regulations, but others with significant repercussions for the OSW regulatory process are not, including instructions for interagency coordination, roles, and responsibilities. To address exactly this type of challenge when the public cannot know what policies and regulations will apply to pending project reviews, the Administration issued a "regulatory freeze" directing agencies to: (1) hold any pending actions scheduled to be published in the Federal Register; and (2) consider postponing rules that have been published in the Federal Register but that have not yet taken effect. In response, DOI immediately issued a departmental memorandum "for the purpose of implementing a targeted and time-limited elevation of relevant decisions at [DOI] for the purposes of reviewing the questions of fact, law, and policy they raise." Following that guidance, DOI promptly announced that it had canceled the public comment period on an already-published DEIS for an oil and gas lease sale in Cook Inlet. The Department must not adopt differing interpretations of the same legal and policy actions for different activities, when nothing in these laws would apply differently to one industrial energy project over another.

Comment Number	Comment
	In short, the public cannot be prepared to offer public comment—and BOEM cannot be prepared to finalize the SFWF or any other DEIS—when there is no certainty as to what laws and policies will apply to the agency's review. Did the revocation of EO 13807 affect interagency Memoranda of Understanding executed under that policy that applies to finalization of the DEIS? Have BOEM and/or DOI's NEPA handbooks been updated to reflect the changes to the NEPA implementing regulations? Now is not the time to rush to decisions that will have major identified adverse consequences on marine resources and fishing communities without proper planning and clarity.
363-14	The scope of the DEIS is deficient because it is too narrow to provide a meaningful evaluation of alternatives. The process for the development and review of this project has been—and remains today—nothing short of chaotic. The DEIS does not meet basic requirements of NEPA and OCSLA, fails to consider several issues raised during the scoping process, and does not cure structural flaws in the OSW planning process.

Response to comments: Thank you for your comment. As described in Ch. 1, because BOEM began the process of preparing this EIS before the updated NEPA regulations became effective, those updated regulations are inapplicable, BOEM has carefully reviewed the EIS for compliance with the procedural and substantive requirements of NEPA. Moreover, BOEM has followed all DOI and Executive Branch procedures.

Comment theme: General Endangered Species Act compliance.

Associated comments

Table I-9 provides the full list of comments received as part of this comment theme.

Table I-9. General Endangered Species Act compliance comment.

Comment Number	Comment
169-7	The Endangered Species Act prohibits the proposed action.

Response to comments: BOEM completed Section 7 ESA consultation with the U.S. Fish and Wildlife Service and NOAA to evaluate potential impacts to threatened and endangered species. The results of that consultation are included in the Final EIS, which includes any mitigation or monitoring requirements identified by the federal agencies to avoid or minimize impacts.

Comment theme: Clarification for CRMC's FAB comment letter

Associated comments

Table I-10 provides the full list of comments received as part of this comment theme.

Table I-10. Clarification for CRMC's FAB comment letter comment.

Comment Number	Comment
383-1	Please allow this letter to serve as further clarification regarding the February 20, 2021 comment letter from the CRMC's Fishermen's Advisory Board (FAB) submitted on the Draft EIS for the SFW project (BOEM docket 2020-0066). As you know the CRMC, as the State's designated CZMA agency, has submitted comments on the Draft EIS for the SFW project (see attached file). However, BOEM also received comments from the agency's FAB, an advisory body to the CRMC, which expressed their collective opinions and views of the project. Please know that the F AB comment letter was not reviewed nor approved by the CRMC. The CRMC February 22, 2021 comment letter are the official comments from the agency.

Response to comments: Thank you for the clarification.

Comment theme: Project compliance with [USACE's] 404(b)(1) [G]uidelines and consistency with the public interest.

Associated comments

Table I-11 provides the full list of comments received as part of this comment theme.

Table I-11. Project compliance with [USACE's] 404(b)(1) [G]uidelines and consistency with the public interest comments.

Comment Number	Comment
169-18	The DEIS fails to take a hard look at the Army Corps of Engineers (the "Corps") public interest test. The Corps' regulations require the Corps to conduct a public interest review for each proposed discharge, and prohibit the Corps from granting a permit that (1) would "not comply with [EPA's] 404(b)(1) [G]uidelines" and/or (2) that would be "contrary to the public interest." 33 C.F.R. § 320.4(a)(1). The DEIS simply fails to offer any explanation as to why and how the Project meets the public interest test, and does not contain sufficient information to form the basis of a conclusion that the Project meets the test.
169-35	III.FAILURE TO EVALUATE WHETHER THE PROJECT SATISFIES THE PUBLIC INTEREST REQUIREMENT. For the Corps to issue a permit for the proposed Project, the proposed use must be in the public interest. The public interest review must be "based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest." 33 CFR §320.4(a)(1) "Evaluation of the probable impact which the proposed activity may have on the public interest requires a careful weighing of all those factors which become relevant in each particular case." Id. "The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments." Id. "The decision whether to authorize a proposal, and if so, the conditions under which it will be allowed to occur, are therefore determined by the outcome of this general balancing process. That decision should reflect the national concern for both protection and utilization of important resources." Id. "All factors which may be relevant to the proposal must be considered including the cumulative effects thereof: among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people." Id. The DEIS simply fails to offer any explanation as to why Project meets the public interest test. In order to have taken a hard look at whether the proposed Project meets the public interest test, BOEM would need at the very least to conduct a thorough review of the electricity supply of the Northeast and alternatives to meet renewable energy demand. The DEIS makes no such effort. Moreover, in order to determine that the proposed Project meets the public interest test, a thorough review of its potential competitive effects on United States onshore based generators must be conducted. The DEIS made no such effort. The proposed Project does not satisfy the public interest test. The proposed Project would result in the loss of thousands of American jobs and billions of dollars of economic activity in the United States because the Project will displace renewable energy projects located onshore in the United States. The proposed Project would raise global warming in the early years of the Project, and overall as compared to renewable energy substitutes such as solar. The proposed Project will raise temperatures at and near its location adding additional stress on marine life that is already under stress. The proposed Project would create vulnerabilities to the electric grid by concentrating so much electricity from one source. No analysis has been conducted to compare the Project to distributed generation sources near load that could form the basis for local micro- grids and reduce the grid's risk to severe weather events as well as criminal acts. The adverse impacts of the Project could be avoided, and all the purported benefits of the Project achieved, under the No-Action Alternative with deployment on onshore solar energy. The DEIS' failure to evaluate whether the proposed Project satisfies the public interest test requires that the DEIS be revised.

Response to comments: Before any decision is made on the applications before the Corps, the Corps will perform all reviews required under the statutory authorities governing its actions. These reviews will consider information in this final EIS.

Comment theme: General coordination with federal agencies, Tribes, and stakeholders.

Associated comments

Table I-12 provides the full list of comments received as part of this comment theme.

Table I-12. General coordination with federal agencies, Tribes, and stakeholders comments.

Comment Number	Comment
283-1	The entire process to bring offshore wind to the east coast of the United States needs to be scrapped. The current lease's need to be withdrawn and there should be no new leases granted until there has been collaboration between BOEM, NMFS, Fishing Industry Groups , Shipping Interests , and Environmental Groups.
284-14	We are encouraged by the overwhelming alignment of purpose among state and federal agencies, developers, and stakeholders for the regional visions set forth by the Responsible Offshore Science Alliance (ROSA) and the Regional Wildlife Science Entity (RWSE). The Nature Conservancy is committed to continue leaning in to help those efforts succeed and we encourage BOEM to maintain the strong support your team has already shown for these efforts.
349-6	The NEPA process should inform BOEM, stakeholders, and the public about how to responsibly proceed with developing the promising and abundant resource of offshore wind power. Several decades of offshore wind development in Europe have shown that offshore wind power can be developed responsibly with regard to wildlife, provided that all siting and permitting decisions are based on sound science and informed by key experts and stakeholders. The European experience shows us that avoiding sensitive habitat areas, requiring strong measures to protect wildlife throughout each stage of the development process, and comprehensive monitoring of wildlife and habitat before, during, and after construction are essential for the responsible development of offshore wind energy. Given the current administration's desire to rejoin international initiatives like the Paris Climate agreement, it would be wise to look to international expertise on this issue.
166-1	Given that multiple wind farms are simultaneously undergoing environmental review, lessons learned while working with cooperating agencies to prepare EIS documents should be adopted for subsequent projects. These include methods for processing and analyzing data (our particular interests relate to fisheries and seafloor habitats), as well as consistent organization of documents so that information is easier to find. We understand that standardization will be challenging when environmental review processes overlap and there are different authors involved in each project. However, consistency in approaches will benefit stakeholders who seek to engage in the review process for these extremely complex projects.
349-11	Existing state commitments are important to ensuring that the United States moves toward a responsibly developed clean energy initiative. President Biden's plan for a clean energy revolution to achieve a 100% net zero emissions economy by 2050 is further evidence of the United States' move to clean energy initiatives. These initiatives will have substantial benefits to society and will further steer the United States away from fossil fuels, and we urge BOEM to work with the states and stakeholders to address this stated interest.

Response to comments: Thank you for your comments. BOEM is committed to working with states, Tribes, and stakeholders on our shared ocean resources. BOEM is also continuously engaging with our European counterparts. This includes holding workshops and exchanges of information, working with European experts, participation in international groups such as the International Conference on Environmental Systems IICES), and contracting with consulting firms for their European expertise.

Appendix A of the FEIS has been updated with information on the coordination and consultation process to date as well as the public participation process for the proposed Project. All comments on the Draft EIS, including those from the fishing industry, were reviewed and incorporated in the FEIS, as deemed appropriate by BOEM.

Comment theme: Alignment with the CZMA federal consistency review process and other state and local authorizations and permits.

Associated comments

Table I-13 provides the full list of comments received as part of this comment theme.

Table I-13. Alignment with the CZMA federal consistency review process and other state and local authorizations and permits comments.

Comment Number	Comment
296-1	BOEM states within the DEIS abstract section that "Cooperating agencies would rely on the DEIS to support their decision making and to determine if the analysis is sufficient to support their decision." See DEIS at i. The NEPA process, however, starts with BOEM's Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) for the Construction and Operations Plan (COP) for a proposed offshore wind project's Construction and Operation Plan (COP), which in the SFW case the NOI was issued on October 19. 2018. For renewable energy projects on the outer continental shelf (OCS) the State's Coastal Zone Management Act (CZMA) federal consistency review process begins with receipt of a consistency certification and the COP, which are filed with the state at the time BOEM issues an NOI. The CZMA review process, however, must be completed within 6-months, unless mutually agreed upon by both the agency and the developer for a stay of the state agency federal consistency decision to provide further time to review necessary data and information. In the SFW project BOEM publicly released the DEIS on January 8, 2021 some 2-years following the NOI. Obviously in this case, given the timing between BOEM's issuance of the NOI and the DEIS it would not have been possible for a state agency to review the DEIS and meet the CZMA 6-month review period. It would be more beneficial to the cooperating agencies if the start of the CZMA federal consistency review were concurrent with BOEM's release of the DEIS. We urge BOEM to work with other Federal agencies, in particular NOAA, to properly align the CZMA federal consistency review process with the NEPA process. Without the current five stay agreements between the RICRMC and the developer (Deepwater Wind South Fork, LLC), this DEIS would not have been available to guide and inform the RICRMC's CZMA decision development.
301-8	It is important to note that, in addition to the BOEM-led National Environmental Policy Act ("NEPA") process, SFW is proceeding through a robust state permit process before the New York State ("NYS") Public Service Commission as part of the Article VII permit process. Through the Article VII proceedings, SFW engaged in a settlement process that resulted in a Joint Proposal between SFW and several parties, which included local residents and groups, the East Hampton Trustees, and PSEG Long Island on behalf of the Long Island Power Authority. The state agencies that signed in support of the Joint Proposal include the NYS Department of Public Service, NYS Department of Environmental Conservation, NYS Department of State, NYS Department of Transportation and the NYS Office of Parks, Recreation and Historic Preservation. As BOEM develops the FEIS, SFW requests that BOEM ensure that there are no conflicts between the Preferred Alternative and the permit approvals and requirements at the state and local levels.

Response to comments: BOEM recognizes the desire to improve state and federal review processes. Broader-scale coordination of these review processes across all offshore wind projects is outside the scope of this EIS. However, Appendix A has been updated related to BOEM's authority and regulatory decision-making process, as well as other permits and authorizations required for the proposed Project.

Comment theme: Wind energy area site selection process.

Associated comments

Table I-14 provides the full list of comments received as part of this comment theme.

Table I-14. Wind energy area site selection process comments.

Comment Number	Comment
316-1	The current process in use by the Bureau of Ocean Energy Management (BOEM), identifies wind energy area sites without consideration of their adverse environmental impacts in the original lease selection, on the locations historically rich and economically vital commercial fisheries, or on the communities that support and benefit from those fisheries. The only factors even considered in the initial location determination was visibility from shore and an attempt to minimize bird interactions, not the needs of other ocean users, particularly fishermen. The potential results of continuing offshore wind solicitation include permanent harm to our environment, diminishment of our industry's ability to produce food from the sea, and increased costs to the consumers who must purchase expensive 'green' power.
361-2	While we have no members in the Project Area, nor will our operations be directly impacted, we remain concerned about the processes being utilized in rushing (OSW) projects. There are three Call Areas currently identified of the California Coast, and we suspect additional actions related to OSW, along the U.S. west coast, in the near future. We freely acknowledge there will be vastly different concerns and issues with floating OSW turbines off the U.S. west coast than those currently being faced by our east coast brethren; but many of the foundational items outlined in the RODA comment letter apply without regard to turbine design or geography.

Response to comments: BOEM recognizes a desire to properly site leasing areas. BOEM conducted an extensive process that considered a host of factors including other ocean users and that included the preparation of an environmental assessment and engagement with the public prior to leasing. Please see BOEM's website for more information: https://www.boem.gov/renewable-energy/state-activities/commercial-wind-leasing-offshore-rhode-island-and-massachusetts.

Broader-scale consideration of BOEM's leasing process is outside the scope of this EIS. However, Appendix A has been updated related to BOEM's authority and regulatory decision-making process, as well as other permits and authorizations required for the proposed Project.

Comment theme: Sufficiency and transparency of other state and local environmental reviews.

Associated comments

Table I-15 provides the full list of comments received as part of this comment theme.

Table I-15. Sufficiency and transparency of other state and local environmental reviews comments.

Comment Number	Comment
343-1	Since South Fork Wind began pursuing its Project in earnest in 2017, review largely has been left to the Town of East Hampton and the New York State Public Service Commission ("NYSPSC"). Over the last four years (see Legal Issues below), there has been little if any review of the Project's environmental impact, economic impact, alternatives, public interest need and purpose. For these reasons, I respectfully request that the documents herein listed (see Documents List below) be incorporated by reference and form part of my comments submitted to the Bureau of Ocean Energy Management ("BOEM") and that BOEM, as lead agency, conduct a broad review of the whole Project including in all respects the onshore and offshore components and "use all practicable means and measures.. to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans." 1 In the absence of substantial review by the NYSPSC and the Town of East Hampton, and should BOEM likewise not require a thorough examination of the onshore part of the Project inasmuch as the offshore part, there will be no review, and no protections will be afforded the residents of Suffolk County, and specifically, the residents of the Town of East Hampton. Residents living on eastern Long Island require protection from the developers (Ørsted and Eversource) and, astonishingly, from our own local and state governments. We need protection from excessive rates (see Price of Power below); the threat of further drinking-water -------contamination by hazardous waste (see PFAS Contamination Wainscott, NY, Report No. 3, enclosed); dangerous construction, and over-building practices (see Substation – Danger below); destabilizing horizontal directional drilling beneath Wainscott Beach; surreptitious expansion plans that will increase the size of the wind farm by six-times (to 600 MW) over what residents initially had been told; and the destruction of the character of our local seaside semi-rural neighborhood. If we cannot look to NEPA, then I fear that no one will take a "hard look" at issues of need, probable environmental impact, public interest and necessity; and by such neglect would permit the developers and elected officials who are working in furtherance of the developers' interests to circumvent the purpose of NEPA, NYSPSC Article VII review, circumvent judicial process, and circumvent US constitutional provisions requiring "due process of law."
343-2	The Town Board of the Town of East Hampton has failed to conduct any meaningful oversight of the South Fork Wind Project. The Town Board has been accused, rightly, of acting precipitously and on an ill-informed basis by pre-approving parts of the onshore Project and granting to South Fork an easement (the "Easement") subject to conditions over which the Town subsequently will have no control. The Board has bound itself, and its citizens before material facts are known and long before a grant of the Easement would be needed for the project to proceed. In doing so, the Board has acted illegally, arbitrarily, and capriciously, exposing the community it serves to unnecessary risks and limiting its ability to protect the Town's interests during the ongoing regulatory proceedings. For example, the East Hampton Town Board did not retain any of its own environmental or transmission experts (which it could have sought to induce South Fork to pay for), and instead relied on information it received from South Fork Wind without questioning such information. The Town Board has abdicated any role in environmental review and continues to ignore the extensive PFAS contamination of soil and groundwater throughout the proposed construction corridor; it turns a blind eye to the high price of energy from the Applicant's proposed Project that will be passed onto local ratepayers; and, has taken a passive role in its failure to represent the interests of residents of the Town of East Hampton. Accordingly, a group of over one thousand citizens has supported the commencement of legal proceeding against the Town of East Hampton (see enclosed, Citizens' for the Preservation of Wainscott, Inc., et al., v Town Board of the Town of East Hampton and Supervisor Peter van Scoyoc, et al., Index 601847/2021 [Sup Ct, Suffolk County 2021]).
343-3	The New York State Public Service Commission ("NYSPSC") has proceeded in such a manner as to prohibit from inclusion into the evidentiary record any evidence, examination or cross-examination of witnesses' testimony as to the need of the South Fork Wind Farm (please see Motion to Reopen the Evidentiary Record (filed: January 13, 2021), subsequent Motion to Reopen Evidentiary Record – Supplemental Information (filed: January 29, 2021), and Motion by South Fork Wind to Strike Kinsella Testimony (filed: November 5, 2020) that was granted to the extent that the entirety of Testimony Part 2 was permanently struck from the record. This meant that all discussion of the variability of offshore wind and the reliability of the Applicant's offshore wind farm to provide electrical power to meet summer-time peak load on the South Fork of Long Island was erased entirely from the record together with a discussion of the exorbitant price of electricity from the proposed wind farm (see Price of Power below).
343-4	Furthermore, pursuant to the Long Island Power Authority Act ("LIPA Act"), Section 1020-f, the Long Island Power Authority ("LIPA") "shall not undertake any project without the approval of the public authorities control board [PACB.]" Nevertheless, in July 2020, LIPA admitted that it "has never submitted a Power Agreement to the PACB for approval" which is a clear violation of New York's Public Authorities Law. LIPA's failure to obtain PACB approval is likely to render the South Fork PPA and any amendment thereto null.

Response to comments: BOEM acknowledges your concerns over the environmental review process. However, BOEM's jurisdiction does not overlap with the LIPA, Town of East Hampton, or the New York State Public Service Commission review of the project. The final EIS analyzes impacts associated with the export cable over its offshore and onshore portions.

Comment theme: Development of a national strategy for offshore wind.

Associated comments

Table I-16 provides the full list of comments received as part of this comment theme.

Table I-16. Development of a national strategy for offshore wind comments.

Comment Number	Comment
361-4	On January 27, President Biden issued an Executive Order entitled Executive Order on Tackling the Climate Crisis at Home and Abroad. Section 207 of the Executive Order establishes a “goal of doubling offshore wind by 2030”. We fully agree with RODA in suggesting the implementation of a national planning policy. “Regardless of the exact form, it is imperative that this strategic planning effort be inclusive in nature and--unlike any previous regional efforts for ocean planning or OSW planning--that a significant proportion of its participants include experts in fisheries science, management, and operations as well as fishing community leaders.”
363-2	First and foremost, we request that BOEM work with its sister agencies and all parties with an interest in the U.S. ocean to create an improved national strategy for the “Blue Economy” that prioritizes food security, environmental protection, and participatory governance. To be effective, this would need to go hand-in-hand with a comprehensive energy plan that provides transparent information regarding energy production, costs, and grid and transmission considerations for OSW as part of an overall strategy.
363-15	Holistic National Strategy “I do not believe that expanding the utility of our oceans should be the death knell of the most dependable economic engine in our nation's history.” (New England fisherman, February 2021). The situation RODA presently finds ourselves in--reviewing what, according to the public record, would be the first federal waters OSW project approved in the U.S.--unfortunately does not to our knowledge leave any commercial fisherman with optimism, excitement, or hope. Fishermen have collectively spent thousands of hours attending meetings and working in good faith with BOEM, developers, states, and others to participate in the OSW process. Yet, the fact remains that the process is one-sided, heavily biased toward the (much more powerful) developers, and riddled with lost opportunities for co-planning and mitigation. Everything from the structure of public meetings to the availability of research funding is stacked in a way that enables OSW advocates to receive all of the resources. In contrast, fishermen are--quite literally--referenced as mere “stakeholders” of OSW and repeatedly asked for their “reactions” to decisions made behind closed doors, or to participate in research activities that do not follow cooperative research design principles. This is not the way to welcome a potentially massive new industry to our shores and waters. To repeat, optimizing the value of our ocean resources to meet multiple public interests including food security, thriving coastal economies, biodiversity conservation, habitat protection, and energy production cannot be adequately addressed through the NEPA process alone. Nor can it be entrusted to large energy companies to “do the right thing”. BOEM has only conducted this DEIS at the penultimate stage of project permitting, and decision points in it are limited to those with a federal nexus. Without a comprehensive strategy for developing a “Blue Economy,” systemic blind spots exist related to food production, consumption, distribution, and equity that undermine the realization of these goals.

Comment Number	Comment
	Ironically, OSW advocates are beginning to recognize a greater need for regional coordination in many areas except for fisheries interactions. For example, the Department of Energy issued a grant of nearly $600k to the Clean Energy States Alliance to develop a roadmap for multistate cooperation on the topics of market characterization, job creation, and turbine installation vessels. It also awarded New York $18.5 million to create a research and development consortium for OSW technology, which the state matched to $41 million and has subsequently received additional large donations from other states and developers. There are many, many more examples of the huge amounts of federal and state funding spent on OSW research, and these high-profile projects have driven improved interstate coordination on these topics. In contrast, efforts to improve the capacity of fishermen, fisheries scientists, and managers in efforts to understand and mitigate OSW interactions are under-prioritized and underfunded. This is clearly evident in the federal appropriations and federal grants processes. We are grateful to the states, OSW developers, and especially the fisheries sector members who have voluntarily committed funding toward this type of research and do not wish to discount the importance of certain ongoing studies. However, the reality is that funding, political access, and media access are heavily imbalanced between the ocean-use sectors, and this perpetuates uncoordinated and strongly divisive approaches to addressing the root problems with multi-use ocean planning. Interstate and federal/state coordination on addressing the impacts of OSW to fisheries and fishing communities is still anemic at best. As you know, RODA has worked extensively to improve regional coordination for OSW and fisheries through collaborative efforts. RODA was a founding member of the Responsible Offshore Science Alliance (ROSA) and has donated substantial time and resources to its success, working with federal and state entities and OSW developers to support and bolster regional science and monitoring of the interaction between these industries. Together with these partners, we have created a structure for transparent regional research with sustained and active participation of the fishing industry. RODA also formed the “Joint Industry Task Force” in 2019 with OSW developers to promote coexistence amongst OSW energy and commercial fishing practices. The guiding principles of the Joint Industry Task Force emphasized the need to identify areas of conflict and cooperative solutions, minimize impacts to fisheries and protect coastal communities, and provide a forum for direct communication among industries. OSW developers committed funds to kick off both ROSA and the Task Force. However, due to the inherent difficulties of building relationships between two industries when each perceives the other as a direct threat, it would be beneficial for BOEM to play a more active role in these efforts. In order to even determine whether OSW projects, including SFWF, could be compatible with fishing and other current users of the space, much less how, a national planning policy must be implemented. This could be a single effort or series of nested efforts and should, at a minimum, have the following goals: • To develop strategies based in science and participation in order to balance ocean uses for optimum public benefit, along with alternative strategies for mitigating climate change and their relative impacts to biodiversity and conservation; • To generate clear information and analysis as to OSW’s potential role in a comprehensive energy policy, including: the benefits of OSW with regard to mitigating GHG emissions accounting for environmental impacts of the entire supply chain; the relative availability, price, and environmental impacts of all existing and potential energy sources; the cost of OSW projects, including subsidies; the cost and benefit of various energy policies to Environmental Justice communities and U.S. employment; electric grid requirements and an informed roadmap for successful incorporation of emerging power sources; transmission considerations for various electricity sources; • To provide national ocean security, power reliability, and minimize foreign access to U.S. ocean space; • To produce significantly more transparent information; • Prioritize ecosystem protection and production, ocean health, human health, and cultural preservation; • Plan to maximize growth across all U.S. “Blue Economy” sectors through carefully and holistically planned investment in domestic supply chains; and • Include strong federal-state coordination and explicit strategies for effectively planning activities with multijurisdictional permitting requirements. Such a policy would not: • Include arbitrarily set OSW production goals that are not carefully calculated for environmental impact, need, grid load, price, etc.; • Prioritize short-term investment for political gain; • Inequitably regulate certain sectors much more stringently than others; or • Perpetuate a piecemeal approach, thereby committing to convert large percentages of the OCS from ecological to industrial use and assume that consequences can be effectively addressed in the future.

Comment Number	Comment
	Possible approaches to a national planning policy include, but are not limited to, the creation of a National Energy Policy, improvements to the National Ocean Policy, or a new Federal Advisory Committee Act body charged with creating recommendations. Regardless of the exact form, it is imperative that this strategic planning effort be inclusive in nature and--unlike any previous regional efforts for ocean planning or OSW planning--that a significant proportion of its participants include experts in fisheries science, management, and operations as well as fishing community leaders. There is significant precedent for such an approach, at the appropriate permitting level (which can be federal, state, or regional) for other energy and natural resource strategies in the U.S. and abroad. For example, as you well know, BOEM manages oil and gas development through five-year plans that include comprehensive analysis and projections of national energy needs, pricing estimates, and environmental impacts. In the United Kingdom, OSW is permitted using a similar concept of national leasing rounds based on energy needs, although the accompanying analysis may be less robust. Germany, Netherlands, and other European countries have also all engaged in comprehensive ocean planning activities to place OSW in a broader environmental and ocean use context. The Rhode Island Ocean Special Area Management Plan (SAMP), for its part, was developed over many years of careful and inclusive planning and provides informative details and strategies to balance multiple ocean uses. If combined with a comprehensive energy strategy, it could serve as a model for a more effective federal approach. So too are there ample warning tales of what may occur in the absence of due diligence in planning new natural resource uses, from the “Gold Rush” to the oil boom, to failures in coastal resilience planning, and many more. In the words of one fisherman, “My tale is not one of obstruction but rather one of experience and the hard lessons taught by failing to understand the fragile nature of our relationship with the living ocean.” To be sure, climate change is an urgent problem, but without a comprehensive, national plan for OSW there is great peril of jeopardizing protected marine resources, food security, energy security, and national security in favor of short-term foreign investment potential in the heavy industrial use of OSW.

Response to comments: Thank you for your comment. BOEM is committed to working with states, Tribes, and stakeholders on our shared ocean resources. However, BOEM efforts related to a national strategy are outside the scope of this EIS.

Comment theme: Development of a programmatic EIS for offshore wind projects.

Associated comments

Table I-17 provides the full list of comments received as part of this comment theme.

Table I-17. Development of a programmatic EIS for offshore wind projects comments.

Comment Number	Comment
363-22	One suggested approach to address the NEPA segmentation for OSW, which should supplement but not replace national strategic planning, would be the development of suitable Programmatic Environmental Impact Statements by region with tiered analyses for individual projects or contiguous lease areas. Although BOEM conducted a Programmatic EIS in 2007 that related, very generally, to the development of offshore alternative energy in the Atlantic, that document was glaringly inadequate and erroneous in its treatment of fisheries impacts. Additionally, it provided no details that would inform analysis of the impacts of offshore wind energy development in the New England region. It also predated the current scope of OSW under consideration.
349-44	To best account for the impacts of the simultaneous development of multiple lease areas on the North Atlantic right whale, we stress that the agency must prepare a full Programmatic EIS encompassing all United States’ East Coast renewable energy development as soon as possible to inform future offshore wind development. Currently, impact analyses are undertaken, and mitigation measures prescribed, on a project-by-project basis leading to inconsistency and inefficiency. It would be highly beneficial to collectively consider available information on North Atlantic right whales in United States Atlantic waters to build a picture of responsible development accounting for the lifespan and migratory movements of the species, which have the potential to overlap with every WEA along the United States’ East Coast on a twice-yearly basis (i.e., northern and southern migration). A Programmatic EIS is also particularly timely given the climate-driven shifts in North Atlantic right whale habitat use observed over the past decade as well as significant changes in their conservation status and major threats. Such an approach will ensure that alternatives and mitigation measures are considered at the scale at which impacts would occur and may potentially help increase the pace of environmentally responsible offshore wind development along the United States’ East Coast.

Response to comments: BOEM thanks you for your suggestion. However, development of a programmatic EIS is outside the scope of this project-specific EIS.

Comment theme: Revised language regarding the issuance of the ITA under the MMPA.

Associated comments

Table I-18 provides the full list of comments received as part of this comment theme.

Table I-18. Revised language regarding the issuance of the ITA under the MMPA comment.

Comment Number	Comment
372-1	As noted above, we intend to adopt this EIS to satisfy our independent NEPA requirements for the potential issuance of an ITA under the MMPA, and that role should be clearly stated at the beginning of the document, not in an appendix. The potential ITA issuance is closely related to the activities permitted in the COP. It is important to ensure that the relationship of these actions and our role as both a cooperating agency and an authorizing agency under MMPA are clearly explained to and understood by the public. We will provide you with recommended language for the FEIS to address this.

Response to comments: The FEIS was revised to include the following statement. "Cooperating agencies may rely on this FEIS to support their decision-making. In conjunction with submitting its COP, South Fork Wind applied to the National Marine Fisheries Service (NMFS) for an Incidental Take Authorization under the Marine Mammal Protection Act (MMPA) of 1972, as amended (16 U.S.C. § 1361 et seq.) for incidental take of marine mammals during Project construction. NMFS is required to review applications and, if appropriate, issue an Incidental Take Authorization under the MMPA. In addition, NMFS has an independent responsibility to comply with NEPA and will rely on the information and analyses in BOEM's EIS to fulfill its NEPA obligations."

Comment theme: USACE versus BOEM NEPA document.

Associated comments

Table I-19 provides the full list of comments received as part of this comment theme.

Table I-19. USACE versus BOEM NEPA document comment.

Comment Number	Comment
363-19	An Announcement of Public Hearings and Request for Public Comment was issued by the U.S. Army Corps of Engineers concurrent with the DEIS. The DEIS does not reference this document nor explain the relationship between the two federal activities beyond a cursory statement that a permit or authorization is required from USACE under Section 404. The two documents also provide differing information. For example, the USACE document describes the proposed action differently, showing two "alternate" turbine locations within the proposed project array that the DEIS does not describe or evaluate in the context of the action alternatives.

Response to comments: The FEIS includes analysis of the two alternative locations as a part of the EFH assessment and based on the conservation recommendations from NOAA, the two alternate locations contain critical habitat and should not be developed.

Public Involvement

Comment theme: Inclusion of fisherman and the fishing industry in the offshore wind decision making process (see also comments under Commercial Fishing).

Associated comments

Table I-20 provides the full list of comments received as part of this comment theme.

Table I-20. Inclusion of fisherman and the fishing industry in the offshore wind decision making process (see also comments under Commercial Fishing) comments.

Comment Number	Comment
176-1	It takes this planet millions of years to make a gallon of oil that we will burn in a fraction of a second. It is obvious that we will need alternative energy sources at some point in the future. With this in mind, I support the exploration and development of wind energy, but it needs to be done correctly. The current push to conception being driven by tax incentives and legislation leaves little time for proper stakeholder input and scientific analysis. We need to slow the process down and get a better idea of the cumulative impacts associated with not just this project, but all of them adjacently covering 1,400 square miles of bottom shared with other ocean users. I am a lifelong fisherman with an electrical engineering background and have participated in cooperative research studies for over 15 years. As an engineer/scientist, I see the possibilities of this project and understand some of the fears that other user groups are concerned with, especially fishermen. Our concerns and observations should hold some merit since we have been out there most of our lives and have substantial knowledge of fish species, currents, and weather. Some of our fears may be quelled with proper science and transparent information about these projects, and I would also like to see the wind companies acknowledging our concerns and observations as true and factual. Just because we are not always the most articulate does not mean we are stupid. With the help of RODA, fishermen have had a means to share their knowledge and input. Working together, I feel all user groups of the ocean can coexist amongst each other. But please remember, fishermen were there first exercising their rights to the ocean long before this new industry was developed. Please take their recommendations seriously.
176-4	Transparency between the wind developers, their contractors, government officials, end users, customers, and fishermen need to be greatly improved upon. My personal experiences of communicating with the developers has been particularly good, but there are many people out there that still have no idea of what is going on. I agree that it is partially their fault for not getting involved, but meetings during the day and so many different sources of information make it difficult to navigate. Maybe BOEM can collect all the data and dispense it through one credible source clarifying everything from costs to impacts to fisheries. Please see RODA's letter submitted on behalf of many fishermen and fishing organizations for more technical details of specific needs for fishermen and windmills to coexist on the ocean.
335-1	Offshore development projects, such as the SFWF and SFEC, will impact small fishing businesses and their respective fishing communities. Therefore, it is essential that the fishing industry is meaningfully consulted, actively engaged and involved in the citing and development.
352-1	With so many wind developments being proposed in this region, we appeal to BOEM to begin to work with us to plan for consistent environmental review for these projects and facilitate regional discussions with the fishing industry and developers that would lead to agreement on issues of environmental monitoring, transiting safety and comprehensive mitigation and compensation planning around each development. Although it is difficult to understand from the DEIS exactly how many structures are being proposed for South Fork, this is a very small fraction of the more than 2000 structures that would be erected in the region to meet the states' 20+ gigawatt plan for the Atlantic.
352-2	It is important to keep in mind that many ocean wind advocates' primary motivation is to have these structures built where they cannot be seen from their beach or their homes. To date, BOEM's siting process has resulted in little to no real consideration of offshore wind energy impacts on those who work in these offshore waters to produce food from the sea, with the lowest carbon footprint of any other major protein source. We look to BOEM leadership to work with us towards these two industries coexisting into the future. Today, our interests have been given no more credence that a check mark in a box and, collectively, we can do better.

Comment Number	Comment
363-23	OSW developers have created significant public confusion with incessant, unverified claims about the status of their projects and their industry, both generally and with regard to fisheries impacts and interactions. Rather than being presented in a clear and objective manner, important decisions and basic project information are buried in an avalanche of press releases and public meetings--and much of the information released is blatantly contradictory. These declarations become extremely difficult to follow; most regard such minutiae such as which consulting firm was hired to design which project component, but even the far more important information regarding plans for which ports or technology to use, and whether domestic workforce plans are in place, are impossible to follow due to the frequency with which plans change. The resources available to developers to flood the public with such information far outweigh those of fishermen to track and understand whether promises have been made and kept, and what the overall process is, much less if it is being adequately followed. Unfortunately, more recently, BOEM's own discordant communications regarding the Vineyard Wind project have added to this atmosphere of disorientation. A concise characterization of this situation would be "confusion by diffusion." When too much information exists, but it is of poor quality, the public interest is not met and coexistence cannot be achieved. RODA does not dispute that there have been a large quantity of "engagement" opportunities provided to fishermen with regard to the SFWF or other OSW projects (although this was not--and is still not--the case in early project planning for the existing projects nor in areas of the U.S. that are conducting that planning now). Rather, we submit that the quality of such opportunities, and of the information transmitted to the public, has been so inferior that in some cases fishermen consider it more harmful to have been involved than to have had no opportunities at all. While it is not BOEM's responsibility to control private sector communications—even public communications by private entities—it is its job to ensure that the public is well informed and has adequate public comment opportunities under the law. In exercising its duty to ensure meaningful public input, "the level of participation should not be given greater priority than the quality and balance of participation." NEPA provides an agency with wide-ranging regulatory and interpretive discretion so long as "its promulgation process as a whole and in each of its major aspects provides a degree of public awareness, understanding, and participation commensurate with the complexity and intrusiveness of the resulting regulations." These comments detail the ways in which meaningful participation has never been available for enormously complex OSW projects, as the NEPA process is largely outside of the process in which key planning decisions are made.

Response to comments: Fishing is an important use of the Exclusive Economic Zone that BOEM must consider in its decision-making. BOEM regularly engages with commercial and recreational fishermen to understand their concerns from both a biological and socioeconomic impact perspective. This has been accomplished through focused engagement with Regional Fishery Management Councils, participation in state-led fishery advisory group meetings, and the convening of a National Academies Fisheries Steering Committee. BOEM incorporates fishing industry recommendations into the leasing process by: issuing guidelines to leaseholders or including lease stipulations to develop and implement a fisheries communication plan, developing a fishing industry webpage, and working closely with state partners to address regional fisheries monitoring associated with potential impacts from offshore wind development.

Comment theme: Comment period extension

Associated comments

Table I-21 provides the full list of comments received as part of this comment theme.

Table I-21. Comment period extension comment.

Comment Number	Comment
363-27	Scoping for this DEIS occurred over a short 30-day period in 2018. At that time, RODA submitted a request for extension of the comment period28 due to: (1) the significance of the project; (2) the public benefit of conducting NEPA review by “eliciting the best possible data and public input before key decisions are made that could unnecessarily impact the human or natural environment, and which may become costly or impossible to mitigate”; (3) the length of the SFWF COP (608 pages and nearly 40 appendices); and (4) overwhelming OSW-related time demands on the very regional fishery participants who would be impacted by the SFWF project during the 30 day scoping period including: • Workshops regarding cable burial risk conducted by Ørsted; • Workshops regarding fisheries monitoring and science for the Vineyard Wind lease site; • Workshops regarding delineation of transit lanes for all of the Northeast lease sites; • BOEM’s announcement and request for input regarding new proposed lease sites in the New York Bight; • NYSERDA’s “State of the Science” workshop specific to offshore wind; • New York State’s Fisheries Technical Working Group meeting; • The Northeast Regional Ocean Council’s meeting to determine regional data and ocean planning priorities; • A meeting of the Rhode Island Fisheries Advisory Board specific to the Vineyard Wind lease; and • Outreach from Equinor regarding design for its lease site. It is unfortunate that BOEM denied the extension request and did not afford the time required to gather thoughtful input from fishing communities, particularly when it has “paused” its review of this and other projects countless times at the request of developers. Nevertheless, some limited scoping recommendations were submitted by commercial fishermen and their representatives, and other requirements for a DEIS scope are imposed by NEPA and other laws.

Response to comments: While the official public process requires a 30-day comment period to allow for public input, as was done for this project between Oct. 19 and Nov. 19, 2018, BOEM considered other significant input brought to its attention such as the inclusion of the vessel transit lane alternative based on a letter from the Responsible Offshore Development Alliance dated January 3, 2020.

Comment theme: Publicly available versions of the COP and DEIS.

Associated comments

Table I-22 provides the full list of comments received as part of this comment theme.

Table I-22. Publicly available versions of the COP and DEIS comment.

Comment Number	Comment
294-2	Analysis in the South Fork DEIS is much less detailed than that in the Vineyard Wind DEIS and SEIS with regards to impacts overall and specifically to fisheries. It appears that the South Fork DEIS was an older draft written in response to earlier submissions of the South Fork COP and then altered to include minimally updated information. According to BOEM, the South Fork COP and submitted on June 29, 2018, May 24, 2019, February 13, 2020 and July 22, 2020. All versions of the COP should be released to the public, as part of the public process, but have not been. All previous versions of the DEIS, should they exist, should also be made available to the public in the interest of transparency, with changes noted. For example, BOEM in the Vineyard Wind SEIS contained an entire section entitled “Changes to the Project Design Envelope and Alternatives Since Publication of the Draft EIS”. BOEM must do the same for the South Fork Wind Farm DEIS for consistency and transparency of process.

Response to comments: Thank you for sharing your concerns with us. Previous versions of the COP do not contain the most up-to-date or accurate information for the Project; therefore, they are not provided on BOEM's website for public review. BOEM has prepared and publicly released the Draft EIS for the South Fork Wind Farm project. SFW submitted an updated COP on May 7, 2021 which added a potential port for fabrication and construction support. The EIS has incorporated this change, which did not change the project design envelope or add an alternative. Therefore, preparing a section entitled "Changes to the Project Design Envelope and Alternatives Since Publication of the Draft EIS" is not applicable.

Comment theme: Publicly available versions acoustic bathymetric, seafloor maps, and habitat maps.

Associated comments

Table I-23 provides the full list of comments received as part of this comment theme.

Table I-23. Publicly available versions acoustic bathymetric, seafloor maps, and habitat maps comment.

Comment Number	Comment
310-39	We requested in our NOI letter that "Acoustic bathymetric, seafloor maps, and habitat maps (including imagery and grain size data) should be available in a GIS-compatible manner in online viewers (e.g., Northeast Ocean Data Portal) and downloadable." These data are needed to assess potential impacts and compare alternatives, and should be included in developing the FEIS.

Response to comments: All data used in preparation of the EIS is either available publicly through online databases or in the Applicant's COP, which is posted on BOEM's website. Readers can view the literature cited in Appendix B for full references and/or links to cited sources.

Comment theme: Orsted-directed outreach to stakeholders.

Associated comments

Table I-24 provides the full list of comments received as part of this comment theme.

Table I-24. Orsted-directed outreach to stakeholders comments.

Comment Number	Comment
351-2	However, no matter what written comments or questions were submitted to DWW or Orsted by the EHTFAC, DWW never responded to any of the series of questions that the EHTFAC or other local fishermen that were asked during public hearings. Any attempt by the FR to garner answers from DWW to offshore wind questions that were outstanding, went unanswered. Despite public acknowledgments that answers would be forthcoming, at no point was communication between the EHTFAC and DWW open and accommodating. East Hampton Town was repeatedly notified of a lack of follow-up and true communication by Orsted to the FAC, or by Orsted to the FR. In direct discussions by the FR with DWW's fisheries liaison and staff, documents were withheld from the FR, and time lapses between requests for notes or maps and delivery of maps sometimes took months. One full-sized nautical chart of the project area of the SFWF was not received by the FR for a full year. No attempt to cooperate and discuss meaningful forms of mitigation, or compensation have ever been discussed with the FR or the EHTFAC. No requests for fisheries economic data related to the SFWF or SFEC was ever made, instead VTR data was utilized which is inherently faulty. Gear loss application forms were repeatedly changed without notice, with a 30-day limit on claims, and a version not allowing for more than one claim in an area that was handed out to some fishermen. Fishermen who both had claims in the same week were handed two completely different forms, with differing rules. None of these rules were made by consensus with New York fishermen. All rules have been made by Orsted, and change without knowledge or consent. Orsted has since stated that the Gear Loss Compensation & Mitigation Application is updated periodically, yet there is no notice of an update on their website, nor past dated versions of forms. There are inconsistencies between their website, and what is being handed out via email, and what they are requiring when an actual claim is made. As an example, in 2020 the FR was asked by two commercial fishermen to help them work to submit gear-loss claims due to Orsted-hired survey boat interactions with their gear. Both are fixed-gear fishermen. The first fisherman has waited nine months and to date has not received an answer on his claim. The second, an offshore-lobsterman, Orsted denied his claim outright and then refused to provide proprietary information for the fisherman to prove his claim on appeal. After refusing to renew the contract of the EHTFAC's FR chosen by the FAC, a new FR hired by Orsted released the proprietary survey vessel track information to the lobsterman, so he could file his appeal, which is still pending. Capt. Evans remains the choice by the EHFAC as FR and was approved by the Town of East Hampton to represent the fishing interests re the SFWF. Orsted has repeatedly omitted or withheld information as proprietary from the FR that quite possibly could have brought EHT's fishermen's claims relief. If fishermen's proprietary information is required in order to begin a claim a developer must also supply the claim-related information when asked.
361-5	Throughout the RODA Letter are examples of items which could have produced less conflicts; had those items been informed with fishermen input. For example: • Turbine orientation (east-west preferred in the Project Area); • Transit lane widening to allow for safe vessel passage and potentially reducing the amount and degree of radar interference; • Misplaced reliance on AIS data as a proxy for all fishing activity and transiting; • The value and utility of the mitigation measures included in Table G1;

Response to comments: Thank you for sharing your concerns with us. While Orsted-directed outreach to stakeholders is outside the scope of this EIS, BOEM is committed to working with states, Tribes, and stakeholders on our shared ocean resources.

Comment theme: Publicly available leasing documentation.

Associated comments

Table I-25 provides the full list of comments received as part of this comment theme.

Table I-25. Publicly available leasing documentation comments.

Comment Number	Comment
363-21	So, too, must the SFWF docket at a minimum contain a full project record so that the public may be informed of the entirety of the project process and decisions. However, several documents with information critically important for evaluating projects plans and their environmental impacts are missing from the docket or the EIS itself or are extremely poorly described, including but not limited to: • An executed lease for SFWF in OCS-A 0486 or OCS-A 0517 and nomination submitted by Deepwater Wind showing qualifications for lease eligibility, including a preliminary proposal for fisheries conflict mitigation (neither of these documents appear to be publicly available anywhere even outside of the docket); • Call for Information and responses providing information regarding fisheries activity in the lease area; • Environmental Assessment for lease issuance; • Proposed and Final Sale Notices for the lease sale A-0486; • Site characterization plans (which differ from the Site Assessment Plan included in the docket); • NMFS Incidental Harassment Authorization or Letter of Authorization for construction activities; • NMFS Incidental Harassment Authorization or Letter of Authorization for site characterization activities; and • Certificate of Environmental Compatibility and Public Need, pursuant to Article VII of the New York Public Service Law. The DEIS and these documents must be provided to the public in an accessible format. It is especially confounding that they are not included in the project record, when BOEM has consistently stated that the only stage in the entire planning and surveying process-- from area identification to lease issuance to survey and assessment activities-- in which impacts to fisheries merit full analysis is in the EIS associated with COP review. Their argument is that no binding or irreversible project decisions have been made to that point, and that fisheries interactions can be effectively de-conflicted through preparation of the Environmental Impact Statement immediately preceding final project approval. Some examples of these statements include: • "After lease issuance but prior to COP approval, BOEM retains the authority to prevent the environmental impacts of a commercial wind power facility from occurring." • BOEM does not consider the impacts resulting from the development of a commercial wind power facility within the WEA, to be reasonably foreseeable at [the time of lease issuance]. Based on "the experiences of the offshore wind industry in northern Europe, the project design and the resulting environmental impacts are often geographically and design specific, and it would therefore be premature to analyze environmental impacts related to potential approval of any future COP at this time." • In the Environmental Assessment for the lease issuance that became the SFWF project, BOEM noted that it received several comments raising concerns about NEPA segmentation and the lack of early analysis regarding fisheries interactions of wind energy projects in the MA/RI lease areas. In response it simply stated "Additional analysis under NEPA will be required before any future decisions are made regarding construction/installation, operation and maintenance, or decommissioning of any future wind energy facility to be sited in the Rhode Island and Massachusetts WEA and cannot be construed as possible project segmentation." While this may be true if interpreted as any future decisions by BOEM, it certainly is not true that no project decisions have been made, including the power purchase decisions that "locked in" the project size, configuration, and technology despite no DEIS in existence prior to this agreement. Despite these clear statements that project-controlling design decisions cannot be made before project finalization, BOEM, States, and developers have already made project-controlling decisions regarding design parameters that have now severely restricted the range of alternatives in the DEIS. This prevents the public from accessing the public participation process in a meaningful way.
363-26	The SFWF has been reassigned multiple times but it is difficult to track this, especially since the official name on BOEM's website does not include the colloquial name of "South Fork Wind Farm." Even the Notice of Availability regarding this DEIS references SFWF as a "Proposed Wind Energy Facility Offshore Rhode Island" without reference to the State that the DEIS claims to shape the project's purpose and need. At a minimum, a complete audit of the BOEM website for each lease area, complete with all records pertaining to each lease, would help the public more easily find all relevant documents. A more explicit suggestion for improving public information is included in the section of these comments regarding the Fisheries Communication Plan below.

Response to comments: Information about the leasing history of the project is available, and has been throughout the development of the EIS, on the BOEM website. https://www.boem.gov/renewable-energy/state-activities/commercial-wind-leasing-offshore-rhode-island-and-massachusetts. BOEM will update its website, as appropriate.

Comment theme: Public participation opportunities.

Associated comments

Table I-26 provides the full list of comments received as part of this comment theme.

Table I-26. Public participation opportunities comments.

Comment Number	Comment
281-3	Ørsted/Eversource and Local Community Outreach and Engagement In addition to working with Long Island labor, the developers have listened, engaged, and altered construction plans based on local community and environmental feedback. This is something we need to replicate in other offshore wind projects. Ørsted/Eversource has worked hand-in-hand over the past few years with the Town of East Hampton to realize additional mitigation efforts that include construction, environmental, and fishery concerns of local residents, businesses and mariners. To highlight a few of the provisions, there is a commitment to maintain access to Wainscott Beach during construction for pedestrians, emergency vehicles, etc.; a commitment to limit construction activities to the off-season months; a comprehensive fisheries compensation plan; and town and community notice and construction monitoring requirements. It is worth highlighting that the East Hampton Trustees have unanimously approved the Joint Proposal (JP), and five NYS agencies have invested extensive time and expertise in this process and have also signed onto this proposal. The Town of East Hampton Board and Trustees voted overwhelmingly to support the Host Community Agreement and the easement/lease agreements for the Beach Lane route. Overall, the JP and related agreements clearly demonstrate a methodical and thoughtful approach to working with the community to actualize New York's first offshore wind project.
303-4	The all-stakeholder-engagement model employed by BOEM and Virginia for a decade has worked well and continues to be the best way to share the ocean space appropriately to avoid or reduce negative impacts on particular users. The Virginia commercial and research lease areas were carefully positioned with cooperation and buy-in from all ocean users and stakeholders. The same stakeholder engagement process has continued and expanded since those development areas were designated and leased, and it continues today.
361-6	As OSW projects spread to other waters important to U.S. fisheries and food security, we hope BOEM and the myriad of other Agencies involved will adapt the programs and processes to make meaningful public participation a priority. To date, this not been the case on the east coast nor the west coast.
378-19	Pamela Mahoney: I'm unmuted. I also will be presenting additional comments, but they in my now you're probably the end of this meeting. But we're Wainscott residents and there, I do want to say that there are so many unaddressed issues. Bonnie spoke to that just now and we've been in the process, involved in this process, since the fall of 2018. We've gone to all the meetings, and then some. We've spent so much of our personal time researching this project and other projects and other parts of the country and in Europe. We have a lot of unaddressed issues here, this is not a slam-dunk done deal. And I don't really care what the proponents say, we have a lot of things we still need to deal with, and one of our, one of my biggest concerns, is the fact that Wainscott residents are not, not really having their say, everybody that calls in and everybody that's attended the meeting, for the most part, are coming from other places. They're out island, they're in other states, they're in other towns, other parts of East Hampton, but not Wainscott. And we were told at a meeting one day that it was the most elegant route, and I thought, you know, that's really not a compensation for being the right route, and other routes are not being adequately and evenly considered. And I just I just We want to be heard, we want people to understand that we're not on board with us and, like I said we've been to the meetings it's not like we're sitting on the outside looking in. We've been involved, we have we have water issues. That again is not coming to the forefront of all of this. I want to see another location thoroughly vetted and we thought that was going to happen and it hasn't happened to say that there are other locations and they've been vetted is not accurate. I am. Like I said, I'll prepare some, some other comments, but as Wainscott residents, we're really shocked that they would want to do this. And, and we don't really even feel we're getting straight answers on a lot of this, and I, I know what it's being compared to a water main installation. This is what they tell us, this is like putting water in the street, which of course we've been through, and it's not, it's nothing like putting water on the street and very honestly, we don't know what this is going to do to our property values, and I am tracking property values at the moment that's something that isn't being discussed. And, and what people are asking me about it, people are asking if we're going to leave. Why would we want to stay there? and You know it's, it's unbelievable and I need to be heard, we need to be respected. People have to know how we feel. I'm so tired of people outside of Wainscott telling us that we need to take one for the team, we need to buck up, grow up, and yet I don't see any of them, offering their neighborhoods or their beaches, for this project. No one comes back and says look, this is another, this is another beach, why don't you look at that, why don't you look at this other location, nobody helps, they just they just call us NIMBYs and, and why the name calling right now. And I am speaking from the heart, today. I didn't have anything prepared, but I did want to say what we feel, and I want to relay what a lot of other people feel and just aren't feeling that they're being heard. And they can turn off their air conditioning. I don't even have air conditioning. That's all I have for now. Thank you.
364-2	Necessary Environmental Considerations for the Final Environmental Impact Statement While the development of offshore wind presents an exciting new opportunity to expand the state's portfolio of clean renewable energy resources,

Comment Number	Comment
	we emphasize that such opportunities must be taken advantage of in a manner that minimizes potential harm to the ecosystems and wildlife that may be impacted. Offshore wind is a new industry operating in areas that present logistical challenges and about which there may be imperfect information. With that in mind, we commend the effort being undertaken to ensure that the project proceeds with a minimal environmental footprint. Fundamental criteria necessary to ensure a strong framework to help mitigate potential environmental and ecological impacts include the need for (1) flexibility through an adaptive operational plan approach that can meet changing circumstances, (2) continuing stakeholder engagement, and (3) a robust data gathering, sharing, and management plan. Given the relative novelty of offshore wind installations along the northeast coast of the United States, there is likely much we don't know about the potential long-term impacts of these projects. Accordingly a sustained monitoring and research effort that informs necessary course-corrections to the operation of the project and environmental mitigation efforts is essential. We also support the need for stakeholder engagement and input throughout each stage of the project.
363-24	The DEIS itself also fails to support adequate public participation as a result of its form and the information contained therein. Critical information that is still subject to federal discretion, including but not limited to the definition of the habitat alternative, alternatives for mitigation including compensatory relief, and the results of the ongoing cod study, have been deferred to inclusion in a future FEIS. The complexity of OSW projects means that an enormous number of decisions shape their ultimate outcome. Just a few of many examples of information included in the proposed action for which the DEIS does not consider alternatives (presumably because the developer has already determined these elements of project design) include: • Turbine orientation; • The cable layout route in anything but the broadest geographic terms; and • Cable burial depth. Many more of these examples are included elsewhere throughout these comments, as well as information that does not appear in the DEIS and appears entirely unregulated, despite having significant effects on the type and degree of environmental impacts. The NEPA review must include at least the most important of these decisions, but BOEM's current approach to it does not.

Response to comments: Thank you for sharing your concerns with us. BOEM is committed to working with states, Tribes, and stakeholders on our shared ocean resources. All comments on the Draft EIS were reviewed and responses prepared for all substantive comments. BOEM incorporated changes in the FEIS, as appropriate. BOEM added information based on the Essential Fish Habitat assessment and consultation recommendations from NMFS, which identified specific turbine locations for removal or micrositing. This provided additional detail for the habitat alternative.

No Action Alternative

Comment theme: No Action Alternative analysis of other energy projects.

Associated comments

Table I-27 provides the full list of comments received as part of this comment theme.

Table I-27. No Action Alternative analysis of other energy projects comments.

Comment Number	Comment
169-16	The DEIS does not properly and adequately analyze the "No-Action" alternative. Under NEPA regulations, agencies must consider all reasonable alternatives, including those not specifically under their authority to implement. See https://ceq.doe.gov/nepa/regs/40/1- 10.HTM. See also NRDC v. Morton, 458 F.2d 827 (D.C. Cir 1972). The DEIS fails to do that. Strikingly, the DEIS fails use basic market and economic principles in analyzing the No-Action alternative. The Project might be able to be analyzed solely as an additive project as far as economic and climate change impacts if it existed in a vacuum, but it does not. Electricity from the South Fork Wind Farm would displace renewable energy projects that would otherwise be built onshore. But for the Project and ones like it, New York, Connecticut, Massachusetts, Rhode Island and Connecticut would turn to onshore solar electricity projects, which create more of a positive economic impact, none of the adverse moderate and major consequences of the Project and have a tiny fraction of the climatic impacts that the Project has. See, ScienceDaily, 4 October 2018, supra ("Extracting energy from the wind causes [adverse] climatic impacts that are … large compared to the effect of reducing US electricity emissions to zero with solar.")

Response to comments: BOEM determined it is likely that if the proposed Project is not built, another offshore wind project or projects would be constructed to meet mandates/demand. This principle was used to frame the No Action alternative and also allowed BOEM to assess the maximum-case scenario in terms of potential impacts. In the air quality analysis, for example, BOEM used the EPA AVERT model to determine lifetime avoided emissions and the COBRA model to estimate the health impacts of the projected emissions changes using informed assumptions (Section 3.3.1). The EPA AVERT model estimates avoided emissions based on the generation profile of a region, hours of peak demand, and the renewable energy source's generation profile. The EPA AVERT model includes rooftop- and utility-scale solar as two of six categories in the calculations.

The commenter assumes that the approval of the COP would displace onshore renewable electric generation, especially solar, and that the No Action alternative would cause an increase in demand for solar. These assumptions oversimplify the economics and regulations affecting renewable energy and fail to account for several facts. First, states in the region have policies specifically mandating or targeting offshore wind generation such that wind generation is more likely to supply significant quantities of electricity independent of this Project. For instance, the state of New York has a mandate for 9,000 MW of offshore wind by 2035, and the state of New York has additional renewable energy goals utilizing other sources (www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Standard). Second, given space constraints, it is unclear if states in the region could meet their overall renewable energy goals with onshore solar alone, casting further doubt on any contention that offshore wind necessarily displaces solar projects (much less that this particular Project will cause such displacement) (https://www.spglobal.com/marketintelligence/en/news-insights/research/new-england-renewable-policies-to-drive-12500-mw-of-renewable-capacity-by-2030). Third, New York is also pursuing increased onshore solar generation as well as other clean sources of electricity (i.e., the state itself recognizes that solar and wind can be complimentary, not mutually exclusive). Specifically, New York has a goal of 5 gigawatts of solar generation by 2035. Fourth, and similarly, the generation profiles for different renewable energy sources vary in timing of their availability and peak production such that they complement each other as a practical matter (e.g., Wang et al. 2019).

In light of these reasons, BOEM did not analyze the No Action alternative by assuming perfect substitution of onshore renewable generation. Furthermore, an analysis of the full environmental impacts of onshore solar electric generation or other onshore renewables projects is beyond the scope of this final EIS because 1) the agency is responding to a proposal from the developer, not deciding whether it should approve onshore solar projects versus offshore renewable energy projects, and 2) the No Action alternative does not have a close causal connection with an increase in onshore solar projects.

To the extent that the commenter relies on the Miller and Keith (2018) study (as reported in the *Science Daily* article, linked https://www.sciencedaily.com/releases/2018/10/181004112553.htm) to suggest that the climate impacts of solar are less than those of wind, this study is evaluating onshore wind and even states that it does not apply to offshore wind.

Comment theme: Methodology, assumptions, and conclusions of the No Action Alternative.

Associated comments

Table I-28 provides the full list of comments received as part of this comment theme.

Table I-28. Methodology, assumptions, and conclusions of the No Action Alternative comments.

Comment Number	Comment
363-36	The No Action alternative, as presented in this DEIS is characterized by: (1) a lack of consistency and clarity; and (2) sweeping, unjustified assumptions made regarding “reasonably foreseeable” future OSW development. Thus, all subsequent comparisons of impacts across alternatives are skewed in a way that is not made obvious, nor do they make logical sense. Given that a major purpose of this document is to provide a baseline for understanding potential consequences of the proposed offshore wind project, it is imperative that BOEM clarify the No Action Alternative for simple public interpretation.
363-40	In summary, clarification is needed as to what the assumptions are for the No Action alternative and how these assumptions were made. If BOEM is presenting as a fact that 2,000 or more WTGs will be installed in the reasonably foreseeable future, it must clearly state that and explain why- not only buried in an appendix, but within the description of the action. Both this “full buildout” scenario and a “no buildout” scenario must be evaluated using all the criteria provided in these comments in order to meet NEPA’s requirements of public informedness.
363-37	"In the introduction to the DEIS, BOEM incorrectly states that Chapter 2 provides detailed descriptions of the analyzed alternatives. The No Action Alternative is not clearly defined, the description is vague and does not state explicitly what is assumed to be “reasonably foreseeable.” It states that the COP for SFWF would not be approved, however: All other existing or other reasonably foreseeable future impact producing activities would persist in the Lease Area. Table 2.3.1-1 includes an impact assessment of the No Action alternative for each resource, including an assessment for cumulative effects. The No Action alternative cumulative effects assessment provides an assessment for impacts with and without approval of additional wind farms in BOEM lease areas. Through these assessments, the No Action alternative provides a baseline against which all action alternatives are evaluated. This alternative poses the following problems: • Before readers are told that 2,050 WTGs and 5,779 miles of cable are included in the No Action future, they are presented with the “Comparison of Impacts by Alternative,” which lists impacts to the numerous resources; • The hypothetical future of “with and without” approval of additional OSW projects should, at a minimum, be treated as 2 separate alternatives (and common sense would suggest that there may be options in between). There would clearly be a massive difference in environmental impacts between 2,050 new WTGs and none; • The scenario referred to as “baseline” is illusory, as there are currently only two WTGs in federal waters off the U.S. northeast coast--a far cry from 2,050. Further, it is not clear whether the “lease areas” in multiple references throughout the DEIS refer to RI/MA, southern New England, or to the entire Atlantic; • It is misleading, at best, for BOEM to omit critical information about the details of what it assumes without justification is considered “reasonably foreseeable wind turbine development” in the description of the No Action alternative; • This description of reasonably foreseeable future activities appears to align with the description provided in the Vineyard Wind SEIS, which BOEM declared terminated before incorporating public comment. Moreover, the SEIS contained detailed explanations of the criteria used to determine what qualified as reasonably foreseeable activities and what those actions were. In contrast, this DEIS provides only unfounded and inconsistent claims; and • The totality of these errors results in a complete masking of the environmental impacts of the proposed SFWF and those of 2,050 WTGs. This analysis has never been completed and the public cannot be adequately informed without it."
363-39	The conclusions of the No Action alternative are not useful in any practical sense. BOEM wraps its analysis by determining that it anticipates the range of impacts for reasonably foreseeable OSW activities to be “negligible to moderate” and that the range of such impacts from reasonably foreseeable activities other than OSW would also be “negligible to moderate.” The range between negligible to moderate accounts for 3 out of 4 possible rankings, and BOEM claims that impacts are the same whether or not offshore wind activities occur. The public cannot draw any meaningful conclusions from this paragraph.

Response to comments: The DEIS was developed with the best available science at the time of publication. Further, the South Fork Wind Farm EIS Cumulative Activities Scenario is presented in Appendix E of the EIS and is based on the same BOEM 2019 study (National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf) as the Vineyard Wind FEIS, and mirrors the Vineyard Wind Methodology for including cumulative impacts as part of the No Action Alternative. BOEM determined that it is reasonable to assume that if the proposed Project is not built, another project or projects would still be constructed because of the need to meet mandates/demand. This assumption also allowed BOEM to assess the maximum-impact scenario in terms of potential impacts.

Comment theme: No Action Alternative impacts.

Associated comments

Table I-29 provides the full list of comments received as part of this comment theme.

Table I-29. No Action Alternative impacts comment.

Comment Number	Comment
363-38	The DEIS describes how the “No Action Alternative “could result in: • Accidental releases and discharges of both fuel/fluids/hazmats and trash; • Electromagnetic fields; • New cable emplacement and maintenance; • Noise • And more.. It is misleading to call this alternative “No Action” and yet be referring to unprecedented and entirely new development and use of the Outer Continental Shelf, for which BOEM has not yet finalized a cumulative review nor environmental analysis.

Response to comments: The No Action Alternative is defined in Section 2.1.4: "Under the No Action alternative, BOEM would not approve the COP, and the Project construction and installation, O&M, and conceptual decommissioning activities would not occur. Likewise, no additional permits or authorizations would be required. Any potential environmental and socioeconomic impacts, including benefits, associated with the Project as described under the Proposed Action would not occur. However, all other existing or other reasonably foreseeable future impact-producing activities would persist in the Lease Area. Table 2.3.1 1 includes an impact assessment of the No Action alternative for each resource, including an assessment for cumulative effects. The No Action alternative cumulative effects assessment provides an assessment for impacts with and without approval of additional wind farms in BOEM lease areas. Through these assessments, the No Action alternative provides a baseline against which all action alternatives are evaluated." Other reasonably foreseeable future activities and projects are defined and discussed in Appendix E Cumulative Activities Scenario, and those non-offshore wind generation projects could result in impacts to the human environment.

Comment theme: No Action alternative future scenario.

Associated comments

Table I-30 provides the full list of comments received as part of this comment theme.

Table I-30. No Action alternative future scenario comment.

Comment Number	Comment
363-100	The magnitude of impacts underestimates the likely realized impacts, which does a disservice to the public trying to understand the net benefits of this renewable energy source. This issue applies across all impacts. BOEM must adequately analyze these impacts. To keep it short, we’ll focus on one example, impacts to benthic habitat, essential fish habitat (EFH), invertebrates, and finfish across alternatives. The no action alternative is expected to have negligible to moderate adverse “impacts if no other wind farms are authorized and negligible to moderate adverse effects if they are authorized.” This is blatantly wrong for multiple reasons. Firstly, the no action alternative would result in no change to current conditions and therefore would have no expected impact to benthic habitat. Secondly, this DEIS is rightly implying that the survey and preliminary construction activities are having adverse impacts to benthic habitat, which must be disclosed to the public, resulting in the moderate adverse effects associated with the no action alternative. Thirdly, the impact ranking provided for the no action alternative does not cover not building the SFWF; it encompasses impacts of construction activities of other (hypothetical and/or future) WEAs in the area (and the area is not clearly defined). Therefore, it is incorrect to state there will be adverse moderate impacts if BOEM selected the No Action alternative. The No Action alternative would have no negative impact on benthic habitat if construction of a WEA does not occur. This is because no turbines will need to be pile-driven into the seabed and benthic habitat converted from soft sediment to hard substrate from turbine associated protection methods.

Response to comments: The No Action Alternative considers the likely trajectory of resource conditions in the absence of the project. This analysis considers the reasonably foreseeable effects on resource conditions likely to result from known environmental stressors, notably including climate change, as well as other federally permitted actions including the potential development of other renewable energy projects. This approach is consistent with NEPA requirements. The environmental effects of preliminary survey activities supporting renewable energy development were disclosed and analyzed in a previous programmatic NEPA EIS for activities authorized by BOEM on the Atlantic OCS (see https://www.boem.gov/oil-gas-energy/atlantic-geological-and-geophysical-gg-activities-programmatic-environmental-impact).

Purpose and Need

Comment theme: Number of turbines needed to meet the energy production goal.

Associated comments

Table I-31 provides the full list of comments received as part of this comment theme.

Table I-31. Number of turbines needed to meet the energy production goal comments.

Comment Number	Comment
166-7	We appreciate BOEM's analysis of the transit lane alternative, as recommended by fishery stakeholders, and the habitat alternative. Since some turbine locations are considered for removal in the transit lane and habitat alternatives, it would be helpful to understand whether these alternatives do in fact meet the purpose and need for the project. The purpose and need includes the following: "In addition, DWSF's goal is to fulfill its contractual commitments to Long Island Power Authority (LIPA) pursuant to a power purchase agreement executed in 2017." This statement suggests that the power purchase agreement, and by extension the amount of power expected by LIPA, is an important consideration for evaluating the range of alternatives. However, the total project generation capacity is not mentioned in the DEIS. From the New York State Energy Research & Development Authority's website, the expectation is that the project would be 130 MW. With 15 possible locations, and up to 12 MW turbines, it would be possible to install only 11 turbines and still generate 130 MW. A reduction in the number of turbines would reduce impacts on both habitat and fisheries. Due to the large amount of complex habitat in the project area, it will be important to minimize the amount of impacted habitat while achieving the project's designed power output. The document should provide some discussion of why the greater number of turbines is planned.
310-1	The FEIS should clearly state its energy production goal and should use the fewest number of turbines to achieve that goal. As stated in the DEIS, "DWSF's goal is to fulfill its contractual commitments to Long Island Power Authority (LIPA) pursuant to a power purchase agreement executed in 2017." In the public meeting on February 11, 2021 BOEM stated that the proponent has a power purchase agreement for 130 MW. The Proposed Action is for up to 15 turbines ranging in size from 6-12 MW. To achieve 130 MW, 11-21 turbines will be needed. There are 18 potential turbine locations of which no more than 15 would be occupied.

Response to comments: The development of the EIS has been based on the Applicant's Project Design Envelope (PDE) which includes a range of up to 15 WTGs. Appendix D provides the maximum case scenario for generation capacity evaluated in the EIS. The transit lane and fisheries habitat alternatives considered in the EIS would result in reduced turbine numbers. Therefore, a separate reduced turbine number/high power outage alternative was not carried forward for separate analysis but is addressed within the DEIS analysis of the Proposed Action and other action alternatives.

Comment theme: Justification for the need for additional energy.

Associated comments

Table I-32 provides the full list of comments received as part of this comment theme.

Table I-32. Justification for the need for additional energy comments.

Comment Number	Comment
169-33	The DEIS assumes without adequate support that offshore electricity generation is needed, a need that was never analyzed. There surely cannot be informed decision making when the threshold question—need for the proposed Project—is based merely upon conjecture.

Response to comments: The South Fork project was chosen by LIPA through a competitive process. BOEM's action is to approve, approve with modifications, or disapprove the South Fork Wind Farm COP and the need arises out of BOEM’s statutory authority, as described in Ch. 1 of the final EIS.

Comment theme: Electricity costs.

Associated comments

Table I-33 provides the full list of comments received as part of this comment theme.

Table I-33. Electricity costs comments.

Comment Number	Comment
357-1	The Executive Summary of the South Fork Wind Farm (SFWF) submission begins with the section “Purpose of and Need for the Proposed Action.” The first paragraph says: Purpose of and Need for the Proposed Action On March 28, 2017, the President determined that it is “in the national interest to ensure that the Nation's electricity is affordable, reliable, safe, secure, and clean, and that it can be produced from domestic sources, including renewable sources” (Executive Order 13783:Section 1(b)). (section ii) The first need for the electricity is “affordable.” Most of my work submitted in the associated case covering Long Island, its nearby ocean, and especially the Town of East Hampton, Case 18-T-0604, was done to show that the economics of SFWF does not support “affordable” as made by the first demand of the President. Further down the same SFWF page there is another incorrect self-recommendation: “The Project would contribute to New York’s renewable energy requirements, particularly the state’s goal of 9,000 MW of offshore wind energy generation by 2030.” There are several reasons that it is not true that SFWF would contribute. Instead, it will be too small and significantly overpriced. NYSERDA (New York State Energy and Research Development Authority) in a publication of November 2018 said that the financially best ocean wind farm producers would produce at least 800 MW. NYSERDA said that nothing smaller than 400 MW should be build and they showed how two projects of 100 MW would not be financially sensible for the purchasers. Clearly, SFWF would violate the recommendations of an important New York State authority. As the Case 18-T-0604 recently may have ended in February 2021, I recently wrote a summary of much of my submitted work. I will present portions to this BOEM case that will show that SFWF should not be approved because of its extremely negative economic comparison with other wind farms. That comparison even shows that an 880 MW wind farm, sighted next to SFWF and owned by the same owners, would sell, at a less expensive price, about 6.67 times the amount of electricity. Very importantly, the first SFWF price per KW would be about twice the price of its neighbor, about 16 cents to 8 cents. But in 5 years the SFWF price will go to $20 cents while the neighbor stays at 8 cents. After 9 years the cost of electricity from SFWF would be almost 3 times the price of its neighbor. Two wind farms owned by the same company next to each other and built about at the same time includes one that is too small and excessively expensive in its sales and another which is competitive with other clean energy production.

Comment Number	Comment
379-2	Mike Mahoney: Hi there. This is Mike Mahoney for Pamela Mahoney. Okay. We're sitting here together and, just, make sure you help me out if I am wrong, and what I'm asking of you guys. But as I listened to Mr. Bennett and to Mary Boatman, I think I'm on target. You in this process will evaluate the alternative landing sites in equal detail, as your the preferred landing site, isn't that correct? And, and when I say that, I want to point out that where Eversource/Orsted, that is proposing to land us in Wainscott in Beach Lane, that is a narrow street that is heavily used by people to access the beach, both in walking, bicycling, jogging, and when I look at the alternative landing site, it is much wider and much more safer for both the residents that access the beach there, as well as the workers. The workers are going to be in a very confined area. Then somebody, and I think it was Mr. Bennett, mentioned about economically feasible. As I understand this project for the South Fork Wind Farm, the cost for the electricity for ratepayers and Suffolk County will be five times higher than any other location in the State of New York. And that concerns me greatly, especially when the adjacent windfarm, Sunrise, is being paid for by all the ratepayers in the State of New York. I don't think that that's proper. I know that that's the agreement that LIPA and Orsted has signed, but I hope that you have input and can go back and suggest that they re-look at that. And then, in addition to that, the project South Fork Wind Farm, the 15 turbines, is being built adjacent to the Sunrise Wind Farm. The difference being, because we had originally asked wouldn't it make sense to just run one cable down to mid-island with the Sunrise and run it in, was that they couldn't because the turbines are producing DC for the South Fork and AC for the Sunrise. Wouldn't it be okay to go back to Orsted/Eversource and say put AC turbines up there, instead of DC and just run the one cable and have less environmental impact, to our ocean bottom and our sea creatures, mammals. Those are the comments that I want to make. The thing that I want to know and hope to know is that BOEM will be looking at those items and making their decision whether to ask or to tell them to adjust, or to accept, or not to accept this project, because, as I see it, there are better alternatives that have not been proposed. And to point that out when I spoke with representatives to PSE&G and LIPA and I said what will be the next savings and CO2 emissions from this project. They told me that, and it took a little bit to get them to respond, initially, they just gave me a smile. But, in fact, they said that they wouldn't be shutting down any of the CO2-generating power facilities in our East Hampton, that they continue to need them to be running things so that they could quickly supply power to the east end of East Hampton. The project has been sold to us as a means to provide peak power during the summer, when air conditioning is being used out there. The wind blows less in the summertime than it does during the wintertime. I wonder the impact to the climate, which this is the goal, ultimately, is to improve our climate and to reduce carbon fossil fuel burning. If we're only adding to CO2 from the equipment used to install this, as well as continuing to run our CO2-generating power facilities, this project doesn't seem to be meeting that guideline to improving our climate or to reducing CO2, or reducing the contribution to climate change, global warming. Those are my comments, and I thank you very much, Meg and panel, and I hope that you will investigate that and you'll make your decision accordingly.
380-13	Simon Kinsella: My name is Simon Kinsella, I support offshore wind generally, but I do not support this project. The evidence that I plan to submit by February 22 demonstrates the following and unnecessarily high price for delivered energy that is double the rate of 16.3 cents per kilowatt hour than Sunrise Wind of 8.1 cents per kilowatt hour. The overall project cost of South Fork Wind is more than $1 billion more expensive per unit of energy over 20 years, than Sunrise Wind. These costs have been concealed from ratepayers. Today, we still do not know the total amount of capacity that will be delivered by South Fork wind, nor do we know the final price that will be passed on to ratepayers for South Fork Wind. This information has been hidden from us. The company that administered the procurement process, PSEG Long Island, awarded South Fork Wind power purchase agreement to its business partner in a noncompetitive recruitment process. South Fork Wind has willfully ignored overwhelming evidence of extensive and pervasive PFAS contamination that exceeds New York state regulatory standards by 100 times in the area where proposes to construct underground, its transmission infrastructure. The reliability of South Fork Wind to provide power when it's needed most during the summer has not been considered by New York State Public Service Commission Article Seven review. Over 8,000 pages were stricken from the record that it tested to wind conditions. For example, if South Fork Wind was installed in 2016, the facility of 132 megawatts would have failed to deliver 82% of their acquired demand for energy on the South Fork from May first August 31 in 2016. Greater protection is needed for marine life, especially on Cox's Ledge and for Atlantic right whales. Necessary research into the correlation between temperature, low wind events, and demand for power has not been conducted. The evidence shows that offshore wind-generated power will not be able to provide energy when it is needed most during the summer. The cumulative wind wake effect has not been adequately researched, and how that will affect onshore conditions. I asked BOEM to conduct a full environmental review pursuant to NEPA in the absence of New York State Public Service Commission Article Seven review. I'll be submitting comments by February 22. Thank you very much for your time.

Response to comments: Ratepayer costs depend on numerous variables beyond the scope of the EIS and which BOEM has no authority to change.

BOEM determined that it is reasonable to assume that if the proposed Project is not built, another project or projects would be constructed because of the need to meet mandates/demand. This assumption also allowed BOEM to assess the maximum-impact scenario in terms of potential impacts. Appendix H of the FEIS considers the influence of offshore wind energy development on climate change and states that offshore wind projects will likely result in a net decrease in GHGs. In response to the concerns about CO2 emissions and net savings, BOEM has updated Section 3.3 of Appendix H of the FEIS to include additional analysis using EPA's AVERT and COBRA tools to assess air quality and health benefits. AVERT uses information about the historical patterns of power generation throughout the year to evaluate the potential for emissions avoided on an hourly basis throughout the year in a specific region, for a given category and size of renewable energy or energy efficiency project.

The FEIS includes proposed mitigation in Appendix G to address concerns about impacts to marine life including the North Atlantic right whale and important habitats.

Comment theme: Purpose and Need development.

Associated comments

Table I-34 provides the full list of comments received as part of this comment theme.

Table I-34. Purpose and Need development comment.

Comment Number	Comment
363-29	The DEIS describes different purposes for the proposed action, grouped by the purposes for the project applicant, BOEM, and cooperating agencies. For the project applicant, these include to develop a commercial-scale OSW facility, in the area of the SFWF lease, with turbines, a substation, and one transmission cable landing in Suffolk County, New York, to contribute to NY's goal of 9,000 MW of offshore wind energy generation by 2030 and fulfill its contractual obligations pursuant to a power purchase agreement with the Long Island Power Authority (LIPA) executed in 2017. BOEM's purpose is to respond to that application by determining whether to approve the Construction and Operation Plan (COP) in furtherance of OCSLA's mandate to make outer continental shelf (OCS) energy resources available for expeditious and orderly development, subject to environmental safeguards including consideration of natural resources and existing ocean uses. For cooperating agencies, the purpose is to consider impacts to relevant resources and, if appropriate, issue permits or authorizations. These described purposes are fundamentally flawed as a matter of law and fact. First, NEPA must be approached to fulfill the agency's purpose and need, not that of a project applicant (although the applicant's interests and objectives may be taken into account). The purpose of NEPA is "to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation." Typically a purpose and need statement must incorporate this overarching purpose in conjunction with action-specific legislation, which in this case is OCSLA. Such an approach is evidenced by BOEM's 5-year plan for oil and gas, which has the stated purpose to implement requirements of OCSLA Sec. 18(a)(3) to "balance the potential for environmental damage, the potential for the discovery of oil and gas, and the potential for adverse impacts to the coastal zone." Following from this correctly framed purpose and need, the 5-year plan then provides a thorough analysis of relevant energy demands and future needs forecasts. An appropriate purpose and need statement for this action would lead BOEM to prioritize OCSLA and NEPA's focus on environmental safeguards and eliminating damage to the environment, rather than on a private agreement executed outside of the NEPA process which would predispose the outcome of environmental review. If anything, this environmental analysis should have informed the power purchase contract, not the inverse. Regardless, an agency cannot circumvent its NEPA obligations "by adopting private interests to draft a narrow purpose and need statement that excludes alternatives that fail to meet specific private objectives" nor can it "craft a purpose and need statement so narrowly drawn as to foreordain approval of" a project proposed by a private party. Moreover, the purpose and need proposed by the private party in this case is poorly grounded in history, as New York's 9000 MW goal for OSW was adopted after the execution of SFWF's power purchase agreement, and long after the leasing and planning process for this project began.

Comment Number	Comment
	In several instances throughout the DEIS, the overly narrow purpose and need statement do in fact improperly limit BOEM's analysis and consideration of an appropriate range of alternatives. BOEM cannot limit its range of alternatives or analysis for this project based on contracts or decisions that were made prior to NEPA review. This is both an established principle of NEPA judicial history and a fact that BOEM has previously acknowledged. It is also important to note that the purpose and need for action under this section of OCSLA--as defined and as it should be defined--differs vastly from public messaging by OSW developers, states, and even the Administration. The two justifications cited for such projects are mitigation of climate change and job creation. If these are priorities of the permitting entities, they should be stated as such and thoroughly evaluated in this and other DEIS documents. If not, they should not be cited as the basis for these projects.

Response to comments: BOEM's decision on SFW's COP is needed to execute its duty to approve, approve with modifications, or disapprove the proposed Project in furtherance of the United States' policy to manage the development of OCS energy resources in an expeditious and orderly manner, subject to environmental safeguards including consideration of natural resources and existing ocean uses (43 USC § 1332(3)). Pursuant to the OCSLA, BOEM is required to manage the development of OCS energy resources in an expeditious and orderly manner, subject to environmental safeguards including consideration of natural resources and existing ocean uses (43 USC § 1332(3)). This mandate requires BOEM to not only consider impacts to natural resources and existing uses, minimized, or mitigated, but also to consider factors that concern the goals of the applicant and the technical and economic feasibility of developing the Project.

Comment theme: Renewable energy project benefits.

Associated comments

Table I-35 provides the full list of comments received as part of this comment theme.

Table I-35. Renewable energy project benefits comment.

Comment Number	Comment
379-13	Adrienne Esposito: My name is Adrienne Esposito. I'm the executive director of Citizens Campaign for the Environment. We are a statewide environmental organization with 140,000 members. Thank you for the opportunity to comment. We'll be submitting more detailed comments, but I just want to make a few brief points tonight. The first is that we, I think it's worth putting into the DEIS, the issue that, although this wind farm won't cause a fossil fuel plant to close, it prevents another one from being built. I've heard several times residents asked if there'll be a carbon dioxide reduction due to plant closure. Well, I think it's important for you remember the whole reason this wind farm was chosen was from a competitive bid to fill an energy need on the South Fork. And that energy need has increased a great deal since COVID, since many more people have moved out there. So, although a plant may not be closing, and that's true, it prevented another fossil fuel plant from being built, because the energy company chose wind over a traditional power plant, and I think that should be in the DEIS.

Response to comments: BOEM determined that it is reasonable to assume that if the proposed Project is not built, another project or projects would be constructed because of the need to meet mandates/demand. This assumption also allowed BOEM to assess the maximum-impact scenario in terms of potential impacts. Appendix H of the DEIS considered the influence of offshore wind energy development on climate change and states that offshore wind projects will likely result in a net decrease in GHGs. BOEM has updated Section 3.3 of Appendix H of the FEIS to include additional analysis using EPA's AVERT and COBRA tools to assess air quality and health benefits. AVERT uses information about the historical patterns of power generation throughout the year to evaluate the potential for emissions avoided on an hourly basis throughout the year in a specific region, for a given category and size of renewable energy or energy efficiency project.

Alternatives Not Analyzed in Detail

Comment theme: Other alternatives that reduce sound energy impacts.

Associated comments

Table I-36 provides the full list of comments received as part of this comment theme.

Table I-36. Other alternatives that reduce sound energy impacts comments.

Comment Number	Comment
144-6	Installation of monopile foundations not only produces significantly more sound energy compared to jacketed foundations, but the resulting in-water structure is monolithic with far less area for marine growth and less habitat in comparison to jacketed foundations such as those used for the Block Island Wind Farm. The third bullet in the next section refers to a potential improvement to aid development of new complex bottom habitat at the base of each turbine. Not only are monopiles less beneficial for marine growth, but they also are far more dangerous during installation. A monopile foundation must not only support the weight of the full turbine system, but it must resist the twisting and turning stresses caused by the wind acting on the long arm of this single shaft from the height of the hub to the bottom of the ocean. This is much different than the jacketed foundation which relies on four legs nailed into the seafloor at an outward angle with cross bracing between the legs for additional support. For this reason, the BIWF needed roughly three-foot diameter piles driven down through the hollow legs, but the new turbines will require 36-foot diameter monopiles driven straight down through the sea floor. We do not know the energy requirements for each because they depend on many design factors, but the energy required for pile driving is dependent on 2 primary factors: pile end resistance and pile side surface resistance. A 36-foot pile has a cross section that is 230 times as great as a 3-foot pile and a surface area per foot of length that is 10 times as great. This means that energy requirements are hundreds of times as great for driving these monopiles compared to the piles needed for the jacketed foundations used at BIWF. Even with 4 piles per foundation the impact of underwater sound energy would be much less during installation of jacketed foundations and a comparison of sound impacts using the two basic designs should be included in the DEIS.
144-17	In addition, considering that the Proposed Action has such significant impacts to fish (as referenced above, injury to finfish greater than 2 grams in size out to a radius of 39,265 feet shown on p. 3-23) and is located in an area of EFH with major concentration of existing fishing, the Proposed Action should include an analysis of alternatives that do not require the enormous energy necessary to drive monopiles into the seafloor. Those alternatives that should be considered include gravity foundations, helical piles, floating platforms, jacketed foundations which require much lower energy levels for pile driving, or other alternatives that do not result in the level of impact that would result from the Proposed Action.
379-11	Rich Hittinger: My next comment is, where is there a complete evaluation of alternatives which require less sound energy impacts, such as gravity foundations, floating platforms, or jacketed foundations, which require much lower energy during pile driving? So, I guess I didn't, I didn't spell my name in the beginning, but it's Rich Hittinger, H-I-T-T-I-N-G-E-R, and I am the first vice president of the Rhode Island Saltwater Anglers Association. I am former vice chairman of the Rhode Island Marine Fisheries Council, and I am a recreational fisherman out of Rhode Island who does a lot of fishing out in this area of Cox's Ledge, so. And I also fish in the area where the Block Island Wind Farm is located. Thank you very much for the opportunity.

Response to comments: BOEM has analyzed the potential impacts of the project design envelope as proposed in the SFWF COP, which includes only monopile foundations. BOEM considered but did not analyze in detail an alternative that would have required other foundation types, described in Table 2.1.5-1. In recognizing potential impacts of the proposed project design envelope, mitigations have been proposed in Appendix G.

Comment theme: Clarify why an alternative location to reduce impacts to Cox Ledge resources was dismissed from analysis.

Associated comments

Table I-37 provides the full list of comments received as part of this comment theme.

Table I-37. Clarify why an alternative location to reduce impacts to Cox Ledge resources was dismissed from analysis comment.

Comment Number	Comment
163-1	Within the discussion of alternatives considered but dismissed (Table 2.1.5-1), the justification for an alternate project location to reduce impacts to Cox Ledge resources is unclear. Concerns relating to impacts to Cox Ledge may not be fully addressed by the fisheries habitat impact minimization alternative (Habitat alternative) as described. The Habitat alternative allows for micrositing or reducing the number of turbines to avoid habitats, but only to an extent to which the project remains viable; there is no guarantee that sensitive habitats can be fully avoided.

Response to comments: BOEM evaluates the proposed action at the location proposed after the developer has conducted evaluation of the proposed location. A different location would be considered a new proposal. Alternatives that were considered but not carried forward for detailed analysis are provided in Table 2.1.5-1.

Comment theme: Lease segregation and alternatives development.

Associated comments

Table I-38 provides the full list of comments received as part of this comment theme.

Table I-38. Lease segregation and alternatives development comment.

Comment Number	Comment
296-2	Specific comments on the SEIS document: Despite the discussion within Table 2.1.5-1 concerning "Alternative location in the Lease Area 0486" and BOEM's dismissal of this alternative for the reasons explained therein, the reality is that Deepwater Wind South Fork created their own hardship by requesting a new lease area boundary (0517) that is commensurate with the SFW project development area. In fact, the DWSF lease area request dated January 16,2020 was filed 15 months after BOEM issued an NOI for the SFW COP EIS preparation on October 18, 2018. In the RICRMC's view, despite the stated reliance upon its regulations to grant the lease request, BOEM should have reasonably foreseen that the developer's request for the 0517 lease area boundary would have ramifications for any meaningful WTG turbine foundation siting alternatives, to achieve the full 15 WTG project. Consequently, the developer may be faced with the elimination of WTG turbine foundation locations and end up with less than the maximum 15 WTG locations due to legitimate fisheries habitat impact minimization concerns.

Response to comments: BOEM's action is to approve, approve with modifications, or disapprove South Fork's COP. BOEM reviewed the assignment application submitted by DWSF and determined that it complied with the technical, financial, and legal requirements for approval under BOEM’s regulations. The assignment was approved by BOEM on March 23, 2020 and had the effect of segregating the area assigned from Lease OCS-A 0486 and created a new lese (i.e., OCS-A 0517). The assignment also had the effect of rendering the “Alternate Location within the Lease Area Alternative” no longer viable because its selection would mean that BOEM would be requiring the lessee to develop the Project in a lease held by a different legal entity and for which another proposal is currently pending evaluation by BOEM (i.e., the Revolution Wind Project proposed by DWW Rev I, LLC). The Revolution Wind Project is intended to satisfy energy demands agreed to under power purchase agreements executed with the States of Connecticut and Rhode Island.

Comment theme: Evaluate an alternative with a reduced number of turbines.

Associated comments

Table I-39 provides the full list of comments received as part of this comment theme.

Table I-39. Evaluate an alternative with a reduced number of turbines comment.

Comment Number	Comment
371-2	The Trustees would also like to point out that the DEIS was prepared assuming the Project would consist of up to 15 wind turbine generators capable of producing 132 MW of energy. However, improvements in turbine technology have become available that could potentially produce the same amount of energy with fewer turbines. If such technology can be deployed here, BOEM should consider reducing the number of turbines and selecting only those turbine locations that will have the least impact on the environment. In so doing, the overall impact of the Project may be substantially reduced.

Response to comments: Thank you for your comment. The Project design envelope allows for the use of turbines from 6 to 12 MW. The Fisheries Habitat Impact Minimization Alternative, as described in Section 2.1.3 of the final EIS and analyzed in each resource section considers the impacts of approving fewer WTG locations.

Comment theme: Evaluate an alternative that uses alternating current (AC) transmission and shares transmission cables with the proposed Sunrise offshore wind project.

Associated comments

Table I-40 provides the full list of comments received as part of this comment theme.

Table I-40. Evaluate an alternative that uses AC transmission and shares transmission cables with the proposed Sunrise offshore wind project comment.

Comment Number	Comment
380-2	Michael Mahoney: Next thing I want you to consider is that this wind farm, South Fork, is being built adjacent to Sunrise. Now, somebody once suggested that they should just combine the cables and just have one trench out in the ocean, and they came back and said well they're using DC turbines on South Fork and they're using AC on Sunrise. Why not just tell the developer to put in AC turbines is my suggestion. Because then we are doing less environmental impact to our sea bottom and that power could be joined with that cable, which is going to run down further, that is a longer route, but that one's going to be run any time, anyhow. In addition, though, running it with the Sunrise would then supply the power to the public at a much lower cost. This South Fork Wind Farm is being paid for by only the ratepayers in Suffolk County where Sunrise is being paid for by all ratepayers in the state in New York. We've been told that South Fork is going to result in Suffolk County having the highest rate cost to ratepayers of anywhere in the State of New York, five times higher than some projects. Combining it with Sunrise, which is being paid for by all the ratepayers in the State of New York, in addition to which Suffolk County is going to be paying for, would result in much lower cost electricity to the ratepayers, which I believe is what should be done. The other thing I'd point out with is that I'm concerned about the company, Orsted Eversource. There has been several litigation matters that have come up there, they've made statements that they haven't honored both companies concerning, and I would encourage you to have a very careful analysis of whether you should even be working with this company. They have not honored commitments that they have made in writing to people in Wainscott. I just regret to say that they're out this, to do this to make money for them, which you know, a for-profit business should do it, but they're not out there to do what's best for the ratepayers and the public. And I want to thank you again for hosting this and I will send you my written thoughts before the 22nd. Thank you, Meg.

Response to comments: Thank you for your comment. SFW proposed to use alternating current (AC) transmission. South Fork Wind, LLC has a power purchase agreement with the Long Island Power Authority to connect to the East Hampton substation. The EIS analyzes the proposed action and BOEM's decision will be based on the COP provided by South Fork Wind, LLC.

Comment theme: Include pertinent information within the body of the EIS document as well as easier access to references.

Associated comments

Table I-41 provides the full list of comments received as part of this comment theme.

Table I-41. Include pertinent information within the body of the EIS document as well as easier access to references comments.

Comment Number	Comment
141-19	Supporting Information As a general observation, despite the potential for significant impacts, the DEIS offers limited project plans and graphics showing the project area, work proposed and generally showing overall project information. Based on our review more could be done to improve access [to] supporting information in the analysis. In some sections the DEIS includes links and the reader must locate supporting information in separate documents that are sometimes linked in their entirety, linked generally to a website that must be reviewed to locate the relevant discussion or in some cases no link is provided. Recommendation: •While we understand the need to link to supporting information to meet established page limits, we recommend that basic project information graphics be presented directly in the body of EIS and early in the document. We also believe that BOEM could take steps to address the disconnect between the discussion in the body of the EIS and supporting documents such as the COP or Appendices to the EIS. As figures, graphics and tables do not count against page total limits/targets we continue to strongly encourage BOEM to present critical project information in the FEIS in this manner including project plans showing WTG locations, proposed cable routes, limits of work and typical sections for the project above and below the water line and seafloor. This information supports the project narrative and will promote a greater understanding of the project. Also noted in our comments on the Administrative DEIS, we continue to recommend the use of hyperlinks directly to the information being referenced or in the absence of a hyperlink that other references include source document information including page number, etc.
166-6	We know BOEM is working under Secretarial Order regarding maximum document length. Our observation while reviewing these documents is that the page limits relegate important content to appendices. BOEM should carefully consider whether additional information can be included in the body of the FEIS. For example, where impacts are deemed to be negligible or minor for a resource, estimates of direct and cumulative effects are provided in Appendix H. We recommend at least summarizing negligible and minor impacts in Table 2.3.1-1. We also suggest that this table would make more sense as part of Chapter 3, which focuses on impacts, rather than at the end of Chapter 2, which focuses on the range of alternatives. In addition, the written descriptions of the geographic analysis areas for each resource (Table E-1 in Appendix E) are fundamental to understanding the assessment and we believe are necessary to include in the body of the document. To the extent that information must be placed in an appendix, we recommend that the document include hyperlinks to figures, tables, and section headings throughout the document. Most of the maps are provided in the appendices to streamline the body of the document, but small reference maps of wind energy areas and lease areas would be useful at intervals throughout the text. Since the EIS frequently references the Construction and Operations Plan (COP), we appreciate that BOEM has provided very specific references to the relevant volumes and sections, as the COP itself is a complex document.

Response to comments: Thank you for your comment. Table 2.3.1-1 provides a high-level summary of all resource impacts. BOEM has worked diligently to provide as much information as is possible, under current regulatory guidance, within the main body of the EIS. Further, the organization of content is consistent with precedent set under the Vineyard Wind EIS. Hyperlinks have not been added, but the EIS does provide detailed section references to other documents (such as the COP).

Comment theme: Increase readability of the figures.

Associated comments

Table I-42 provides the full list of comments received as part of this comment theme.

Table I-42. Increase readability of the figures comments.

Comment Number	Comment
141-21	Please note that Figure F-7 in Appendix F (p. F-23) is illegible. (Comment 141-21)
163-2	The image resolution of certain figures within the DEIS should be increased to improve interpretability. For example, legend text on Figure 2.1.3-1 is barely readable.

Response to comments: Thank you for your comment. We have included a better resolution figure in the Final EIS for Figure F-7. All images can also be zoomed to increase font size and readability in the electronic version.

Comment theme: Fix acronym misspelling.

Associated comments

Table I-43 provides the full list of comments received as part of this comment theme.

Table I-43. Fix acronym misspelling comment.

Comment Number	Comment
163-12	Pages 3-52 and 3-111 use the acronym "EMPs". Is this referencing EPMs? If not, this acronym should be defined within the Abbreviations section.

Response to comments: This was a typo and has been corrected to be EPMs.

Water Resources

Comment theme: Include information on rising sea levels and sunny day flooding in the EIS.

Associated comments

Table I-44 provides the full list of comments received as part of this comment theme.

Table I-44. Include information on rising sea levels and sunny day flooding in the EIS comment.

Comment Number	Comment
133-6	CCE recommends the following are included in the DEIS: 1. A section that identifies the adverse impacts of rising sea levels on Long Island already documented including coastal erosion, saltwater intrusion into our aquifer particularly on the east end of Long Island, increased flooding events, the new phenomena called “sunny day flooding” where streets and low-lying areas are flooded on a sunny, calm days, but higher tides cause communities to flood.

Response to comments: A description of relative sea level trends at tide stations (as reported by NOAA) has been added to Section 3.3 of the FEIS. In addition, a description has been added to describe the impacts of higher sea levels and increased storm surges on coastal erosion and flooding susceptibility (as described by New York Sea Grant).

Comment theme: Reference Ocean Acidification report.

Associated comments

Table I-45 provides the full list of comments received as part of this comment theme.

Table I-45. Reference Ocean Acidification report comment.

Comment Number	Comment
133-10	NYS DEC will be releasing a new report on Ocean Acidification. This report should be referenced in the DEIS.

Response to comments: At this point in time, this document is not yet published. The New York State Assembly, Bill No. SO2411 states the interim report will be prepared no later than December 31, 2021, and the final report will be prepared no later than December 31, 2022. Since this report is not yet published (and likely won't be by the time the FEIS is published), we cannot include it.

Comment theme: Include DEC Environmental Remediation Site and potential impacts to groundwater.

Associated comments

Table I-46 provides the full list of comments received as part of this comment theme.

Table I-46. Include DEC Environmental Remediation Site and potential impacts to groundwater comment.

Comment Number	Comment
338-24	19. Section 3.3.2.1.2 – Onshore Groundwater should include a discussion of DEC Environmental Remediation Site #152250 (the East Hampton Airport) and the potential for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) contamination in groundwater along the onshore SFEC route.

Response to comments: The following additional information on potential environmental contaminants was added to Section 3.3 of the FEIS: DEC Environmental Remediation Site #152250 (the East Hampton Airport) has been added to the discussion of existing onshore groundwater conditions. Information for this site and any updated information from other remediation sites within the analysis area have been gathered from NY DEC and summarized in the FEIS.

Comment theme: Water quality and habitat concerns.

Associated comments

Table I-47 provides the full list of comments received as part of this comment theme.

Table I-47. Water quality and habitat concerns comments.

Comment Number	Comment
145-9	BOEM must analyze impacts to water quality and habitat from offshore wind projects. During installation of the turbine foundations and power cords, sediment will become suspended and impact the marine environment, especially if the sediment contains any toxic materials from historical offshore dumping. Careful analysis of turbine siting should be conducted to minimize the impact from such pollution during construction. Impacts from any fluids released from turbines during operation, such as lubricating oils and coolants, must be monitored and mitigated to the greatest extent possible.
366-6	Water quality itself in and around the turbines, depending on sedimentation and scour, could become disastrous as was the case of the Thanet Wind Farm, in Thanet England Again from OCS Study BOEM 2017-014, section 3.1.11 “COP activities associated with OSW development may temporarily reduce the amount of, or access to, water column habitat due to physical disturbance and/or water quality degradation. Activities related to offshore wind development may affect the water column by increasing vessel traffic and noise, increasing sedimentation, and potentially increasing contamination from construction activities.” Because of sharp tides in and around Cox’s Ledge, BOEM must thoroughly analyze, preferably with in-situ site specific methods to determine tidal flows and strength prior to the siting of Wind Turbine Generators (WTGs). The very real possibility of WTGs, because of hard tide, creating sediment plumes was the unfortunate end result of the Thanet Wind Farm, seen from space by NASA with sediment plumes from turbines monopoles six kilometer’s long and almost 500-feet wide. BOEM should analyze fully the region of the SFWF area and turbine placement.

Response to comments: BOEM appreciates your concerns regarding project impacts to water quality and habitat. Section 3.3 of the FEIS describes both onshore and offshore water quality impacts due to the project and other offshore wind projects. BOEM and others have previously completed studies regarding flows and the movement of sediments in and around the project area; these studies are cited in the EIS (and supporting documents), as appropriate. Appendix G also provides both Applicant-committed measures and other potential monitoring and mitigation measures that BOEM could incorporate into the Record of Decision to further reduce water quality impacts.

Appendices

Comment theme: Appendix A, Table A-1 edits.

Associated comments

Table I-48 provides the full list of comments received as part of this comment theme.

Table I-48. Appendix A, Table A-1 edits comments.

Comment Number	Comment
301-101	In Appendix A, Table A-1, the following edits should be incorporated into the FEIS: • The IHA application was filed with NMFS on September 15, 2020 • The Individual Permit application for Section 404 and Section 10 was filed with USACE on December 23, 2020. • The CECPN was filed with NYSDPS on September 14, 2018, and this filing included request for water quality certification. • The onshore transmission cable will avoid freshwater and tidal wetlands, so Article 24 and Article 25 are not applicable to that portion of the Project. • There is a duplicate entry for NYS OGS (Article 2, Section 3). It should be listed as TBF.

Comment Number	Comment
338-9	The Agencies have identified the following inaccuracies on Table A-1. Cooperating Agencies, Required Environmental Permits, and Consultations for the Project: a. The current State Pollutant Discharge Elimination System (SPDES) General Permit is GP-0-20-001, not GP-0-15-002. b. It is unclear why an Individual SPDES permit may be required for construction greater than 1 acre at the substation. Generally, construction activities over 1 acre are covered under GP-0-20-001, unless they are determined to be an ineligible activity as listed in Part 1, Subparagraph F of GP-0-20-001. c. Table A-1 incorrectly lists Environmental Conservation Law (ECL) Article 70 (Uniform Procedures) as a permit/approval. ECL Article 70 outlines the timeframes and procedures for administering DEC's key regulatory permits and is not a permit/approval. The Coastal Erosion Hazard Area permit that is referenced in Table A-1 is regulated pursuant to Article 34 of the ECL. d. Table A-1 does not differentiate between the DEC permits/approvals that are required for the Montauk O&M facility versus those statutory and regulatory standards under the DEC's original jurisdiction that require a demonstration of compliance pursuant to Article VII of the Public Service Law for the South Fork Export Cable (SFEC). Applications for DEC permits/approvals must be filed with DEC for the Montauk O&M facility, including a Section 401 Water Quality Certification, Article 25 Tidal Wetlands Permit and an ECL Article 15 Protection of Waters Permit (excavation and fill activities). For the SFEC, the following statutory and regulatory standards apply pursuant to the ECL and its implementing regulations in Title 6 of the New York Codes, Rules and Regulations ("6 NYCRR"): (1) ECL Articles 11, 13, and 25 and their implementing regulations regarding marine resources, such as fisheries and habitat; (2) ECL Article 11 and 6 NYCRR Part 182, relating to threatened and endangered Atlantic sturgeon; (3) ECL Article 17 and 6 NYCRR Parts 700-706, relating to water quality; (4) ECL Article 15 and 6 NYCRR Part 608, regarding water quality and excavation and fill activities; and (5) ECL Article 27 and 6 NYCRR Part 360, et seq., relating to disposal and management of solid waste.

Response to comments: Appendix A, Table A-1 of the FEIS was updated as follows:

- The IHA application was filed with NMFS on September 15, 2020
- The Individual Permit application for Section 404 and Section 10 was filed with USACE on December 23, 2020.
- The CECPN was filed with NYSDPS on September 14, 2018, and this filing included request for water quality certification.
- Article 24 was deleted. Article 25 was noted as applicable for the Montauk O&M facility.
- The duplicate entry for NYS OGS (Article 2, Section 3) was deleted and remaining entry listed as TBF.

Table A-1. Cooperating Agencies, Required Environmental Permits, and Consultations for the Project, was also updated as follows:

- The current State Pollutant Discharge Elimination System (SPDES) General Permit is GP-0-20-001. A footnote was added that an individual SPDES permit is not expected since construction activities over 1 acre are covered under GP-0-20-001, unless they are determined to be an ineligible activity as listed in Part 1, Subparagraph F of GP-0-20-001.
- Environmental Conservation Law (ECL) Article 70 (Uniform Procedures) was eliminated as a permit/approval.
- Table A-1 differentiated between the DEC permits/approvals that are required for the Montauk O&M facility versus those statutory and regulatory standards under the DEC's original jurisdiction, per commenter direction.

Comment theme: Appendix A dredging information for the potential O&M facility in Montauk.

Associated comments

Table I-49 provides the full list of comments received as part of this comment theme.

Table I-49. Appendix A dredging information for the potential O&M facility in Montauk comment.

Comment Number	Comment
301-102	In the section on the U.S. Army Corps of Engineers, SFW recommends that the FEIS should include reference to the dredging planned for the potential O&M Facility at Montauk.

Response to comments: Appendix A, U.S. Army Corps of Engineers section was updated to state "As an offshore wind energy project, the Project needs to be situated offshore in the water. The fill activities associated with the Project consist of the inter-array cable armoring at the base of the wind turbine generator (WTG) foundations, protective cable armoring for the South Fork Export Cable, dredging planned for the potential O&M Facility at Montauk, and construction of a temporary cofferdam."

Comment theme: Appendix A section typo on Marine Mammals Protection Act.

Response to comments: In the section on the Marine Mammals Protection Act, the FEIS was updated to state that "NMFS received an application for an IHA from SFW".

Associated comments

Table I-50 provides the full list of comments received as part of this comment theme.

Table I-50. Appendix A section typo on Marine Mammals Protection Act comment.

Comment Number	Comment
301-103	In the section on the Marine Mammals Protection Act, the DEIS indicates that "NMFS received an application for an ITA from DWSF" - this should be IHA.

Comment theme: Appendix A agency contacts.

Associated comments

Table I-51 provides the full list of comments received as part of this comment theme.

Table I-51. Appendix A agency contacts comment.

Comment Number	Comment
301-104	In Table A-2, Lisa Grudzinski should be listed as the contact for the USACE, and SFW understands that Steve Papa will now be the contact for the USFWS.

Response to comments: Table A-2 was updated to replace Lisa Grudzinski with Robert Vietri. The FWS contact was updated to Steve Papa.

Comment theme: Appendix A clarification on the roles and jurisdictions of the cooperating agencies.

Associated comments

Table I-52 provides the full list of comments received as part of this comment theme.

Table I-52. Appendix A clarification on the roles and jurisdictions of the cooperating agencies comment.

Comment Number	Comment
363-20	The division of OSW project review across jurisdictions and project phases make it extraordinarily difficult for a member of the public to understand what is decided or regulated by what entity, if at all. The relationship between various federal, state, and local coordinating or permitting entities and a clear description of their processes must be provided; the DEIS includes only a table (A-1) listing the required permits.

Response to comments: Appendix A of the EIS contains a detailed description of the roles and jurisdiction for other cooperating federal agencies, permitting activities, and the consultation processes that will occur in parallel with the NEPA process for the current leasing stage (COP review). Discussion of other leasing stages is outside the scope of this EIS and any future project stages will be addressed in a separate NEPA document.

Recreation

Comment theme: Analysis and monitoring offshore wind project impacts to recreational activities.

Associated comments

Table I-53 provides the full list of comments received as part of this comment theme.

Table I-53. Analysis and monitoring offshore wind project impacts to recreational activities comment.

Comment Number	Comment
145-3	Offshore wind energy projects constructed through BOEM’s leasing process may cause negative impacts to a broad range of ocean and coastal recreation uses. BOEM must continue to analyze and monitor potential impacts to these activities, as well as resulting socioeconomic impacts. Such activities include but are not limited to, beach going, swimming, surfing, sailing, pleasure boating, diving, bird watching, whale watching, and other wildlife viewing. Scenic enjoyment of the marine environment is a valued aspect of many of these activities, as well as a recognized recreational use itself. Ocean recreation and tourism is the largest and most economically significant ocean use sector in the United States. Tourism, and the recreation it relies on, constitutes the single largest contribution to our ocean economy, engaging millions of Americans, and generating more than $100 billion to our nation’s economy each year. These activities are also critical to sense of place, culture, and quality-of-life in many coastal communities. Accordingly, decisions regarding the potential siting of offshore wind energy development must avoid or minimize impacts to recreational uses and associated values.

Response to comments: Thank you for your comment. BOEM funded the study "Atlantic Offshore Wind Energy Development: Values and Implications for Recreation and Tourism" (Parsons et al. 2018) and other studies addressing tourism and recreation, which are used in the analysis in the FEIS. You can find these studies at: https://www.boem.gov/renewable-energy-research-completed-studies. Through BOEM's Environmental Studies Program, we will continue to collect information in support of the decision process.

Comment theme: Provision of additional information on recreational fishing in the EIS.

Associated comments

Table I-54 provides the full list of comments received as part of this comment theme.

Table I-54. Provision of additional information on recreational fishing in the EIS comment.

Comment Number	Comment
166-28	The DEIS considers for-hire recreational fishing impacts separately from private recreational fishing impacts. The grouping of private recreational fishing with the recreation and tourism resource, rather than with commercial and for-hire fisheries, is not intuitive to us and makes it challenging for readers to understand the full picture of potential impacts on all fishery sectors. If fishery species are affected by the project, this will affect both for-hire and private recreational fishing. Linkages between biological and fishery conditions would be more straightforward to explain if both types of recreational fishing were grouped into a single resource, while still considering their differences, as was done for the grouping of commercial and for-hire recreational fishing. Regardless of how the document is structured, private angling accounted for over 50% of recreational trips made in 2016 and is economically important in the SFWF project area (Fisheries Economies of the United States 2016). By grouping private recreational fishing with the tourism sector and considering it through Appendix H, rather in the main body of the document, we are concerned that the impacts to private recreational anglers are essentially discounted.

Response to comments: There is a paucity of quantitative data related to recreational not-for-hire fishing in the analysis area; therefore, quantitative analysis for this resource is not possible at this time. BOEM is considering how best to approach this issue for future similar projects. The document ""Fisheries Economies of the United States 2016"", is a comprehensive summary document and the data presented discusses the overall economic level for not-for-hire recreational anglers in the offshore New England Region (ME, NH, RI, CT, MA). However, it does not relate to how projects like SFWF are likely to affect not-for-hire recreational fishing, and is not detailed enough in geographic extent to discuss specific recreational angling locations. This data gap will be added to the project's appendix of incomplete/unavailable information.

The following language will be added to Sec 3.5.8 Recreation and Tourism: "Survey results from commercial and recreational fishermen in relation to the Block Island Wind Farm indicate an increase in recreational fishing near the WTGs (Smythe et al. 2018) which can be attributed to the reef-effect that attracts a variety of fish and marine invertebrates. However, the magnitude of benefits to recreational fishermen resulting from the Project may be reduced due to the greater distance from shore (Starbuck and Lipsky 2013). The increase in recreational fishing at the Block Island Wind Farm resulted in increased vessel congestion, which affected commercial and recreational fishermen. These users acknowledged they also had elevated concerns about damaged gear, as commercial, for-hire recreational, and private fishing all continue in the Lease Area. It is possible that recreational fishing in the Lease Area will continue but at a reduced rate as some fishermen could relocate to other fishing locations due to safety concerns."

Comment theme: Project impacts to the Southeast Lighthouse.

Associated comments

Table I-55 provides the full list of comments received as part of this comment theme.

Table I-55. Project impacts to the Southeast Lighthouse comment.

Comment Number	Comment
285-4	The DEIS fails to assess the Project's specific impacts on the unique history and history-related tourism of the Southeast Lighthouse. The DEIS does not properly contemplate the effect of the wind turbine generators (WTGs) on tourism as a result of the viewshed impacts. Under NEPA, BOEM must consider a wide range of effects, specifically including impacts that are "historic, cultural, [and] economic." Yet the DEIS does not consider how the changed viewshed could negatively impact tourism to the Lighthouse. Tourism revenue is vital for the Lighthouse's continued preservation. Further spoliation of Block Island's historic landscape increases the risk of lost tourism revenue. Despite this risk, the DEIS' discussion of tourism blithely dismisses potential impacts without sufficient discussion or research. BOEM must carefully consider the impacts on the Southeast Lighthouse's unique character, which qualifies as a "resource" both to the area's economy and under NEPA's definition. Negative impacts on tourism revenues due to the WTGs may be quite significant and these potential adverse effects must be further analyzed and quantified in the DEIS.

Response to comments: Impacts to historic properties such as the Southeast Lighthouse are addressed in Section 3.5.2 Cultural Resources. Impacts to historic properties will also be assessed under the National Historic Protection Act, and will be mitigated if adverse effects are identified.

General visual resource impacts to non-historic features are addressed in Sec 3.5.9 Visual Resources. The WTGs off Block Island are 4 miles from the Southeast Lighthouse, while SFWF is 19 miles from the lighthouse in roughly the same direction, so if adverse visual effects are experienced from SFWF they would not be new but would add to existing adverse visual effects. Additionally, Sec 3.5.8 Recreation and Tourism does cite a study suggesting that recreational users have relatively low adverse effects from visible intrusions beyond 20 miles. There is no quantitative data available to support how WTGs affect tourism beneficially or adversely at the Southeast Lighthouse. Sec 3.5.8 Recreation and Tourism will be updated with the following qualitative language: "Recreational sightseers at the Southeast Lighthouse on Block Island could experience adverse effects when environmental conditions permit visibility of the new WTGs at a distance of 19 miles, and visibility is not overshadowed by the existing Block Island WTGs. Conversely, existing tourism at locations like the Southeast Lighthouse could benefit from sightseers interested in viewing the Project when environmental conditions permit. A wind farm's visibility from a given recreational location is not considered an adverse or beneficial impact by itself; instead, the tourism impacts are dependent upon on an individual's reactions to the view (Smyth et. al 2018)."

Comment theme: Expansion of recreational analysis to include recreational boaters, divers, and wildlife and whale watchers.

Associated comments

Table I-56 provides the full list of comments received as part of this comment theme.

Table I-56. Expansion of recreational analysis to include recreational boaters, divers, and wildlife and whale watchers comment.

Comment Number	Comment
338-51	The analysis of offshore recreational impacts during construction on p. H-106 should be expanded beyond recreational fishing to include other recreational boaters, divers, and wildlife and whale watchers.

Response to comments: Thank you for your comment. The EIS has been revised to include recreational boaters, divers, and wildlife and whale watchers.

Land Use

Comment theme: Assessment of onshore SFEC impacts to a nearby elementary school and adjacent neighborhoods.

Associated comments

Table I-57 provides the full list of comments received as part of this comment theme.

Table I-57. Assessment of onshore SFEC impacts to a nearby elementary school and adjacent neighborhoods comments.

Comment Number	Comment
141-16	(p. G-3) The SFEC is being installed in previously disturbed areas, however, impacts on a ROW close to an elementary school have not been assessed in the DEIS. We recommend that they be discussed in the FEIS.
287-1	As a 45 year resident at the above address I feel compelled to address the proposed offshore windmill operations and maintenance facility Inlet Seafood Marina on East Lake Drive, Montauk NY. I am totally against this proposal as it will industrialize a remote area at the end of a long dead end road that runs through a residential neighborhood. East Lake Drive is a 3 mile long winding two lane dead end road that is dangerous under the best of conditions. It winds through a residential neighborhood and numerous wetlands. On any given day you will see people walking, jogging, bicycling, pushing baby strollers all along the roadway. My driveway happens to be on a blind curve on East Lake Drive near the Inlet Seafood Marina and under the present conditions it is very hazardous to enter and depart due to speeding vehicles. I am very concerned for the safety of my family, myself and others. The additional traffic that this proposed facility will generate is not suitable for this area and the roadway conditions. Every truck that delivers equipment, materials, fuel, crew members, etc to the proposed facility will have to drive the entire 3 miles then return back along the same roadway. Speeding and careless driving is already a serious safety issue here.

Comment Number	Comment
304-1	I am totally against this proposal as it will industrialize a remote area at the end of a long dead end road that runs through a residential neighborhood. East Lake Drive is a 3 mile long winding two lane dead end road that is dangerous under the best of conditions. It winds through a residential neighborhood and numerous wetlands. On any given day you will see people walking, jogging, walking their pets, horseback riding, bicycling, pushing baby strollers all along the roadway. My home is across from an entrance to an active wildlife park, and deer and other indigenous and threatened species of turtles, snakes, and threatened and listed endangered species of frogs to name few. I live approximately 2000' feet from the Inlet Seafood Marina (proposed site under this proposal in Montauk, New York. Under the present conditions it is very hazardous to enter and depart due to speeding vehicles. I am very concerned for the safety of my family, myself and others. The additional traffic that this proposed facility will generate is not suitable for this area and the roadway conditions. Just last summer several pedestrians were hit by cars walking along this narrow roadway. Every truck that delivers equipment, materials, fuel, crew members, etc to the proposed facility will have to drive the entire 3 miles then return back along the same roadway. Speeding and careless driving is already a serious safety issue here.
332-1	As a 20 year resident at the above address I feel compelled to address the proposed offshore windmill operations and maintenance facility proposed for Inlet Seafood Marina on East Lake Drive, Montauk NY. I am totally against this proposal as it will industrialize a remote area at the end of a long dead end road that runs through a residential neighborhood. East Lake Drive is a 3 mile long winding two lane dead end road that is dangerous under the best of conditions. It winds through a residential neighborhood and numerous wetlands. On any given day you will see people walking, jogging, walking their pets, horseback riding, bicycling, pushing baby strollers all along the roadway. My home is half a mile from an entrance to an active wildlife park, and home to deer and other indigenous and threatened species of turtles, snakes, and threatened and listed endangered species of frogs to name few. I live approximately 1.5 miles from the Inlet Seafood Marina (proposed site under this proposal in Montauk, New York.). Under the present conditions it is hazardous to enter and depart due to speeding vehicles. I am concerned for the safety of my family, myself and others. The additional traffic that this proposed facility will generate is not suitable for this area and the roadway conditions. Last summer several pedestrians were hit by cars walking along this narrow roadway. Every truck that delivers equipment, materials, fuel, crew members, etc to the proposed facility will have to drive the entire 3 miles then return back along the same roadway. Speeding and careless driving is already a serious safety issue here.
343-7	Finally, of great concern is the cumulative effects on a residential neighborhood just one hundred feet away from the East Hampton Substation. At this substation, there are three (3) diesel peaker-plants (of 2 MW each) that were installed nearly sixty years ago (in December 1962) and another jet-powered diesel peaker-plant (of 21.3 MW) that was installed fifty years ago (in December 1970). The age of this equipment at the East Hampton Substation is indicative of the general age of the other equipment and wires in and around the facility (i.e. old and fragile much like myself who was born a month before that jet-diesel peaker-plant was installed). In the same compound are two large storage tanks: one containing Kerosene No. 2 Fuel Oil (of 135,000 gallons); and the other containing Diesel (of 55,000 gallons). These tanks are in proximity to a new five-megawatt battery facility that recently has been built to support the additional power from the proposed new South Fork Wind Farm of 132 to 180 megawatts (the final size of the proposed wind farm has not been disclosed). In addition to this mix is a frail and aging local transmission system. There have been two recent electrical fires: one in January 2020 in the neighboring Bridgehampton Substation (see enclosed article in the East Hampton Star); and a transmission fire on Mill Lane in East Hampton in 2016 (see photos enclosed). Into this dangerous environment, the Applicant plans to connect its proposed 132-to-180megawatt wind farm and to deliver more than double the power that the system was designed to handle. The gross lack of oversight demonstrated elsewhere gives cause for concern over residents' safety that live only one hundred feet away from the East Hampton Substation. Please see the list of documents enclosed (overleaf).

Response to comments: Additional information has been provided in Section 3.5.5 of the FEIS regarding potential Project impacts to the adjacent elementary school.

Section 3.5.5 of the FEIS discloses that construction of the chosen landing site and onshore SFEC route would temporarily disturb neighboring land uses through temporary increases in construction noise, vibration and dust, intermittent delays in travel along impacted roads., vehicular traffic and the traffic plan with East Hampton. Appendix G provides Applicant-committed measures and other potential mitigation measures that BOEM could incorporate into the Record of Decision to reduce public health and safety concerns.

Existing sites of environmental contamination and/or hazardous materials and wastes are evaluated as part of the water quality analysis (see Table 2.3.1-1 and Appendix H). As described in the COP, the interconnection to the East Hampton substation will be developed as part of the NYISO interconnection process and will include all the equipment necessary to safely connect the SFEC with the NYISO transmission system. No change made in the FEIS.

Comment theme: Residential neighborhood impacts associated with the Beach Lane Alternative.

Associated comments

Table I-58 provides the full list of comments received as part of this comment theme.

Table I-58. Residential neighborhood impacts associated with the Beach Lane Alternative comment.

Comment Number	Comment
362-2	Consideration of Residential Neighborhood Impacts BOEM's analysis lacked sufficient consideration of implications of Deepwater Wind's plan to site high-voltage, commercial or industrial infrastructure in a residential neighborhood. Absent consideration of the distinctive problems associated with major infrastructure construction in a residential environment, including the interests of neighboring property owners, BOEM cannot accurately compare the likely outcomes from the various potential routes for the SFEC. BOEM's analysis should reflect that as the first ocean OSW export cable landing to be approved in New York State, the final ROD will set a precedent for subsequent ocean OSW projects. BOEM should consider the precedent of approving a landing site in a non-commercial residential area, which, if repeated, could end up resulting in increased cumulative impacts and repeated community opposition. With respect to this project, BOEM did not consider the considerable community opposition to Deepwater Wind's proposed Beach Lane alignment. The Article VII proceeding before the New York State Public Service Commission is evidence of the intense opposition that has developed in the Wainscott area to Deepwater Wind's proposed Beach Lane cable landing and the 2.0 miles of trenching through residential streets and lanes that the SFEC's construction would require. In the Article VII proceedings, CPW and others have presented detailed analysis of the numerous detrimental impacts associated with the Beach Lane route. Moreover, CPW has presented technical and engineering analysis of the alternative Hither Hills/LIRR and Atlantic Avenue routes that would produce fewer environmental impacts. This opposition to Deepwater Wind's Article VII certificate increases the risk that the Project will either not receive the necessary permits under New York State law required for construction along the Beach Lane route to proceed or, if such permits are issued, additional delay from litigation would result. For example, even if the Public Service Commission grants the Article VII certificate, the likely judicial review of the Commission's decision creates the risk of additional delays that would postpone construction and operation of the SFWF. BOEM should also consider the risks posed by litigation in other venues, including the suit recently filed in New York State Supreme Court by CPW and other plaintiffs against the Town of East Hampton for its unlawful authorization of a resolution approving an easement agreement for Deepwater Wind to construct the SFEC along the Beach Lane alignment. BOEM must consider the well-founded stakeholder opposition to Deepwater Wind's proposed Beach Lane alignment. The Wainscott community is justifiably opposed to the siting of high-voltage transmission infrastructure in its neighborhood, including the prospect of up to two-and-a-half years of disruptive construction that it would require. There is good reason that residential settings such as Wainscott are rarely, if ever, selected for high-voltage transmission cable landings or corridors. The sea-to-shore transition work area where the marine cable makes landfall is the most intensively impacted location along the proposed onshore cable corridor. This work zone would extend more than 600 feet along Beach Lane and would entail excavation for burial of the transition vault, horizontal directional drilling, cable pulling, and staging of generators, heavy equipment, materials and personnel to support the operation. This activity would continue for the 7-month construction window from October through April and could potentially extend for up to 30 months. The Applicant proposes that vehicles and pedestrians share an unrealistic 10-foot wide access lane alongside the transition work area, with construction activities occupying the remainder of the narrow (49.5-foot) right-of-way. Community opposition is so ardent that residents of Wainscott have petitioned the Town of East Hampton, as allowed under New York State law, to hold a vote to incorporate the hamlet as a village, which would permit self-determination with respect to land use issues in the area of the proposed SFEC alignment. BOEM's consideration of the risks and disruptions inherent to the proposed Beach Lane routing due to stakeholder opposition is therefore essential for maintaining public support—not only for this project, but for the ongoing development of OSW resources off Long Island and all along the Atlantic coast.

Response to comments: Thank you for your comment. Section 3.5.5 of the FEIS evaluates alternative impacts to onshore land uses including changes to noise, traffic, EMF generation, and consistency with local land use planning. Comments received during scoping and DEIS comment periods regarding opposition to the Beach Lane landing site are identified in the SFWF Scoping Report and FEIS Response to Comments Appendix. BOEM will make a reasoned determination on which alternative to select in the Record of Decision based on the FEIS findings.

Comment theme: Analysis of potential interconnection facility noise impacts.

Associated comments

Table I-59 provides the full list of comments received as part of this comment theme.

Table I-59. Analysis of potential interconnection facility noise impacts comments.

Comment Number	Comment
322-9	Section 4.12 of Exhibit 4 (Environmental Impact) of the application of Deepwater Wind South Fork, LLC (now South Fork Wind, LLC) to the New York State Public Service Commission pursuant to Article VII of the New York State Public Service Law, a copy of which is Exhibit H to this memorandum, included a noise analysis for the Interconnection Facility at Cove Hollow Road that discussed anticipated noise from two high-voltage transformers, two oil-cooled reactors, and two exterior condenser units (at the control house). This analysis indicated that low noise equipment and a 11.5-foot solid perimeter wall would mitigate the potential noise. The DEIS discusses noise from the offshore facility and other aspects of the onshore project, but does not discuss noise at the onshore Interconnection Facility or proposed mitigation of such noise. It should be revised or supplement to include such discussions.
322-10	The DEIS should also indicate whether generators will be located at the Interconnection Facility and evaluate the cumulative noise impacts of the entire Cove Hollow power facility.

Response to comments: Section 3.5.5 of the FEIS evaluates potential Project noise impacts from the interconnection facility. The existing text states the following: "As designed, the interconnection facility would generate sound below existing, ambient sound levels (VHB 2020). According to federal, state, and local noise standards, there would be no impact and no need for mitigation as a result of the operation of the interconnection facility. The interconnection facility, therefore, would have a negligible adverse impact to land use and no impacts to coastal infrastructure." No changes to the FEIS are warranted.

Comment theme: Montauk O&M consistency with current zoning and land use.

Associated comments

Table I-60 provides the full list of comments received as part of this comment theme.

Table I-60. Montauk O&M consistency with current zoning and land use comments.

Comment Number	Comment
322-15	Similarly, upland improvements may include an office, storage warehouse, lighting, and surface improvements, and more detail regarding specific upland improvements should be provided in the DEIS. It should be noted that O & M improvements that displace or interfere with traditional commercial fishing and pack-out operations would be of concern to the Town and may not be compatible with the Town's adopted Local Waterfront Revitalization Plan (L WRP).

Comment Number	Comment
287-3	The subject property, Inlet Marina, is zoned for Waterfront Business. This zone designation does not provide for industrial use, does not include the use as a transfer station nor the use as a ferry terminal. One has to ask why this facility is necessary in Montauk when an ideal facility for this type of industrial operation already exists in Quonset Point, Rhode Island. Quonset Point is closer to the proposed windmill farm, it is less than ten miles by road from Interstate Route 95 and it is adjacent to a major airport. Whereas the Montauk location is 35 miles by roadway, mostly 2 lane, to the nearest highway, Sunrise Highway. The traffic and congestion is already terrible along this route that winds through a number of small rural towns.
287-6	Please do not place the O&M facility at the Inlet Seafood Marina in Montauk. It is a totally inappropriate location and the disturbance and harm to the environment that it will generate will be immeasurable. Quonset Point, Rhode Island is an established port that can easily handle the needs that are required for the windmills without having to destroy, disturb and disrupt an entire pristine area of eastern Long Island.
304-4	One has to ask why this facility is necessary in Montauk when an ideal facility for this type of industrial operation already exists in Quonset Point, Rhode Island. Quonset Point is closer to the proposed windmill farm, it is less than ten miles by road from Interstate Route 95 and it is adjacent to a major airport. Whereas, the Montauk location is 35 miles by roadway, mostly 2 lane, to the nearest highway, Sunrise Highway. The traffic and congestion is already terrible along this route that winds through a number of small rural towns. If the whole idea of building windmills is to eliminate carbon emissions and burn less fossil fuel then Quonset Point is a more appropriate choice. Some may argue that this facility will bring jobs into Montauk. As a business owner I will attest that I, and a lot of other local businesses, have plenty of jobs to offer but unfortunately there is a limited workforce due to the lack of affordable housing to fill those job opportunities. Please do not place the O&M facility at the Inlet Seafood Marina in Montauk. It is a totally inappropriate location and the disturbance and harm to the environment that it will generate will be immeasurable. Quonset Point, Rhode Island is an established port that can easily handle the needs that are required for the windmills without having to destroy, disturb and disrupt an entire pristine area of eastern Long Island.
332-4	The fact there is an Alternate industrial site in Quonset, R.I. identified, - there is ZERO need to open the door to such industrialization. The subject property, Inlet Marina, is zoned for Waterfront Business. This zone designation does not provide for industrial use, does not include the use as a transfer station nor the use as a ferry terminal. One has to ask why this facility is necessary in Montauk when an ideal facility for this type of industrial operation already exists in Quonset Point, Rhode Island. Quonset Point is closer to the proposed windmill farm, it is less than ten miles by road from Interstate 95 and it is adjacent to a major airport. Whereas, the Montauk location is 35 miles by roadway, mostly 2 lane, to the nearest highway, Sunrise Highway. The traffic and congestion is already terrible along this route that winds through a number of small rural towns. If the whole idea of building windmills is to eliminate carbon emissions and burn less fossil fuel then Quonset Point is a more appropriate choice. Please do not place the O&M facility at the Inlet Seafood Marina in Montauk. It is a totally inappropriate location and the disturbance and harm to the environment that it will generate will be immeasurable. Quonset Point, Rhode Island is an established port that can easily handle the needs that are required for the windmills without having to destroy, disturb and disrupt an entire pristine area of eastern Long Island.

Response to comments: The EIS considers O&M building siting in one location at Montauk in East Hampton, New York, or at one of two potential locations at Quonset Point in North Kingstown, Rhode Island. Additionally, the EIS also considers a range of existing port facilities located in New York, Rhode Island, Massachusetts, Connecticut, New Jersey, Maryland, Virginia, or Canada for offshore construction, staging and fabrication, and/or crew transfer and logistics support. BOEM evaluates the impacts from port usage but does not have jurisdiction over decisions about these facilities.

Details for O&M facilities at existing port facilities are described in Section 3.5.5 of the EIS and Section 3.1.2.5 of the COP. As described in the COP, O&M facilities would be located on an existing waterfront parcel. The EIS notes (in Section 3.5.5) the O&M facility would be consistent with the range of land uses associated with the ports listed in Table 3.1-5 of the COP. The COP describes the majority of ports that can support the Project’s needs are not anticipated to require expansion of or modifications to existing infrastructure; in the event that such locations undertake expansions or modifications, the port owner or lessor will be responsible for securing the necessary federal, state and local permits and overseeing the construction.

Comment theme: Montauk Project-related impacts to resident property rights and current uses.

Associated comments

Table I-61 provides the full list of comments received as part of this comment theme.

Table I-61. Montauk Project-related impacts to resident property rights and current uses comments.

Comment Number	Comment
304-3	The location of this site is already in an area of an over capacity waterway with yachts, fishing vessels, sailboats, paddleboards, rowboats, peddle boats, recreational vessels and windsurfers. The increased dredging necessary will also DIRECTLY affect our private property rights for those who have waterfront homes such as myself. The increase in water INFLUX into Lake Montauk after dredging to the depths and volume cited herein, will accelerate our erosion and damages to our personal beaches, and way of life. A storm event could wipe out our homes, and properties, for which I preserve my rights and this e of my neighbors to put this on record. This location will Directly and Adversely affect our livelihoods, our water quality, and our PRIVATE PROPERTY RIGHTS ! A cause of accelerated Erosion and Increased Environmental Impact of our near shores and Private shorelines will and can be Challenged for decades in court under the Private Property Rights granted in and verified with Aerial mappings over the past years! The fact there is an Alternate industrial site in Quonset, R.I. identified, - there is ZERO need to open the door to such a High Net Worth area of Homeowners with HUGE Price per square Foot of beach to be at DIRECT RISK -The subject property, Inlet Marina, is zoned for Waterfront Business. This zone designation does not provide for industrial use, does not include the use as a transfer station nor the use as a ferry terminal.
332-3	The location of this site is already in an area of an over capacity waterway with yachts, fishing vessels, sailboats, paddleboards, rowboats, peddle boats, recreational vessels and windsurfers. The increased dredging necessary will also DIRECTLY affect waterfront property owners. The increase in water INFLUX into Lake Montauk after dredging to the depths and volume cited herein, will accelerate our erosion and damage beaches, and way of life. A storm event could wipe out our homes and properties.

Response to comments: Erosion-related impacts are analyzed in the FEIS (see Table 2.3.1-1 and Appendix H). Appendix G provides Applicant-committed measures and other potential mitigation measures that BOEM could incorporate into the Record of Decision to reduce erosion-related and other shoreline concerns. Potential Project impacts to property rights are described in Section 3.5.5. No change made in the FEIS.

Comment theme: Interconnection Facility design to reduce visual and noise effects.

Associated comments

Table I-62 provides the full list of comments received as part of this comment theme.

Table I-62. Interconnection Facility design to reduce visual and noise effects comment.

Comment Number	Comment
322-11	As noted above, the Project has been submitted to the Town's Architectural Review Board for review of the proposed concrete wall at the Interconnection Facility, with an indication that the purpose of the wall is to provide a visual barrier to the electrical equipment and to reduce noise emissions. The proposed concrete wall will deflect sound and the noise analysis in the DEIS should indicate whether this factor has been taken into account.

Response to comments: As described in Section 3.5.5, as designed, the interconnection facility would generate sound below existing, ambient sound levels. No changes to the EIS are warranted.

Comment theme: Restrictions on construction timing and beach access.

Associated comments

Table I-63 provides the full list of comments received as part of this comment theme.

Table I-63. Restrictions on construction timing and beach access comments.

Comment Number	Comment
322-12	Page H-112 of the DEIS discusses, as mitigation, that, if BOEM requires the mitigation measures identified in Appendix G, such as complete avoidance of construction activities from Memorial Day through Labor Day that would impede traffic or access to recreational areas, minor and short-term adverse impacts for local residents who recreate during non-summer months would be further reduced. The DEIS should be updated to describe the specific seasonal, daily, hourly, and other limitations on construction, agreed to by South Fork Wind, LLC, that are required in the Town's Easement Agreement for the Project, a copy of which is Exhibit I to this memorandum (see, e.g., Paragraph 1.4 of the Easement Agreement and Paragraphs 1, 17, 19, 24, 30, 112, and 113 of Schedule B to the Easement Agreement).
322-13	South Fork Export Cable (SFEC) and Beach Lane Landing Site The Construction and Operation Plan (COP) for the Project identified a 30-foot target depth beneath the beach for the export cable's sea-to-shore transition, and the Project's ability to adhere to this depth should be confirmed. Beach Lane is a Town road with limited parking for use by Town residents. The extent and duration of reduced public access to the beach during construction of the sea-to-shore transition should be identified in the DEIS, and the DEIS should also identify agreed-upon mitigation for such impacts, as set forth in the Town's Easement Agreement for the Project (see, e.g., Paragraph 1.4 of the Easement Agreement; Paragraphs 1, 4, 6, 10, 11, 12, 32, 39[c], 39[m], 39[n], 40[£], and 40[o] of Schedule B to the Easement Agreement; and Paragraph 1 [c] of the "Road Use and Crossing Agreement" -- Exhibit 1 to Schedule B to the Easement Agreement).
338-33	The DEIS includes a 12-month construction window for the SFEC. However, the developer has agreed to time of year restrictions (including for construction activities) as part of the ongoing Article VII proceeding. As such, the Final EIS should include an updated timeline.

Response to comments: Construction is anticipated to take place over days or weeks. As described in Section 3.5.8, DWSF will establish in coordination with local communities, groups, and Hither Hills State Park, a construction schedule to minimize impacts to the local community during the summer tourist season. As described in Section 3.5.8 of the EIS and Section 3.2.2 of the COP, pedestrian and vehicle access at Beach Lane would be maintained throughout construction.

Comment theme: Dredging details associated with the Montauk O&M facility.

Associated comments

Table I-64 provides the full list of comments received as part of this comment theme.

Table I-64. Dredging details associated with the Montauk O&M facility comments.

Comment Number	Comment
322-14	Operation and Maintenance (O& M) Facility in Montauk The DEIS identifies Montauk Harbor as a potential location for an operation and maintenance (O & M) facility to support operations at the South Fork Wind Farm. The O & M facility may require site improvements affecting both the marine and terrestrial resources on and adjacent to the property where the O & M facility will be located. The DEIS identifies initial and maintenance dredging, the enlargement of docks, addition of slips, bulkhead repair, and bank stabilization to facilitate crew transport vessels and a 60- foot crane that would be berthed at the O & M facility. Moreover, the DEIS indicates that dredged spoils are proposed to be trucked to nearby beaches for beach nourishment. However, the identification of proposed dredging depths, locations, and volumes at and adjacent to the O & M facility site is necessary to assess compliance of the proposed O& M uses with local zoning regulations. Similarly, the details of any bank stabilization and new shore hardening should be identified. The placement of dredged sediment for beach nourishment requires additional details in the form of design plans and timing to ensure such dredged sediment can be added to beaches currently proposed to receive sediment as a result of the Federal Lake Montauk Navigational Improvements Plan or the Fire Island to Montauk Point (FIMP) reformulation plan.
330-3	Overall, CCOM supports the thorough and comprehensive analysis and recommendations that BOEM has made in the DEIS, and look forward to the approval process moving forward. That said, regarding the document’s discussion of the proposed operations and maintenance (O&M) facility in Montauk Harbor, CCOM would like to see greater detail specific to initial and maintenance dredging, potential improvements to docks and additional slips, and any changes to the property to the extent that they may have environmental impacts. In addition to requesting greater clarity from BOEM on the plans for the Montauk O&M facility, CCOM expects a rigorous Town of East Hampton permitting process for any change within Lake Montauk related to the O&M facility, as would be the case with any significant project, including potential permits from the town’s Natural Resources Department and/or Planning Department for a site plan review, as required.
338-6	The scope of upgrades for the Operations and Maintenance (O&M) facility at Port of Montauk, NY has been refined in the federal permit application to the U.S. Army Corps of Engineers (USACE). The Agencies recommend that the COP and DEIS be updated to reflect the current scope of activities, including eliminating the bulkhead refacement and waterward encroachment and reducing the area and volume dredged (i.e., dredge up to approximately 2,500 cubic yards of sediment from an approximately 1,500 square foot area to a depth of 12.4 feet below the plane of mean low water, including a 1-foot overdredge).

Response to comments: Additional details regarding anticipated dredging depths, locations, and volumes have been updated throughout the EIS. Please see Section 2.1.1.1.5, 3.3.2.2.3, and 3.5.5.2.3 for information specific to the O&M facility at Montauk Harbor. Also see Appendix BB3 of the COP.

Comment theme: Growth-inducing impacts associated with Montauk O&M facility improvements.

Associated comments

Table I-65 provides the full list of comments received as part of this comment theme.

Table I-65. Growth-inducing impacts associated with Montauk O&M facility improvements comment.

Comment Number	Comment
338-49	As requested in the Agencies’ scoping comments, the analysis should evaluate growth-inducing aspects if improvements are made to the Montauk O&M facility and whether there could be adverse effects to existing uses including ferry service, seafood processing and distribution, transportation given limited onshore routing alternatives, and cumulative effects if the Proposed Action occurs concurrent with the USACE-proposed deepening activities. Additional, site-specific detail should be provided describing potential impacts to demographics (Section 3.5.3) land use and coastal infrastructure (Section 3.5.5), vessel traffic and existing port operations (Section 3.5.6 and Appendix H), and cumulative effects (Appendix E).

Response to comments: The FEIS analyses impacts on existing resources within the scope of the proposed O&M facility. See Section 3.5.5.2.3 for a description of potential changes to the Port of Montauk as a result of the project.

Navigation

Comment theme: Project will not affect marine navigation and safety.

Associated comments

Table I-66 provides the full list of comments received as part of this comment theme.

Table I-66. Project will not affect marine navigation and safety comments.

Comment Number	Comment
121-4	I will close in saying that I have crisscrossed many oceans and entered many ports around the world often crossing busy shipping lanes and have encountered all manner of obstructions and hazards to navigation. It is often dangerous work especially at night in bad weather. Fortunately with modern marine electronics and radar we are better prepared than ever to make it back to port safely.
320-3	Furthermore, WindServe Marine's parent company, Reinauer Transportation, has operated offshore near these proposed lease areas supporting critical commerce in marine transportation between New York and Canada for over 97 years. In our review, we have determined that the project as proposed will have no adverse effects to marine safety and navigation.
367-1	Overall, the DEIS sufficiently evaluates the impacts to navigation safety of waterway users and our missions. The Coast Guard supports the Proposed Action Alternative, which is a lNM by lNM spacing and layout, in alignment with other proposed adjacent wind farms. As we concluded in the Massachusetts/Rhode Island (MA/Rl) Port Access Route Study (MARIPARS) report (referenced in the DEIS as USCG 2020), the best outcome to mitigate effects on safe navigation and Coast Guard missions is the adoption of a uniform grid pattern across the entire MA/Rl wind energy area. The standard and uniform grid pattern may also mitigate cumulative impacts to commercial and recreational fishing. We understand small variances may take place in the siting of individual wind turbine generators. Small variances throughout the wind farm should not significantly affect safety of navigation. The MARIP ARS provided quantitatively derived recommendations for turbine spacing and transit lane widths, however, any variances in turbine location should not reduce these diagonal lanes to less than the 0.6 NM recommended.

Response to comments: Thank you for your comment.

Comment theme: Navigation and safe transit through offshore wind farms requires additional analysis.

Associated comments

Table I-67 provides the full list of comments received as part of this comment theme.

Table I-67. Navigation and safe transit through offshore wind farms requires additional analysis comments.

Comment Number	Comment
380-31	Bonnie Brady: The DEIS talks only about 15 turbines but doesn't hit the cumulative effect of a Rhode Island/Massachusetts wind energy area that is two-thirds the size of the Grand Canyon National Park. I, we were part of a meeting, two years ago in November, trying to get these transit lanes and was told by this company Orsted, you can either go east, west, or you can go south, let me see what is, it northwest-southeast but you can't go both ways, which would require a 70-nautical-mile jog around this wind turbine. That is completely unacceptable. Overall, the cumulative impacts of transit is unclear, and it's inconsistent analysis.

Comment Number	Comment
363-48	The DEIS fails to sufficiently analyze navigational safety which continues to be a deep concern held by the fishing industry. RODA has submitted numerous comments to BOEM and USCG outlining safety concerns on the proposed uniform 1x1 nm spacing design supported by OSW developers. These are summarized in brief here and more detailed justification can be found in the submitted letters, which are incorporated by reference. RODA's justification for transit lanes of 4-mile width is contained in this series of communications. In short, BOEM must properly analyze impacts to safe navigation and vessel traffic prior to decisions made on the impacts from this project. This should be conducted for all alternatives described by the DEIS.
363-47	The DEIS also masks the obvious safety benefits of minimizing hazards in historic fishing vessel transit locations. There are several examples: The DEIS states that transit lanes of 2-3 nm would have the same impacts as the Proposed Action "because the lane would not overlap any proposed WTGs or the OSS." This would clearly not be the case in the cumulative effects analysis if it properly considered such lanes in the entire MA/RI lease area. • The map included in the description of this alternative is misleading as it does not include the size and location of the 1400 square miles of contiguous lease areas. • The DEIS characterizes overall cumulative adverse impacts as "moderate" and states that, when compared to the Proposed Action, cumulative navigation impacts could slightly increase or decrease depending on final design. This simply does not make sense and provides no justification for the conclusion. • The DEIS states "[w]hen compared to the Proposed Action, the transit corridor could facilitate or hinder vessel transit, depending on the type of vessel. The transit corridor could increase the potential for allision, collision, and other navigation conflicts as compared to the Proposed Action." Again, the proposed action consists of up to 15 turbines in 3 rows. The transit lane alternative consists of up to 12 turbines in 2 rows. If there is an explanation for how the latter alternative could increase the potential for collisions in comparison to the former, it must be provided. • Elsewhere in the document, in the section on Environmental Justice, BOEM reaches a different conclusion: "When compared to the Proposed Action, air, water quality, and commercial fishing impacts could slightly decrease depending on final design" based on the transit lane alone. This needs to be explained.
355-9	Safety The industry has been consistent in asking for turbine spacing and transit lane location/spacing for the safety of the industry for fishing and navigating throughout the wind energy area. We have made the case many times that windfarms will create an additional hazard on the water, especially in foul weather, and will hamstring search and rescue efforts. Page 205 in the DEIS acknowledges and confirms that very concern. "Wind energy structures would be visible on military and national security vessel and aircraft radar. Nonetheless, the presence and layout of large numbers of WTGs could make it more difficult for SAR aircraft to perform operations, leading to less effective search patterns or earlier abandonment of searches. This could result in otherwise avoidable loss of life due to maritime incidents". If this is the case, why is there not a requirement to spread these turbines further apart? We need to consider the hazards to safety that a complete build out of all the wind farms will have on the fishing industry and SAR efforts. This is just one of several reasons why we have been advocating for wider spacing between turbines and wider spacing for transit lanes.
166-32	We continue to hear concerns from commercial fishing partners about navigation safety, including the potential for impacts to use of radar. The continued ability of the Coast Guard to effectively conduct search and rescue, or SAR operations, described in the Other Uses analysis, is also of concern. The ability of fishing vessels to operate within the South Fork Wind Farm and adjacent wind farms will influence the magnitude of negative effects of the projects on commercial fisheries. The impact information related to navigation and vessel traffic is narrowly included in one summary table (Table 2.3.1-1) and kept primarily in Appendix H; it would be helpful to pull some of this information forward, especially the cumulative effects, to the impacts section (3.5.6). This is important because even though it is technically feasible to transit through the South Fork Wind Farm, safety concerns and navigational complexity appear understated in other parts of the draft text. For example, successful transit is dependent upon many factors including environmental conditions, radar cluttering and shadowing and gear conflict with other resource users. Safety concerns pertinent to commercial and for-hire fisheries likely apply to private recreational anglers as well. We hope BOEM will recommend any mitigation measures included in Table G-2 that make transit and fishing in the wind farm safer, beyond those already required under Federal Aviation Administration, United States Coast Guard, and BOEM guidelines.

Comment Number	Comment
360-11	In the DEIS, the geographic analysis area for navigation and vessel traffic only includes the Rhode Island and Massachusetts lease areas for the cumulative analysis scenario. However, in a footnote in the appendix, the DEIS further adds that the spacing/layout for projects/regions are as follows: The spacing/layout for projects/regions are as follows: NE State water projects include a single strand of WTGs and no OSSs; for projects in the RI and MA Lease Areas, a 1 × 1–nm grid spacing is assumed; for the projects in the New Jersey/New York and the Delaware/Maryland lease areas, BOEM assumes that a 1 × 1–nm grid spacing also would be utilized; for the Coastal Virginia Offshore Wind Project, the spacing is 0.7 nm; and the Dominion commercial lease area off the coast of Virginia would utilize 0.5 nm average spacing, which is less than the 1 × 1–nm spacing due to the need to attain the state's goals. Because vessel traffic outside the Massachusetts and Rhode Island lease areas is likely to be very different, as the DEIS seemingly recognizes, there should not be an assumption that the spacing layout will be employed outside the geographic area considered in the DEIS, but it is reasonable to assume that the Coast Guard will tailor recommendations to BOEM for other lease areas based on a detailed assessment of vessel traffic in those areas. The Coast Guard already has several proceedings underway that are considering vessel navigation safety needs vis-à-vis offshore wind and other ocean activities, including multiple port access route studies and the fairways rulemaking docket. Thus, vessel navigation and transit issues will depend on project-specific considerations and, therefore, should be deferred to future environmental analyses. Further, the evidence in the record does not support holding projects in other areas along the Eastern Seaboard to a comparable layout scheme as the wind energy areas in the DEIS. Therefore, even if BOEM is considering employing aspects of the cumulative impact analysis in the DEIS as a template for future offshore wind projects in other areas, it should explicitly state in the final EIS that the layout expectations in the cumulative impacts analysis will not be used to set the standard for 1 x 1 NM spacing on projects outside of the Massachusetts and Rhode Island wind energy areas.

Response to comments: Thank you for your comment. The USCG has assessed the uniform 1 x 1 NM layout, without any additional transit lanes, and compared it to proposals with transit lanes in the MARIPARS (Massachusetts Rhode Island Port Access Route Study) that was released in May 2020. The USCG has endorsed the 1 x 1 NM layout, finding that the standard and uniform grid pattern will "would allow for safe navigation and continuity of USCG missions through seven adjacent wind farm lease areas over more than 1400 square miles of ocean.

The potential for increased collisions is disclosed in section 3.5.6.2.3 of the FEIS.

Comment theme: Consistency with the Coast Guard’s MARIPARS study.

Associated comments

Table I-68 provides the full list of comments received as part of this comment theme.

Table I-68. Consistency with the Coast Guard's MARIPARS study comments.

Comment Number	Comment
367-2	The mitigations listed in the DEIS Appendix G are consistent with the Coast Guard's input to the Vineyard Wind project and are intended to further reduce the impacts of the South Fork Wind Farm. Additionally, the Coast Guard recommends the following: a. Aviation Lighting Requirements: Aircraft operating within or near the wind energy area, including Coast Guard aircraft, need turbine lighting that is compatible with current Night Vision Imaging Systems (which includes Night Vision Goggles). This will allow aircraft to navigate effectively and safely within a wind farm for search and rescue, national defense, law enforcement and homeland security operations in addition to commercial aircraft supporting wind farm construction and maintenance. The DEIS did not include a mitigation measure that addresses this need. FAA Advisory Circulars 70/7460-lM, 150/5345-43}, and FAA Engineering Brief#98 provide guidance on such lighting. Although FAA authority extends to 12NM, for consistency in all projects, we request that BOEM apply FAA guidance to this project. Additionally, BOEM should incorporate the Circular into the Final Lighting and Marking Guidelines, when published, to ensure turbine lighting is standardized. b. Re-Evaluation: The Coast Guard requests the opportunity to re-evaluate any analyses submitted by South Fork, or require additional analysis after installation (e.g., to determine post-installation radar and communications impact) including the following: (1) On 16 February 2021, BOEM informed Coast Guard that 0rsted submitted an updated NSRA. At this time, it is unknown if the additional information would change the feedback provided in this letter. We will conduct an in-depth review of that document and may provide additional input to BOEM separately. (2) As of today, all comments submitted to the Federal Register docket are unavailable for review. We will conduct an in-depth review of those comments for pertinent information related to our authority as a cooperating agency and may provide additional input to BOEM separately. c. Periodic Review: The wind farm installation and operation, including the control center and its operators, and all plans and policies related thereto, should be subject to regular review by the Coast Guard on at least an annual basis, or more frequently if circumstances dictate. d. Amending Mitigations: The Coast Guard requests the opportunity to suggest amendments to approved mitigations at any time before, during, or after installation of the wind farm should material facts or circumstances come to light that were either unforeseen or were not reasonably available at the time these conditions were issued.
360-10	We encourage BOEM to follow the recommendation of the USCG that the uniform 1 X 1 NM grid pattern is preferable to 4 NM grid patterns because of negative impacts to navigation from the Vessel Transit Lane Alternative, as discussed below.
360-11	In the DEIS, the geographic analysis area for navigation and vessel traffic only includes the Rhode Island and Massachusetts lease areas for the cumulative analysis scenario. However, in a footnote in the appendix, the DEIS further adds that the spacing/layout for projects/regions are as follows: The spacing/layout for projects/regions are as follows: NE State water projects include a single strand of WTGs and no OSSs; for projects in the RI and MA Lease Areas, a 1 × 1–nm grid spacing is assumed; for the projects in the New Jersey/New York and the Delaware/Maryland lease areas, BOEM assumes that a 1 × 1–nm grid spacing also would be utilized; for the Coastal Virginia Offshore Wind Project, the spacing is 0.7 nm; and the Dominion commercial lease area off the coast of Virginia would utilize 0.5 nm average spacing, which is less than the 1 × 1–nm spacing due to the need to attain the state's goals. Because vessel traffic outside the Massachusetts and Rhode Island lease areas is likely to be very different, as the DEIS seemingly recognizes, there should not be an assumption that the spacing layout will be employed outside the geographic area considered in the DEIS, but it is reasonable to assume that the Coast Guard will tailor recommendations to BOEM for other lease areas based on a detailed assessment of vessel traffic in those areas. The Coast Guard already has several proceedings underway that are considering vessel navigation safety needs vis-à-vis offshore wind and other ocean activities, including multiple port access route studies and the fairways rulemaking docket. Thus, vessel navigation and transit issues will depend on project-specific considerations and, therefore, should be deferred to future environmental analyses. Further, the evidence in the record does not support holding projects in other areas along the Eastern Seaboard to a comparable layout scheme as the wind energy areas in the DEIS. Therefore, even if BOEM is considering employing aspects of the cumulative impact analysis in the DEIS as a template for future offshore wind projects in other areas, it should explicitly state in the final EIS that the layout expectations in the cumulative impacts analysis will not be used to set the standard for 1 x 1 NM spacing on projects outside of the Massachusetts and Rhode Island wind energy areas.

Comment Number	Comment
345-1	Mayflower would like to comment on the Vessel Transit Lane Alternative out of the three action alternatives evaluated. The Vessel Transit Lane Alternative included a designated transit lane of 4 nautical miles in width, one of several proposed by the Responsible Offshore Development Alliance (RODA) in January 2020. The evaluated transit lane would intersect the southern portion of the South Fork Wind Farm lease area (OCS-A 0517), effectively eliminating the southern row of foundation locations, as well as the Mayflower lease. Two additional transit lanes were proposed by RODA that also would impact the Mayflower lease. In considering the various direct and indirect impacts of the Vessel Transit Lane Alternative as required under NEPA, BOEM determined that navigation and maritime safety with respect to commercial fishing would be among the most potentially affected resources. In this respect, BOEM considered the expert, independent study of navigation and safety risks conducted by the United States Coast Guard in 2020 (the MARIPARS report). Importantly, the MARIPARS report concluded that 1-nautical-mile wide east-to-west paths (to which the MA and RI offshore wind leaseholders have committed) would facilitate traditional fishing methods, 1-nautical-mile-wide north-to-south paths would provide adequate access for search and rescue access, and that 0.6- to 0.8-nautical-mile-wide northwest-to-southeast paths would allow commercial fishing vessels to traverse from port through the lease areas and to fishing grounds, all in a predictable and safe manner and without the need for additional routing measures. These three lines of orientation more than satisfy published United States Coast Guard standards for safe navigation in development of offshore wind. Additional transit lanes beyond the ample sea space provided in the predictable and measured 1x1 grid would unquestionably hinder, and in cases like Mayflower, decimate delivery of contracted supply to the market and put New England's energy security at risk. In light of the MARIPARS report's expert conclusions, which already took the RODA proposal into consideration, BOEM would be appropriately justified in relying on the MARIPARS report to determine that Vessel Transit Lane Alternative is not the preferred alternative.
301-14	In Table 2.3.1-1, Comparison of Alternatives, the DEIS provides different, and conflicting, rationale for the comparison of the Vessel Transit Lane Alternative and the Proposed Action Alternative for impacts to Navigation and Vessel Traffic and to Commercial Fisheries and For-Hire Recreational Fishing. For Navigation and Vessel Traffic, the DEIS states that the "Overall cumulative adverse impacts [for Vessel Transit Lane Alternative] would be moderate. When compared to the Proposed Action, navigation impacts could slightly increase or decrease depending on final design." This overestimates the cumulative adverse impact to navigation safety, as demonstrated by the MARIPARS report, which evaluated the cumulative impact, i.e., a full build-out of the entire MA/RI WEA (which is essentially identical to the Geographic Analysis Area for navigation safety defined in Appendix 3 of the DEIS) and determined that a 1-NM x 1-NM grid layout, in an east/west/north/south orientation, preserves navigation safety. This also ignores the findings included elsewhere in the table for Commercial Fisheries and For-Hire Recreation Fishing, which are also affirmed in the MARIPARS report, stating that vessel transit lanes "could increase the potential for allision, collision, and other navigation conflicts as compared to the Proposed Action" (p 2-18), resulting in a finding that the cumulative adverse impacts of the Vessel Transit Lane Alternative would be moderate. SFW recommends that findings related to allision, collision and other navigational conflicts should be consistent for all resources and should be based on the findings of the MARIPARS report.

Comment Number	Comment
167-5	Regarding vessel traffic though, we were disappointed to see the Vessel Transit Lane Alternative included in this DEIS and urge BOEM to instead work with experts at the U.S. Coast Guard to create a just and workable approach for this and future projects. This, of course, is a matter thoroughly litigated in the recent Vineyard Wind DSEIS. Just as NOIA stated in that docket, the concept of a uniform layout will effectively accommodate vessel transit without significant impact, even though a 1 nautical mile layout as generally agreed to by industry and included in the South Fork proposal is already a concession that reduces density of turbines. Quite simply, a 1x1 layout best balances the interests of all who want to use federal waters; no one gets everything they want but no one is grievously harmed. We defer to the experts at the Coast Guard who have reviewed a uniform, well-spaced layout for offshore wind projects. Just last year in the Port Access Route Studies, we were told that: USCG has determined that if [wind energy] turbine layout is developed along a standard and uniform grid pattern, formal or informal vessel routing measures would not be required as such a grid pattern will result in the functional equivalent of numerous navigation corridors that can safety accommodate both transits through and fishing within the WEA. While these navigation corridors would be smaller than those suggested by some commenters, the USCG believes they should be sufficient to maintain navigational safety and provide vessels with multiple straight-line options to transit safely throughout the MA/RI WEA. As you know, the Transit Lane alternative would create a 4 nautical mile-wide transit lane through the South Fork project. At the very least, such an approach is proven to reduce the ability to produce energy from the Wind Energy Area (WEA) in this region, something mentioned by various commenters in the Vineyard Wind SEIS and a clear negative in-and-of its own right. While there is some belief in the fishing community that these wider lanes are needed, as the Business Network for Offshore Wind commented in that docket that a precedent for creating wide transit lanes through wind areas would reduce the clean energy production in the area and “constrain the U.S. OSW industry’s ability to mitigate climate change, the end result being even greater negative impacts upon fisheries in southern New England and along the Eastern Seaboard.” Climate change is well-established as a threat to fisheries and fishing communities, and construction of abundant renewable energy resources is a critical tool for combating climate change. The precedent of reducing America’s ability to produce renewable energy from the earliest offshore wind projects should be avoided entirely. Wider lanes could end up chilling investment and opening the possibility that some offshore wind projects do not become reality for the Atlantic Coast. However, our concerns are also for the more immediate safety of mariners. As the Coast Guard found, wider transit lanes amidst energy projects as considered here in the South Fork transit alternative would mean that “most traffic would be funneled into the corridors thereby increasing traffic density and risks for vessel interaction.” As we stated in the Vineyard Wind supplemental’s record, NOIA’s member companies have nearly half a century of experience with running vessels through multi-use areas, primarily in the Gulf of Mexico. This is an area that sees military, energy, commercial and recreational traffic regularly sharing common waterways. An arbitrary, limited number of corridors for a variety of ships will never be a prudent approach to routing vessel traffic, especially for ships which will come from different fleets, different ports, and different industries. Congested transit lanes are a source of consternation and concern and should not be artificially created lightly.
301-11	"From a navigational safety standpoint, implementation of several 4-NM-wide transit lanes that prohibit surface use, as proposed by RODA, are not based on any scientific study or data and directly contradict the United States Coast Guard (“USCG”) findings in The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study (“MARIPARS”) report. The MARIPARS report demonstrates that vessel transit lanes are not reasonable. Throughout the DEIS, repeated statements assert that, among other things: • “The vessel transit lane…could facilitate transit of vessels through the Lease Area…” (pg. 2- 8), and • “If the Transit alternative is implemented, impacts related to allision and collision risk could be reduced throughout all lease areas.” (pg. 3-105). These statements are not supported by the record. In fact, the marine navigation safety expert in the United States, the USCG, has reached the opposite conclusion after an exhaustive study laid out in its MARIPARS report, referenced in the DEIS (pg. H-88). The USCG MARIPARS report clearly states that transit lanes, as proposed in the Vessel Transit Lane Alternative (Table 2.3.1-1), are not necessary to preserve, and in fact fail to preserve navigation safety. Such lanes would actually increase risk and make navigation more dangerous. SFW highlights the following information that should be referenced in the FEIS. • In its Federal Register notice announcing the availability of the final MARIPARS report (85 FR 31792), the USCG stated, “Although these larger navigation corridors may appear to provide more area for navigation, they actually provide far less area than the numerous corridors that result from the recommended array and spacing,” as proposed for the Project. • Additionally, the USCG goes on to say that transit corridors as proposed in the Vessel Transit Lane Alternative would make “navigation more challenging, [as] most traffic would then be funneled into the corridors thereby increasing traffic density and risks for vessel interaction.” • The USCG further concluded that the spacing and layout as recommended in the MARIPARS report, and as proposed for the Project, would “provide sufficient space for certain vessels that fish in the Massachusetts/Rhode Island Wind Energy Area (“MA/RI WEA”) to continue fishing after the wind farms are constructed” and that wider transit lanes per RODA’s proposal would “largely preclude fishing in the MA/RI WEA” (emphasis added). • In October 2020, the USCG reiterated the findings of the MARIPARS report were wellsupported and validated in its response to a “Request for Correction” by RODA (enclosed with these comments as Exhibit A). The USCG’s response to the RODA letter strongly affirmed the MARIPARS report was correct in concluding that: o The multiple data sources used in the MARIPARS analysis were appropriate; o Fishing operations in the MA/RI WEA were properly and fully considered in the study; o The 1-NM x 1-NM grid layout would provide sufficient spacing for vessels to safely transit through the MA/RI WEA; and o The mathematical formulas used by the Coast Guard to support its conclusion that 1-NM x 1-NM grid layout preserved navigation safety, without transit lanes, were correct."

Comment Number	Comment
363-49	The statement in the DEIS that the 1x1 nautical mile spacing was recommended by USCG is inaccurate, as it was proposed by the developers, not USCG. Analysis in the Massachusetts Rhode Island Port Access Route Study by USCG outlines traffic and navigation risks associated with the proposed spacing, but does not provide recommendations on project design. We maintain that this proposed spacing will make fishing operations and transiting much less safe and possibly prohibitive. As you know, our organization filed an appeal of the USCG's Massachusetts Rhode Island Port Access Route Study (MARIPARS) alleging deficiencies under the Information Quality Act. USCG denied that appeal stating, in part: The MARIPARS is only "influential" to the extent that it would form the basis of a subsequent Coast Guard policy decision to commence a rulemaking for the purpose of establishing a new routing measure or amending an existing one… Your letter suggests the MARIPARS is tantamount to a final decision about the turbine layout within the MA/RI WEA, however that decision will ultimately be made by BOEM, which in addition to the Coast Guard's navigational safety opinion, will consider many other inputs… the MARIPARS is not influential because the decisions on wind turbine siting could be made in its absence. We are now alarmed to see that the DEIS does not provide any such "other inputs" at all, as it contains next to no citations for how the future presence of structures will impact vessel traffic and navigational safety, including radar interference or nearly all of the other issues RODA and others have previously raised. In fact, the meager two citations used in the DEIS's navigation and safety analysis are to non-existent documents: "BEOM 2020" (assuming this is a spelling error, there is also no cited literature for "BOEM 2020" in the Navigation and Vessel Traffic or Other Uses bibliographies); and "Brostrom et al. 2019," a statement made in a press release by the CEO of Ørsted which is hardly a scientific justification. The DEIS simply does not provide enough information or rationale for the proposed action to provide safe navigation for mariners."
363-50	BOEM must not rely solely on the MARIPARS to draw the conclusion that transit lanes are unnecessary in the MA/RI lease block. The DEIS does not correct the deficiencies in the MARIPARS, therefore there is not an adequate basis to support the developers' attestations that a 1x1 nautical mile spacing for the WEAs would accommodate safe transit. Instead, BOEM must use the best available information to prevent unreasonable interference to fishing operations and transit, which has been provided by fishermen and fishing groups, i.e., experts in the field, in numerous comment letters and during public workshops. Based on the outcomes of the workshops and engagement with the fishing industry, RODA reiterates our unanswered request provided in response to the Vineyard Wind SEIS to address the concerns presented in regard to the original MARIPARS study, which wholly support adoption of this transit lane alternative.

Response to comments: Thank you for your comment. The USCG is a cooperating agency to the FEIS and is the lead agency on navigational matters; and, therefore, BOEM relies on --and gives deference to-- the USCG's expertise and analyses for purposes of informing the navigational impacts in the EIS.

The findings from MARIPARS are incorporated into the FEIS; EIS findings do not indicate that adding lanes will affect navigational safety measurably, but that reducing spacing of WTGs could. In the event a layout is chosen that diverges from the standard and uniform grid pattern that has been approved in previous projects, the USCG would revisit the need for formal or informal measures to preserve safe and efficient navigation and SAR operations.

Comment theme: Project-related fog.

Associated comments

Table I-69 provides the full list of comments received as part of this comment theme.

Table I-69. Project-related fog comment.

Comment Number	Comment
169-40	In addition, the DEIS fails to discuss the potential impact on fisherman and navigation from the microclimate and potential fog creating ability of the Project as is illustrated below by a photo of the Horns Rev wind farm.

Response to comments: While certain conditions can result in fog being carried aloft by the wind wakes behind the turbines, this is a rare event. A cool, nearly saturated air mass must pass over a warm sea surface with windspeeds high enough to engage the wind turbine blades but not so high as to cause mixing at the surface (Hasager et al. 2013). This phenomenon has rarely been seen among the thousands of offshore wind turbines in Europe and has yet to be observed with the Block Island Wind Farm or the Coastal Virginia Offshore Wind turbines. It is mechanically the same as banner clouds sometimes forming on the leeward side of a peak of terrain after a rainstorm. Adapting to current weather conditions is a regular part of safe vessel operation and BOEM would expect all vessel masters to make best judgements on their comfort in operating in specific weather conditions.

Comment theme: Vessel traffic analysis and data.

Associated comments

Table I-70 provides the full list of comments received as part of this comment theme.

Table I-70. Vessel traffic analysis and data comment.

Comment Number	Comment
294-15	According to the DEIS, BOEM anticipates a peak of 207 vessels due to offshore wind construction over a 10-year time frame. It also states that large numbers of wind turbines in an area, and there are many planned for the MA/RI lease area, could make Search and Rescue operations more difficult, lead to less effective search patterns and earlier abandonment of searches, and result in “otherwise avoidable loss of life due to maritime incidents.” This is extremely concerning for vessels such as ours that would transit the Project area and surrounding area. Loss of life is not a minor or moderate impact. The increase of vessel traffic in the area only adds to the navigational hazards of fixed structure going into the water simultaneously. Furthermore, the navigational safety risk assessment in the DEIS used only AIS data for a one-year period to determine its analysis and conclusions. This is not adequate. The DEIS maintains that the vessel activity in the area, based on AIS alone, is largely commercial fishing. If this is true, then AIS data alone is not adequate for a navigational safety risk assessment. AIS is required only on vessels 65 feet LOA and longer, and only required within 12 miles of shore. The South Fork Wind Farm is located 16.6 nautical miles southeast of Block Island according to the DEIS itself, putting it out of the required AIS range. Therefore, even fishing vessels required to have AIS on board are not required to have it operating when in the Project area. Many commercial fishing vessels smaller than 65 feet transit also the area and are not required to have AIS on board at all. This means that AIS alone is not an adequate measurement of vessel activity in the area, particularly since the vessel traffic in the proposed Project area is “largely commercial fishing.” Any navigational safety analysis in the DEIS must include VMS, which data BOEM already possesses and has used in other parts of the DEIS for fisheries analysis [sic]. The DEIS also relied heavily on the MARIPARS, which was fundamentally flawed and omitted various elements. Regarding the significant errors revealed in the MARIPARS document, we have attached the comments prepared by Dr. Thomas Sproul, which identifies departure from USCG regulations regarding navigation safety corridors and contains computation errors regarding spacing in the MARIPARS analysis. The MARIPARS itself based its calculations on the so-called “Netherland’s study” which requires a 500 m UNCLOS Safety Zone on each side of a vessel transit route if vessels are to transit between turbines, but fails to include this safety zone on both sides of the corridors between turbines in its calculations, an omission clearly visible in MARIPARS Figure 21 (p. 36). Therefore, the DEIS analysis is also flawed. Additionally, the MARIPARS and DEIS analysis do not consider the 207 construction vessels expected to be regularly found in and around/ transiting the area during construction and buildout of the MA/RI lease area as part of its navigational analysis. It is not reasonable to assume on one hand that current vessel traffic will remain the same and then on another hand state that 10 years of offshore wind construction in the area will introduce up to 207 new, and many large, vessels in the area. These new construction vessels may require additional safety clearance. BOEM must fully analyze all vessel traffic in the area, including VMS traffic, and anticipated wind farm construction vessel traffic in its navigational safety analysis. This must include any activity and clearance the 207 construction vessels are expected to require, over an anticipated 10-year construction period in the MA/RI area. To rely purely on one year’s worth of AIS traffic is not an adequate assessment, particularly when not required by fishing vessels in the lease area, and when additional data-including BOEM’s own data- is available. If BOEM anticipates as the DEIS states that search and rescue operations will become more difficult, leading to otherwise preventable deaths, all navigational impacts should be “major”.

Response to comments: The USCG is a cooperating agency to the FEIS and is the lead agency on navigational matters; and, therefore, BOEM relies on - and gives deference to- the USCG's expertise and analyses for purposes of informing the navigational impacts in the EIS. The FEIS has been updated, in appropriate sections, to reflect the Final MARIPARS results. Dr. Sproul's studies were provided to USCG as comments on their Draft MARIPARS. USCG considered those comments in formulating the Final MARIPARS, which did not adopt Dr. Sproul's recommended transit lane widths.

Comment theme: Marine radar interference analysis.

Associated comments

Table I-71 provides the full list of comments received as part of this comment theme.

Table I-71. Marine radar interference analysis comment.

Comment Number	Comment
294-18	The DEIS does acknowledge that the 15 turbines of the Proposed Action and additional 959 turbines present without the Proposed Action "could interfere with marine radars". On page 3-91, the DEIS states that "fishing vessels operating in or near offshore wind facilities may experience radar clutter and shadowing." The lack of a radar interference analysis in the DEIS is glaring. This is a major omission. The DEIS states that "Most instances of interference can be mitigated through the proper use of radar gain controls." First, "most" is not "all". And considering that the DEIS elsewhere states that impediments to search and rescue efforts caused by the Project and offshore wind in general would result in "otherwise avoidable loss of life due to maritime incidents" it is especially important that all interference with safe navigation be fully analyzed before putting mariners in potential life-threatening situations. Second, BOEM clearly does not understand the proper use of gain controls. For example, consider these excerpts, taken from an actual 2018 Furuno marine radar manual aboard one of our Seafreeze vessels: "The gain control adjusts the sensitivity of the receiver. The proper setting is such that the background noise is just visible on the screen. If you set it up for too little sensitivity, weak echoes may be missed…. Echoes from waves cover the central part of the display with random signals known as sea clutter…Be careful not to remove all sea clutter, because you may erase weak echoes…. When echoes from precipitation mask solid targets, adjust the A/C RAIN control to split up these unwanted targets into a speckled pattern, making recognition of solid targets easier. Be careful removing all rain clutter, because you can erase weak echoes. Further, the possibility of losing weak echoes is greater when you use A/C RAIN and A/C SEA to reduce clutter." Therefore, interference to marine radar interference due to turbines cannot simply be tuned out by the vessel radar operator without losing true targets. This is especially true in inclement weather conditions. Furthermore, one previous USCG radar study on the Cape Wind project concluded that "there is a difference between a target being visible and a target being noticeable……Targets within the wind farm…compete with numerous false targets caused by the turbines…. The 130 turbines proposed for Nantucket Sound provide for a much greater number of potential false targets than the 30 wind turbines of Kentish Flats…" The MA/RI area buildout, including the proposed Project, would result in 974 turbines in the Project area. Therefore, previous studies completed on smaller or fewer turbines such as the cape Wind project may significantly underestimate the impacts which would result from a buildout of the MA/RI wind area leases. A new updated and complete analysis is necessary. Safety must be BOEM's top priority in all offshore wind permitting actions. To acknowledge that the proposed Project would interfere with marine radar but to omit any radar analysis from the DEIS is major omission. BOEM must include a full marine radar interference analysis, using the number and size of turbines expected in the proposed Project and surrounding projects as part of any DEIS. This must be part of any navigation safety risk assessment of any Project.

Response to comments: BOEM acknowledges the concern about impacts to marine radar and is working with the National Academy of Sciences to fully understand the issue and determine appropriate mitigation measures.

As noted in Table G-1 of the FEIS and as recommended by the USCG, South Fork Wind would install sensor-operated foghorns and AIS transponders on select WTGs and ESPs, to promote safe navigation during limited visibility (e.g., fog or night) and adverse weather conditions. It is outside the scope of the

FEIS to determine if these measures would be implemented for other offshore wind projects. The Final MARIPARS (USCG 2020) concluded that general mitigation measures, such as properly trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS all enable safe navigation with minimal loss of radar detection.

Comment theme: Mitigation and monitoring measures proposed for navigation and vessel safety.

Associated comments

Table I-72 provides the full list of comments received as part of this comment theme.

Table I-72. Mitigation and monitoring measures proposed for navigation and vessel safety comments.

Comment Number	Comment
301-53	SFW provides the following comments on the mitigation and monitoring measures proposed for navigation and vessel safety in Appendix G, Table 2 of the DEIS. • Mooring Attachment. Foundations are not designed for mooring purposes and the presence of an access ladder creates a safety risk if unauthorized people should attempt to access foundations containing high voltage components. This measure is a remnant of initial USCG guidance that applied to the Cape Wind project and/or the BIWF. In subsequent guidance (including NVIC 02-07, and NVIC 01-19) the USCG abandoned this condition as impractical, especially as it applied to safety lines. Further, the latest USCG guidance (NVIC 01-19) does not reference safety lines at all and does not mandate access ladders. The NVIC simply states that the design and positioning of ladders should consider potential emergency scenarios. Lastly, in its letter to BOEM that recommended certain permit conditions relative to the Vineyard Wind project, with likely similar conditions pertaining to South Fork and all offshore wind projects, the USCG is silent on the topic of access ladders and refers only to survivor's platforms "if installed." Consequently, the wording of this entry in the DEIS should be deleted in its entirety, and "compliance with NVIC 01-19" should be recommended.
301-54	Operations and Maintenance Plan. SFW recommends that the USCG, through BOEM, provide clarity and definition to the phrase "monitoring system capable of searching for and locating mariners [plural] in distress." SFW is not aware of a similar monitoring system currently deployed globally. SFW requests to continue discussion with USCG and BOEM regarding such a monitoring system.

Response to comments: This measure was deleted from Table G-2 in appendix G of the FEIS.

Comment theme: SFEC burial risk assessment.

Associated comments

Table I-73 provides the full list of comments received as part of this comment theme.

Table I-73. SFEC burial risk assessment comment.

Comment Number	Comment
338-50	The Navigation and Vessel Traffic analysis (Appendix H) is wholly focused on the lease area and does not contemplate the high vessel usage along the South Shore of Long Island that overlaps with the proposed SFEC. The COP Appendix X - Navigation Safety Risk Assessment also did not analyze risks to vessel traffic associated with the cable. The Agencies recommend a cable burial risk assessment be developed to analyze risks to the SFEC.

Response to comments: Risks have been considered as part of the ordinary, temporary impacts during construction activity. SFW would be expected to work with the Coast Guard to publish appropriate notices to mariners alerting the maritime community of any planned construction activities. SFW will provide BOEM with a cable burial risk assessment with their Fabrication and Installation Report, which BOEM will review. Also, SFW will be required to monitor the cable on a regular basis.

Comment theme: VMS and AIS for reporting fishing vessel behavior.

Associated comments

Table I-74 provides the full list of comments received as part of this comment theme.

Table I-74. VMS and AIS for reporting fishing vessel behavior comments.

Comment Number	Comment
366-17	Also VMS was not required on all squid boats until 2014, so squid VMS data from New York pre 2014 will be incomplete, and any data re the other NOAA permitted fisheries that take place from within the RI-MA WEAs or east and south of the RI-MA WEAs, such as whiting, ling, butterfish, scup and fluke fisheries will not be accounted for from the VMS model.
339-8	The SFWF DEIS also underestimated the amount of New York commercial fishing vessel traffic in this area when it failed to properly use VMS data in conjunction with AIS data to assess the level of fishing and transit activity within the WEA. A majority of New York commercial fishing boats are not registered as 65 feet or larger, and as such are not required to have AIS. Additionally AIS was not a federal requirement of commercial fishing vessels until 2016, and with the exception of Plan A AIS, most Plan B systems (those required by commercial fishing vessels) do not have satellite capability which allows for AIS tracking, they only work within a small range of 5-10 miles. If the RODA Transit Vessel Lane Alternative (TVLA) is not put into action in the SFWF project, then it is reasonably assumed that other WEA developers will not implement additional traffic lanes, Thus this project will become precedent-setting for the remainder of the projects in RI-MA WEAs, and perhaps beyond. Major negative impact will be had by all commercial fishing businesses in New York that fish beyond the SFWF without the RODA-TVLA to access their fishing grounds. Loss of income to boats, loss of income to shoreside businesses, loss of productivity, increased expenses and decreased safety must all be analyzed thoroughly.
363-53	Perhaps it is optimistic to reference this as a “final” statement on vessel Automatic Identification System (AIS), but hope springs eternal. Repeatedly, for years, multiple fisheries groups including RODA have informed government agencies and OSW developers that Automatic Identification System (AIS) technology should not be used as a primary data source for evaluating vessel behavior. These comments have been echoed by the National Marine Fisheries Service and even acknowledged in formal comments by BOEM. Even for vessels that are using AIS, the USCG acknowledged that in June of 2018 over 50 percent of towing vessels operating in U.S. waters transmitted incorrect AIS data Reliance on only AIS data to characterize vessel traffic patterns in the MA/RI WEAs was perhaps the prime basis for RODA’s challenge to the MARIPARS. It is therefore utterly baffling that the SFWF DEIS again relies only on AIS data to evaluate vessel navigation and safety. AIS is an automated, autonomous maritime tracking system that provides vessel information, including the vessel’s identity, type, position, course, speed, navigational status and other safety-related information automatically to appropriately equipped shore stations, other ships, and aircraft. We do not dispute the quality and nature of AIS data; it is simply not used enough by fishing vessels in the MA/RI WEAs. AIS data is only required on vessels 65 ft. in length or greater (which does not account for most vessel activity in the area), has only been required since 2016, and may by law be turned off when further than 12 nautical miles from shore. Despite this, in the DEIS’s environmental consequences analysis regarding the “Presence of Structures” (which is, confusingly, unrelated to the navigational safety analysis), exactly three references are cited: • The navigational safety risk assessment (NSRA) prepared by SFWF • MARIPARS • AIS data for 2018 from the Office for Coastal Management The project’s navigational safety risk assessment (NSRA) purports to rely on data other than AIS, stating that it used “vessel monitoring System (VMS) data provided by [NMFS] to assess fishing vessel traffic in the proposed project area” (later clarifying that this does not refer to raw data, but rather to the maps contained in the Northeast Ocean Data Portal). The data portal provides “heat maps” based on VMS that show relative concentration of fishing vessel effort over predetermined time periods. They do not show vessel traffic. They also do not purport to, nor would it be possible, to generate fine-scale information from VMS data sufficient to show vessel movement patterns within the WEAs. Moreover, arguably the most heavily occurring fisheries in the MA/RI WEA are either not portrayed on the data portals at all (e.g. lobster fishery, recreational fisheries) or only have a few short years of VMS data (e.g. squid fishery). Finally, SFWF prepared the NSRA to comply with the guidelines in USCG Navigation and Vessel Inspection Circular (NVIC) 02-07 (USCG 2007), which has since been canceled and replaced with NVIC 01-19 (USCG 2019). RODA asks that the NSRA instead be prepared to be compliant with the NVIC 01-19.

Comment Number	Comment
	On public webinars for this project, BOEM claimed to have utilized VMS and VTR data to analyze the transit lane alternative. If this is the case, the DEIS provides absolutely no record of it. It would be important to show these efforts, as this statement raises serious questions in and of itself. VTR data does not provide vessel position information and, as noted above, VMS does so only on extremely broad geographic scales. There are other ways to gather information on vessel traffic and safety, but BOEM needs to do that work and provide the opportunity for public review.
366-15	The SFWF DEIS analysis of the transit lane alternative does not take into the account the great hardship that New York boats would suffer if the RODA -Transit Lane Alternative is not selected. As was noted in my USCG letter re the Massachusetts Rhode Island Port Access Route Study in 2019 in Montauk there are only a handful of the 100 federally registered commercial fishing vessels that have AIS. For those Montauk boats that are 65 feet or larger, those fishing vessels that carry AIS only carry Class B/CS, which is a line of sight radar that only works on average about five miles, due to far less wattage, 2W This class of AIS also does not have satellite capability. Shinnecock is also a port whose fleet is not required to carry AIS on their boats. None of the Shinnecock fishermen present at the Montauk meeting use AIS. As you can see from the map footnoted below, Montauk and Shinnecock are absent from the map AIS Data 2015-17 fishing vessels tracks based on boats leaving from both ports. However for New York commercial fishermen, they heavily fish the area within and outside of the RI- MA WEAs. For example, since 2000, New York's fishermen have caught over 100 million pounds of squid; (see Page 9) some years, 40% of that catch has come from the fishing grounds south of Nantucket, which is right in the middle of the RI-MA WEA. Yet none of those trips are logged via AIS tracking of the top two landing ports for squid from New York. The SFWF DEIS also underestimated the amount of New York commercial fishing vessel traffic in this area when it failed to properly use VMS data in conjunction with AIS data to assess the level of fishing and transit activity within the WEA. Additionally AIS was not a federal requirement of commercial fishing vessels until 2016, and with the exception of Plan A AIS, most Plan B systems (those required by commercial fishing vessels) do not have satellite capability which allows for AIS tracking, they only work within a small range of 5-10 miles.
366-16	A majority of Montauk and Shinnecock's boats (our state's top two ports) do not show any AIS data. And yet not only for the MARIPARS, but also for BOEM's DEIS, for the SFWF/SFEC, BOEM only utilized AIS data? The question was asked at the public BOEM hearing last week as to why was AIS data used when New York State boats do not have AIS data? BOEM replied that VMS and VTR data was also used for navigational information and purposes, when in fact according to BOEM's own documents, VMS and VTR was for fisheries related data, not navigational decisions. We request that AIS not be the primary method analyzed to determine port access and transit to and from New York and our fishing grounds from within and surrounding the RI-MA WEAs.

Response to comments: Thank you for your comment. The FEIS analysis relies on several sources of information to characterize the use of the area by the commercial fishing industry including AIS, VMS, and VTR data. All of these data sources individually have limitations but combined, they are the best available information to characterize the fishery use. Please reference the Commercial Fisheries section 3.5.1 for a discussion of VMS data used for commercial fishing vessels.

Comment theme: Ice accumulation and safety risks and mitigation measures.

Associated comments

Table I-75 provides the full list of comments received as part of this comment theme.

Table I-75. Ice accumulation and safety risks and mitigation measures comments.

Comment Number	Comment
363-95	Ice accumulation on the turbines is a known issue for wind energy areas in cold climates and is not considered in the DEIS. Icing should be analyzed for not only the safety risks associated with ice throws to mariners, but also for the environmental and energy contributions from any voluntary ice-remediation technologies. There are known methods for reducing ice buildup on turbine blades such as pre-treatment, coatings and heating, but these are not identified or analyzed. Currently BOEM does not require de-icing or pretreatment but analysis should consider impacts to power generation if Northeast winter storms could impact turbine capabilities. Fishermen have repeatedly raised to BOEM and OSW developers the effect that ice buildup on turbine blades may have on safe passage of vessels around a turbine. Rime icing is a major concern for wind turbines, and once temperatures rise, the ice is likely to dislodge from the blades. Layouts with minimal spacing between turbines increase the risk to transiting vessels from falling ice. The distance from the turbine that the ice can travel varies, dependent on whether the blades are active or locked down. Some of the additional factors affecting the distance travelled include the rotor diameter, hub height, size of the ice fragment, rotor position, and wind speed. Although those cited studies do not necessarily suggest icefall is likely to occur outside of the 500 m buffer zone, reports including one conducted by GE and referenced by the New York Times (but since deleted) in 2004 suggest ice throw from much smaller turbines can occur up to several hundred meters. Indeed, the NYT article also highlights the need for BOEM to independently verify any claims regarding icing; it cites several studies that directly contradict information provided by the OSW trade association at the time. Given the size and height of the turbines, in addition to unique geographic features in New England, ice accumulation and safety risks must be analyzed in the DEIS. If BOEM finds that safety or power risks are possible due to icing, it must require mitigation measures as a condition of any OSW permit it may issue.
363-7	Ensure that all OSW projects incorporate adequate deicing technology and practices;

Response to comments: Meteorological data indicates that the potential for icing on WTG blades in this region is very low due to the conditions necessary for ice to form on these blades. Additionally, as noted in Appendix G Table G-1, SFWF would include safeguards that would stop the WTG from operating if ice is detected on the blade.

Mitigation (General)

Comment theme: Incorporation of mitigation measures in the cumulative impact scenario.

Associated comments

Table I-76 provides the full list of comments received as part of this comment theme.

Table I-76. Incorporation of mitigation measures in the cumulative impact scenario comment.

Comment Number	Comment
301-19	Further, this cumulative impact analysis does not factor in the reality that SFW, and other projects, will implement significant actions to reduce impacts through mitigation measures, including with regard to design and installation/construction activities and navigational safety. The FEIS should incorporate reasonably foreseeable industry practices and legally required mitigation in assessing impacts.

Response to comments: Thank you for your comment. The DEIS assesses the impacts of a range of characteristics and locations for components that would be considered as part of the Proposed Action and other action alternatives using a “maximum-case scenario” process. Through the maximum-case scenario process, BOEM analyzes the aspects of each design parameter or combination of parameters that would result in the greatest impact for each physical, biological, socioeconomic, and cultural resource.

Therefore, although future projects could result in implementation of additional mitigation measures, these measures are not considered when evaluating the No Action Alternative and cumulative impacts.

Comment theme: Mitigation and monitoring recommendations.

Associated comments

Table I-77 provides the full list of comments received as part of this comment theme.

Table I-77. Mitigation and monitoring recommendations comments.

Comment Number	Comment
133-8	A section that identifies the type of environmental monitoring data that will be required. Please identify how this data will be made publicly available. CCE suggests that BOEM create a standardized monitoring protocol for all offshore wind farms in our county. That data should be publicly available on BOEM's website so that NGOs, Academia, and the public can readily obtain access.
145-2	MONITORING AND ADAPTIVE MANAGEMENT As the federal agency responsible for approval of offshore wind projects, BOEM must require that offshore wind projects have a standardized and publicly available monitoring program in place before and after wind projects are constructed. Offshore wind projects at this scale would constitute a new type of ocean use in our waters, so we need to monitor environmental indicators for possible impacts. The standardized data from such monitoring programs can then be used to adaptively manage and mitigate negative environmental impacts from future projects, or halt the construction of future projects. The offshore wind industry needs to move with caution while monitoring environmental data as they develop offshore ocean areas. Without standardized, publicly available, and mature monitoring programs in place, major negative impacts could occur without BOEM or the public's knowledge.
145-14	For each of the environmental impacts listed above, BOEM must analyze and mitigate them seasonally, as different species have varied sensitivities at different times of the year. Mitigation options to address seasonal movements of marine species must be assessed. Future developers of these leases must release a detailed construction schedule so that BOEM and the public can assess the effects on marine species. The cumulative impact from other planned offshore wind projects must also be addressed, as the offshore wind energy industry is poised to grow exponentially in the next decade.
379-16	Adrienne Esposito: Oh, and the other last comment, I just want to 100% agree with the first speaker from Surf Riders, who asked for standardized monitoring and data before and after installation for all the wind farms, and I would just add to that that that data should be publicly available. We have lots of data, but if the NGOs cannot see it and understand it and use it in our research, and academia can't use it in their research, then it's not as valuable. And this kind of data is what will make us be able to have even better siting and can do even more meaningful mitigation, so I believe it to be a key component of this process and to help guide us in the future. Thank you again for the opportunity to comment.
380-16	Bob DeLuca: Good evening, Miss Perry, yes, and all those attending, my name is Bob DeLuca, D-E-L-U-C-A. And I serve as president of A Group for the East End. A Group for the East End is, a professional, membership-based not-for-profit organization founded in 1972 to protect and restore the natural resources of Long Island's five East End towns. We represent the conservation interests of several thousand member households and businesses from across the region. For the record, I hold undergraduate and advanced degrees and environmental science and have worked in my capacity at the Group and as a professor of field biologist and senior environmental analyst on Long Island for over 35 years. I've reviewed all the available materials for this proposal before preparing these comments. As a policy matter A Group for the East End is supportive of the advancement of wind and solar energy infrastructure as a critical and urgent necessity and dealing with the increasing environmental, economic, and demographic impacts of climate change on our coastal environment and near shore communities. But this support is never offered without careful consideration. To this end, our project assessment leads us to support the South Fork Wind Farm and this DEIS, but we also want to strongly underscore the critical and enduring need for a final project that meets the highest standards for environmental research, mitigation, monitoring, and ongoing assessment that will make the project a model for other communities to emulate.

Comment Number	Comment
380-19	Bob DeLuca: On that point, let me conclude by making as strong a recommendation as I possibly can, for long-term transparent monitoring that continuously assesses potential and long-term impacts on the ocean's living resources, as well as those mitigation measures designed to protect a wide range of vertebrate and invertebrate life that may be impacted in one way or another by this or any wind farm proposal. Given the limited experience with offshore wind farm development in the U.S., there's no doubt that much remains to be learned, and it's also true that there will be many more wind farms to come. As such, we believe this project and our region have a unique opportunity to set the environmental standard for the most sustainable offshore wind industry we can envision. And that goal is consistent with the shared environmental values that have shaped our eastern region for the better for decades. I thank you very much for your time and consideration of our comments.
166-34	A robust monitoring program is important to understanding project effects and adaptively managing wind farm construction in the region going forward. It would be helpful to understand how DWSF and other regional developers will be held accountable to monitoring plans, as well as the mechanism for modifying these plans over time. Given that large scale offshore wind development is new for our region, and that the spatial scale of reasonably foreseeable projects is unprecedented world-wide, there are certain to be effects that we cannot fully anticipate at present. We appreciate developer commitments to the work of the Responsible Offshore Science Alliance and the coordination around monitoring that will result, but these are voluntary agreements as opposed to permit conditions.
166-35	There are many opportunities for learning and adaptive management going forward. For example, the DEIS discusses that there may be positive effects associated with the creation of artificial hard bottom habitats. A range of materials could be used for scour protection and for cable armoring where burial is not possible. These materials will likely have different ecological benefits, depending on the species. Materials can be selected for their expected benefits, and/or the effects of different types of materials might be compared. Time of year restrictions on construction and maintenance, e.g., to protect fish spawning activity, also provide an opportunity for data gathering and adaptive approaches. These windows may shift over time as the region continues to experience the effects of climate change. Such shifts could have implications for best practices related to operations and maintenance of the South Fork Wind Farm project, as well as other projects in the region.
176-3	Scientific analysis of fisheries, marine mammals, ocean, and weather patterns need to be monitored before, during construction, and throughout the entire existence of all wind farms and neighboring areas. There may be unforeseeable situations or events associated with one or all of these projects individually or cumulatively.
284-8	One of the challenges in reviewing the DEIS and the long list of associated appendices is that it is not always clear what components of the design envelope have been settled upon by the developer, and which of the "proposed" and/or "potentially additional" mitigation and monitoring measures listed in Appendix G will ultimately become the minimum required measures as part of the regulatory conditions that the developer ultimately must adhere to as part of the final permit or Record of Decision. In order to ensure meaningful public participation and appropriate transparency, we recommend that the FEIS include as much detail as possible about what measures will be used, the performance standards they must meet, and how the developer will be evaluated on meeting those standards. We also recommend incorporating replicated BAG (before-after-gradient) designs into ecological monitoring plans and protocols to facilitate converting observations from early projects into informed predictions for future projects.
284-9	As this project will be one of the first utility-scale offshore wind developments in the southern New England wind energy area, where many other projects are planned, it is critically important to closely monitor and rapidly report out on successes and challenges of construction and early operation. Information gained via monitoring of early projects should be used to assist other future offshore wind projects in selecting the least impactful methods. We urge BOEM to develop a proposed methodology and aggressive timeline for the public, BOEM, and its consultive federal agencies to review this information and apply it to support an adaptive management approach. Based on the anticipated project construction schedule in the cumulative impact analyses, there will be between 139 and 311 turbines installed each year from 2022 through 2025 in the southern New England wind energy area alone. To meaningfully inform this rapid progression of projects, the developers (or others given the responsibility for monitoring) should be required (as a permit condition, or contractual funding agreement) to analyze and report on construction and operations monitoring data at least every 6 months for the first three years of the project. This rapid reporting will be a significant requirement for the developer, and thus there should be a commensurate commitment of time and resource investment by the agencies. Once BOEM receives these monitoring reports, federal agencies would need to conduct a rapid evaluation to determine "If data collected are sufficiently robust, BOEM or other resource agencies could use the information obtained to support potential regulation changes, or new mitigation measures for future projects." We agree strongly with this statement from the Vineyard Wind 1 SEIS and thus urge that a process be outlined for these evaluations to take place. Added information should also inform regular revisions and updates to the now dated Best Management Practices, which are based on the 2007 BOEM Programmatic EIS.

Comment Number	Comment
284-10	The ocean environment is changing at a rapid and unprecedented pace due to climate change. These early offshore wind energy projects represent a part of the solution to this crisis by building renewable energy generators, but even with a rapid decarbonization of the global economy there will be continued environmental change through the life of this project. Some assumptions that are critical for reducing impacts will need to be frequently updated, particularly for future projects and critically endangered animals like the North Atlantic Right Whale (NARW). For example, the phenology of seasonal migrations is used to establish seasonal pile driving restrictions even though over the last several years, NARW distribution and patterns of habitat use have shifted, in some cases dramatically (Pettis et al. 2017)" and the same has been shown for other large whales. Climate change is already causing major shifts in fish species distribution which are already impacting commercial and recreational fishermen and coastal communities. The Nature Conservancy is working with regional fisheries management Councils and Commissions across the country and along the entire US East coast to help make fisheries management 'climate ready' but that is adapting to change, not slowing it. While early projects like South Fork and Vineyard Wind 1 will set precedents for future projects in the region, BOEM will need to carefully evaluate the changing conditions for each location and project, in consultation with agency and independent researchers, to determine which monitoring and mitigation measures can be directly transferred and which ones require more evaluation. It is critical that throughout the next decade of rapid offshore wind buildout that we invest in the science needed to stay current and keep adjusting the best practices and mitigation measures as the research indicates.
301-55	SFW provides the following comments on other mitigation and monitoring measures proposed in Appendix G, Table 2 of the DEIS. • Post-installation cable monitoring. This measure includes inspection survey frequencies that SFW believes are inconsistent with industry standards given the assessed static seabed conditions. In addition, the time proposed for reporting does not provide sufficient time to prepare such reports and conduct appropriate quality assurance and quality control reviews. SFW would like to discuss this measure with BOEM, including both the frequency at which the proposed surveys should occur as well as the proposed reporting requirements.
169-5	The DEIS's assumptions for the No Action Alternative are especially flawed by assuming that if the proposed action does not occur then other offshore wind would take its place. That analysis makes zero sense. [Footnote:]The DEIS assumes throughout the document that future offshore wind projects will be built even if South Fork Wind Farm is not completed under the No Action Alternative. Indeed, the term "future offshore wind" is used 84 times in the DEIS. The DEIS states "…the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be the same [as] those impacts described under the No Action Alternative." p. 3-31; "…plus all other future offshore wind projects in the geographic analysis area." p. 3-31; "BOEM assumes that construction of future offshore wind projects (construction period estimated to last 2 years per project) would begin in earnest in 2021, peak in 2025, and conclude in 2030." p. 3-48.
301-56	Monitoring and minimizing foundation scour protection. The proposed duration of monitoring for habitat disturbance is disproportionate to the anticipated impacts. We contend that the physical habitat disturbance associated with the installation of the foundations and scour protection should be monitored until the habitat conditions are similar to the ambient conditions, which would indicate recovery from disturbance. Mandating that habitat recovery be monitored throughout the life of the project is excessive, particularly given that physical habitat recovery is anticipated to occur in two years or less. An adaptive monitoring strategy, whereby monitoring continues until recovery has been observed, would be more appropriate for understanding physical habitat recovery. The "reef effect" associated with the introduced foundations and scour protection will likely produce impacts such as colonization of the structures and increases in organic deposition that are likely to occur over a longer time frame. An adaptive monitoring framework, whereby monitoring continues until the 'climax community' has been established would be more informative and appropriate than monitoring throughout the lifetime of the project.
301-57	"Pile-driving time-of-year restriction (page G-7 and BA Table 8, No. 7). "No pile driving activities would occur from January 1 to April 30. The FEIS should distinguish between impact pile driving and other, less intensive, pile driving such as vibratory installation methods, which may be utilized for other parts of the Project. This timeframe should be applicable only to impact pile driving, not to vibratory pile driving."
301-58	Boulder relocation reporting. SFW suggests that this measure be specific to boulders located in state waters and/or areas of low boulder density. Although it may be possible to provide the location of repositioned boulders when a targeted boulder tool such as a boulder pick is used to move individual boulders, it is not feasible when using a less precise tool such as a boulder plow within an area of high boulder density. SFW would like to discuss this measure with BOEM to identify where boulder relocation reporting is technically feasible.
364-3	Any and all mitigation plans developed must be transparent and subject to independent review. Any proposed changes to established mitigation plans should be made publicly available and subject to stakeholder input prior to adoption. Likewise, all research and results of ongoing monitoring efforts should be published to ensure adequate transparency and to inform the development and operation of other offshore wind installations.

Comment Number	Comment
284-13	Conducting ecological monitoring inside the individual project sites is one key component for assessing potential impacts of these projects. But there needs to be more clarity on priorities, standardization of methods, and transparent and rapid sharing of information. With so many projects set to be built concurrently, the adaptive approach we are recommending for management and permitting projects at BOEM must also apply to how developers and researchers prioritize, plan, conduct, analyze and share monitoring results. There is clear overlap between site specific monitoring and regional monitoring, and they should not be considered as separate silos. The proximity of multiple large planned projects in the southern New England wind energy area calls out for an integrated monitoring approach. Monitoring to assess potential impacts to migratory birds and other avian species should be a high priority in this category. Thoughtful consideration for integrating efforts that under other circumstances might be done on a project-by project bases [sic] has potential to simultaneously increase efficiency and improve the scientific integrity of the information obtained. Large-scale and long-term monitoring is essential to track both environmental and human features of the ecosystems that overlap multiple planning areas and leases.
301-4	Temporary Impacts and Mitigation. Most potential adverse impacts will be temporary during construction and will be reduced through mitigation measures implemented by SFW. BOEM should identify measures that consider Project-specific impacts and should not duplicate existing regional efforts to study potential impacts.
301-41	In Appendix G, BOEM describes the considerations for the proposed monitoring measures including to "develop or modify future mitigation measures for the conceptual decommissioning of the Project or all stages of future projects" (Appendix G, Page G-1). SFW acknowledges that science and data will underpin the mitigation measures for the Project and agrees that it is important that all mitigations are based on strong and robust science. However, SFW would also acknowledge that, as tools, measurements and data evolve, the collective understanding of best practice and mitigation measures will also evolve. This evolution of scientific understanding will be useful for both project development and for implementation of effective mitigation efforts for future projects. For example, studies conducted at the BIWF related to electromagnetic fields (“EMF”) have proven that there are no discernable long-term impacts of EMF from BIWF’s export cable.
301-42	BOEM also indicates that the proposed monitoring measures "contribute to regional efforts intended to gain a better understanding of the impacts and benefits resulting from offshore wind energy projects in the Atlantic (e.g., potential cumulative impact assessment tool)" (Appendix G, Page G-1). SFW continues to actively support several regional efforts for collaboration. These efforts include the Responsible Offshore Science Alliance, Regional Wildlife Science Entity, environmental technical working groups, etc., both through dedicated personnel and front running financial commitments. SFW strongly cautions BOEM against duplication of this work solely on an individual project basis, which would undermine the set-up of the regional groups, since these groups have significant funding and capacity to take forward some of those important regional initiatives. SFW would be happy to utilize and share data from its affiliates’ existing North American portfolio of projects, such as they have done for the BIWF, and with the recent announcement of a Memorandum of Agreement with NOAA.
301-43	SFW is proceeding under a project design envelope approach that assumes the “maximum case scenario” is evaluated in the DEIS. This results in identification of greater impacts than what the Project may actually implement in the final design and installation phase as some options are mutually exclusive and would not all be implemented together. For example, the Project may not select the largest capacity WTG and also utilize all turbine locations (Appendix D). Thus, while there are certain major impacts identified in the DEIS for the Proposed Action Alternative, this should not be a basis for rejection of this alternative or the level at which mitigation measures are assessed, particularly where a “maximum case scenario” has been evaluated. Environmental protection measures, mitigation, and monitoring need to be flexible and should consider offsets to Project specific impacts rather than to the maximum case scenario. SFW recommends that BOEM and the federal cooperating agencies consider flexibility in the way mitigation measures are presented in the FEIS and in conditions in subsequent federal decisions and permit approvals.
310-44	All fisheries communication, fish and benthic monitoring plans, and scientific survey mitigation plans should be approved by NMFS prior to being implemented.
313-3	We expect that the higher rated impacts can and will be addressed by mitigation, through ongoing stakeholder discussion and outreach before the EIS becomes final. For example, we are pleased to know that the developers are in active conversations with regulators and eNGOs to agree to using technology to mitigate any impacts to the North American Right Whale.
316-3	There is also a lack of science as to the longer-term impacts of these proposed industrial scale developments in US Waters. At a minimum BOEM working with the developers must require scientific fisheries monitoring for the life of the project. This will help address data gaps identified above, but also help address un expected effects of turbine placement and development in these waters.

Comment Number	Comment
330-2	Locally, CCOM applauds the Town of East Hampton's ambitious sustainable energy goals, which also cannot be achieved without actively pursuing offshore wind energy and a utility-scale offshore wind project which may result from the SFW initiative or future proposed projects. In addition, CCOM and Montauk have a unique stake in the climate change battle given the hamlet's shoreline vulnerability to sea level rise and extreme weather relative to others, as well as risks to fisheries from ocean acidification and warming waters. However, CCOM continues to pay particular attention to, and to minimize to the maximum extent as possible, any known, unknown, or unforeseen environmental impacts, including those to the fishing industry and environmentally sensitive and preserved lands associated with installation, operation, and maintenance of these technologies. A rigorous and transparent permitting process must proceed, with extensive pre-through post-project monitoring to ensure we thoroughly understand and address impacts on the scaling of individual and multiple projects.
347-3	The mitigation measures outlined in Appendix G should be required in the final Record of Decision for the SFWF. CZM highlights the following measures that are of heightened importance to threatened and endangered marine mammals and avian species in the area: restrictions on pile driving, the use of Protected Species Observers, vessel avoidance measures, speed restrictions, and noise reduction technologies to protect marine mammals; and deterrent devices, robust monitoring framework, installation of VHF telemetry stations, reporting of dead and injured birds, and installation of appropriate lighting to protect avifauna. DWSF should continue to coordinate with Massachusetts agencies on mitigation opportunities for avifauna impacts, including establishing baseline monitoring and identifying opportunities for habitat enhancement. In addition, any cable protection implemented to remediate inadequately buried or uncovered cables should be matched with adjacent native sediments in order to minimize habitat conversion and risks to fishing gear.
349-1	This is a pivotal moment in America's nascent offshore wind story and the fight to reduce greenhouse gas emissions and mitigate the impacts of climate change. The Biden Administration's Executive Order 14008 acknowledges the necessity of developing renewable energy to mitigate the catastrophic implications of climate change, and directs federal agencies to plan and prepare for the transition away from fossil fuels as a commitment to reduce emissions and create jobs. Additionally, states along the Atlantic coast are rapidly mobilizing to tap into this booming global industry and harness the abundant, clean energy available off their shores. In line with the goals of the new Administration, states from Massachusetts to Virginia have collectively committed to developing approximately 29 gigawatts of offshore wind power, and that amount is expected to increase. As states set bold goals to transition from polluting fossil fuels to a clean energy economy, offshore wind provides a tremendous opportunity to fight climate change, reduce local and regional air pollution, and grow a new industry that will support thousands of well-paying jobs in both coastal and inland communities. Offshore wind also has great potential to advance other opportunities for clean energy, like green hydrogen, that promote new industries and further advance the transition to a green, clean energy systems. The rapid transition to a clean energy economy is of paramount importance to wildlife and the environment. Absent a substantial shift from carbon intensive sources of energy to solutions like offshore wind, we face climate change that will drive many species of fish, mammals, birds, waterfowl, amphibians, reptiles, and pollinators to extinction in both marine and terrestrial environments. These complicated biological support systems enable humanity's continued success across commercial and social sectors. Protecting these complicated webs of biology for future generations is vital to preserving the economic, social, and technological wellbeing that our society relies on for our health and survival. As recognized by the United Nations Environment Program Convention on the Conservation of Migratory Species of Wild Animals, migratory species, such as migratory marine species, are particularly vulnerable to the impacts of climate change. Similarly, a recent report by National Audubon found that bird species, already facing threats from habitat loss and other stressors, face significant impacts from climate change that can be ameliorated if we are able to keep warming from reaching higher levels. Against this backdrop of unprecedented climate change risks and the threat of species extinction and shifts in distribution, it is imperative that all offshore wind development activities move forward with strong protections in place for coastal and marine habitat and wildlife. We can and must develop this resource thoughtfully and responsibly, using science-based measures to avoid, minimize, mitigate, and monitor impacts on valuable and vulnerable wildlife. This must include a specific focus on ensuring sufficient measures are in place to protect our most vulnerable threatened and endangered species and a robust plan for pre, during, and post construction monitoring that can enable effective adaptive management strategies.
349-7	Despite offshore wind's rapid growth in Europe, United States offshore wind remains a new industry, with the nation's first commercial project – the Block Island Wind Farm (30 MW) – only coming online in December 2016. As a result, BOEM needs to rigorously review the potential impacts of offshore wind development on marine wildlife and habitat to develop and adopt appropriate mitigation measures. Various potential impacts that may be associated with offshore wind construction and operations have the potential to directly, indirectly, and cumulatively impact marine species and habitats in the coastal zone and offshore environment along the coast.

Comment Number	Comment
349-14	BOEM must take strong and intentional action to advance robust monitoring to assess impacts as offshore wind is developed and to enable adaptive management. As previously noted, offshore wind remains a relatively nascent technology in the United States and, as such, BOEM must closely monitor the impact of offshore wind construction and operations on marine wildlife and the ocean ecosystem to guide its adaptive management and future development. It is necessary to understand baseline environmental conditions prior to large-scale offshore wind development in the United States, so offshore wind impacts can be clearly understood with relation to pre-development environments. To this end, BOEM must establish and fund a robust, long-term scientific plan to monitor the effects of offshore wind development on marine mammals, sea turtles, fish, bats, birds, and other species before, during, and after the first large-scale commercial projects are constructed. This monitoring data must be made readily available to stakeholders and the public to inform future decisions in the growing offshore wind industry. Without strong monitoring in place, we risk losing the ability to detect and understand potential impacts and setting an under-protective precedent for future offshore wind development. Such monitoring must inform and drive future project siting, design, implementation, and mitigation as well as potential changes to existing operations to avoid or minimize any negative impacts to wildlife and other natural resources.
349-30	BOEM also retains the ability to consider adoption of supplemental mitigation measures if monitoring or the agency's data collection efforts identify an unexpected negative impact. While it would be inappropriate for BOEM to rely on an adaptive management plan to address the environmental considerations highlighted in the DEIS in lieu of necessary mitigation measures, the agency is allowed and encouraged to adopt further adaptive management measures if needed.
364-6	A commitment to habitat restoration, and a requirement for funding such restoration through an environmental mitigation and restoration fund, if needed to return the area to pre-built ecological function.
372-15	We identified inconsistencies in the mitigation measures presented in the DEIS that should be revised in the FEIS. Specifically, the mitigation measures presented in the DEIS do not wholly align with mitigation measures described in the proposed IHA and the Biological Assessment, received on January 8, 2021. This misalignment creates confusion and uncertainty, particularly when BOEM is relying on mitigation measures to reduce risk or determine significance of effects to protected species. While it is unclear which mitigation measures BOEM is relying on for the analysis of impacts in the DEIS, it should be made clear in the FEIS. We also encourage you to clearly identify, define, and analyze proposed and alternative mitigation measures so that measures required as a result of a consultation or permit are incorporated in your decision without the need for further analysis.
379-1	Matt Gove: Matt Gove, G-O-V-E. I'm from Surfrider Foundation, and we're still reviewing this project, getting through that DEIS, but we haven't seen anything in there that would keep us from supporting this project so we'll be sending in formal written comments, but just wanted to highlight that we're, we're really hoping to see some leadership from BOEM here on monitoring. We really need to have monitoring before the project goes in, after it goes in, if it does go in, and, and for all the other projects that that could be coming down the pipeline. If we don't have a standardized monitoring to have standardized data across all these projects, we'll have no idea, you know, if any impacts are happening that we can't see. So that's, that's my main point for tonight and we'll send in more comments later. Thank you.

Response to comments: Thank you for your comment. Appendix G of the Final EIS has been updated to include modifications and/or additional mitigation and monitoring measures that BOEM could choose to incorporate into the Record of Decision. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision. BOEM fully supports regional monitoring and sharing data with the public as offshore wind development progresses and will incorporate results in future decisions.

Comment theme: Clarification as to whether additional measures considered by BOEM are considered as part of the Proposed Action.

Associated comments

Table I-78 provides the full list of comments received as part of this comment theme.

Table I-78. Clarification as to whether additional measures considered by BOEM are considered as part of the Proposed Action comments.

Comment Number	Comment
144-7	Next, in Appendix G, Table G-2 Potential Additional Mitigation and Monitoring Measures appears to contain measures that were considered but not included as a part of the Proposed Action Alternative. There are several measures listed there that could contribute to significantly reducing potential impacts and therefore should be included as part of the Proposed Action Alternative and included as requirements for the proposed project.
166-9	Mitigation measures are described in Appendix G. Table G-1 summarizes measures that have been agreed to by DWSF and Table G-2 lists potential additional measures. While not alternatives per se, these measures are fundamental to how the project will be constructed and will influence the impacts the project will have on various resources. The FEIS should clarify if any of the mitigation measures listed in Table G-2 are assumed as part of the alternatives, including for the purpose of impacts analysis. This clarification is important because some of these measures could have significant potential for reducing project impacts, potentially more so than what is suggested in the document. As stated on page 3-38: “If BOEM requires the above measures, impacts to benthic habitat, EFH, invertebrates, and finfish could be further reduced, although impacts would still be negligible to moderate.” For example, Section 3.5.1.4 notes that monitoring of the export cable would reduce the expected adverse impacts on commercial fishing, however, this is only included as a potential additional mitigation measure in Table G-2. The issue of which mitigation measures might be required becomes further complicated when considering the cumulative scenario. It seems that the same mitigation measures will likely be required for other projects, but this would ideally be clarified as it has bearing on the cumulative effects analysis: “Assuming other offshore wind projects employ the same minimizing measures included in the Project, impacts would be further reduced and would be moderate” (Appendix H, page H-68).

Response to comments: The Proposed Action and the alternative analyses in this EIS do not assume that the proposed mitigation measures discussed in the DEIS would be included to avoid or reduce potential impacts but did include those measures voluntarily committed to by South Fork Wind (described in Table G-1 of Appendix G). Table G-2 in Appendix G of the Final EIS has been updated to include modifications and/or additional mitigation and monitoring measures that BOEM could choose to incorporate into the Record of Decision. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could also be considered by decision makers and incorporated into the Record of Decision.

Comment theme: Mitigation measure for release of drilling fluids during horizontal directional drilling work.

Associated comments

Table I-79 provides the full list of comments received as part of this comment theme.

Table I-79. Mitigation measure for release of drilling fluids during horizontal directional drilling work comment.

Comment Number	Comment
145-13	During the Horizontal Directional Drilling (HDD) segment of the Project when the power cable comes ashore, BOEM must monitor closely for release of drilling fluids and mandate only the use of nontoxic and natural drilling fluids. Likewise, any lubricants, greases, oils, or coolants used on the turbines themselves must be as nontoxic as possible and closely monitored for any leakage.

Response to comments: Table G-1 in Appendix G states that "At the onshore horizontal directional drilling (HDD) work area for the SFEC, drilling fluids would be managed within a contained system to be collected for reuse as necessary." Additionally, "An HDD inadvertent release plan would minimize the potential risks associated with release of drilling fluids or a frac-out." No change made in the EIS.

Comment theme: General support for monitoring and mitigation measures in the EIS.

Associated comments

Table I-80 provides the full list of comments received as part of this comment theme.

Table I-80. General support for monitoring and mitigation measures in the EIS comments.

Comment Number	Comment
154-9	We support all of these proposed measures, especially scientific survey mitigation (page G-16), and we propose some additional mitigation measures for BOEM to consider.
338-2	The Agencies generally agree with the scope of the issues identified in the DEIS and believe that the identified impacts can be addressed in ways that will provide for a successful outcome. As identified in our scoping comments, we anticipate that most significant adverse impacts resulting from offshore wind development in the lease area were already identified and avoided and minimized to the extent feasible in the 11 preceding years of consultation between federal and state agencies. In the end, BOEM's No Action Alternative is not an acceptable path forward based on the analysis of impacts. The Agencies commend BOEM on including a Distributed Temperature Sensing System on the export cable, a system which continuously monitors data to determine if burial conditions have changed and remedial actions are warranted. Similarly, we were pleased to see BOEM specify that the export and inter-array cables would be removed upon decommissioning. BOEM undertook a careful review of the underwater noise exposure by assuming "difficult" pile installation, which is highly likely given the challenging, boulder-strewn seabed. These and other mitigation and monitoring measures presented in the DEIS demonstrate BOEM's commitment to responsible offshore wind development.

Response to comments: Thank you for your comment. BOEM will consider all mitigation measures in the FEIS and could include them in the Record of Decision.

Comment theme: Micrositing to protect sensitive cultural resources and marine habitats.

Associated comments

Table I-81 provides the full list of comments received as part of this comment theme.

Table I-81. Micrositing to protect sensitive cultural resources and marine habitats comments.

Comment Number	Comment
159-2	It is further recommended that micositing be used for placement of all WTG components and cabling not just in complex fisheries, but for the scope of lease area. The BOEM should require DSWF to complete micrositing for placement of WTG and cabling structures as other research shows off-shore WTG farms have long-term effects on ecosystem function, and benthic habitat (Causon and Gill, 2018).
316-7	Current plans also call for separate transmission infrastructure for each project which should be negotiated to minimize the potential impact to commercial and recreational fishing grounds. Existing projects have already shown the problems that can arise when cables are only minimally buried. The need for deep cable burial suggests that micro-siting is required in order to build these projects with limited impacts on fishing.
363-9	Prohibit placement of turbines in sensitive habitat including spawning areas and high-value fishing grounds;
310-3	While MA DMF is supportive of the Habitat Alternative objectives, the DEIS does not clearly define micrositing procedures for avoiding sensitive habitats or what habitats would be deemed sensitive. How micrositing will be done and what thresholds and habitat classification will be used to determine when to move a turbine needs to be described in the FEIS.

Response to comments: As noted in the Executive Summary of the EIS, the Proposed Action includes micrositing. " SFW would space WTGs in a uniform east–west and north–south grid with 1 × 1–nautical-mile (nm) spacing between WTGs and diagonal transit lanes at least 0.6 nm wide. This configuration would still allow micrositing of WTGs to avoid sensitive cultural resources and marine habitats." Micrositing would also occur under all other considered action alternatives.

The FEIS follows the method described in the DEIS where turbine and cable location impacts to benthic habitat were evaluated based on identification of areas of complex habitat determined by NOAA through the EFH assessment process.

Comment theme: Collaboration with other agencies and individuals to better monitor impacts to the environment.

Associated comments

Table I-82 provides the full list of comments received as part of this comment theme.

Table I-82. Collaboration with other agencies and individuals to better monitor impacts to the environment comments.

Comment Number	Comment
284-11	We appreciate ongoing efforts by BOEM and others to compel developers to conduct ecological monitoring in their lease area, and to contribute funds to both regional fisheries research and long-term regional monitoring of wildlife impacts. Conducting scientific research and preconstruction, during construction, and post-construction monitoring to advance understanding of the effects of offshore wind development on marine and coastal resources and ocean uses is essential. Science should be conducted in a collaborative and transparent manner, utilizing recognized marine experts, engaging relevant stakeholders, and making results publicly available and timely shared, as appropriate, on the Northeast and Mid-Atlantic Ocean Data Portals and other public platforms.
284-15	We believe there are several opportunities in the next couple of years where the installation of a network of non-proprietary oceanographic monitoring arrays could facilitate a variety of ancillary research and monitoring efforts aimed at improving our understanding of the ecosystems on the outer continental shelf, assess changes related to early wind farm construction and operations, and better predict cumulative impacts of projects slated to be constructed in the latter half of the 2020s. These include (1) an ambient sound field array with sensors capable of detecting construction noise (including pile driving) and sensors for Passive Acoustic Monitoring for marine mammals, a more sophisticated acoustic network could also locate through triangulation a sound source received by multiple receivers, (2) an expanded above water Motus receiver array network for detection of micro-tagged birds, and (3) an expanded network of acoustic receivers capable of detecting marine life that are affixed with transponder tags. In addition, strategic investment in basic physical oceanographic sensors on these arrays can help oceanographers interpret marine life and bird observations in ways that better allow for predicting impacts of additional expansions of offshore wind energy generation along the US Atlantic coast.
349-15	BOEM must also collaborate with state efforts (e.g., the New York State Energy and Research Development Authority (NYSERDA) Environmental Technical Working Group (ETWG)), scientists, NGOs, the wind industry, and other stakeholders to use information from monitoring and other research, and evolving practices and technology to inform cumulative impacts analyses moving forward. The current best management practices listed in the DEIS are very general, primarily discussing waste management and debris.39 These practices must evolve as monitoring informs impacts and the adaptive management practices needed to account for unanticipated impacts associated with this new industry. Likewise, analyses should include more specific information related to impacts of offshore wind development and operation on wildlife as it becomes available and management practices advance. As monitoring informs management practices, BOEM must require continued monitoring and employment of adaptive management practices by offshore wind projects. This will ensure that BOEM can swiftly minimize damages of unintended or unanticipated impacts to coastal ecosystems or wildlife and inform strategies for future wind projects to avoid potential impacts.

Response to comments: Thank you for your comment. BOEM fully supports regional monitoring and sharing data with the public as offshore wind development progresses and will incorporate results in analysis supporting future decisions.

Comment theme: Installation of acoustic receivers on monopiles.

Associated comments

Table I-83 provides the full list of comments received as part of this comment theme.

Table I-83. Installation of acoustic receivers on monopiles comment.

Comment Number	Comment
338-30	Vemco acoustic receivers should be installed on monopiles. Acoustic data should be retrieved, batteries replaced, and hardware maintained on a quarterly to semi-annual basis. Acoustic data should be shared with Management agencies and researchers. Funding and research should be conducted to apply acoustic tags for species potentially impacted by the Project.

Response to comments: Table G-1 in Appendix G includes the use of a semipermanent acoustic network consisting of near real-time bottom-mounted and/or mobile acoustic monitoring platforms. No change made in the EIS.

Comment theme: Communication with the fishing industry regarding compensation plans (see also Commercial Fishing section).

Associated comments

Table I-84 provides the full list of comments received as part of this comment theme.

Table I-84. Communication with the fishing industry regarding compensation plans (see also Commercial Fishing section) comments

Comment Number	Comment
355-4	Mitigation We in Rhode Island had hoped that compensation conversations were going to go better than they did with the previous company, but it seems as though there is a race to the bottom of who can undervalue the fisheries the most. Though I have not been directly involved I have been updated on how the Orsted negotiations are going and have heard that Orsted will not even speak with the RI FAB directly (or the industry), but only with CRMC. We are constantly told that there will be transparency working with the wind energy companies and we are consistently shown the opposite. It is disheartening to hear of this situation. I hope that Orsted will reach out to the industry for a honest discussion on mitigation.
166-10	Overall, Table G-1 and Table G-2 are very general and do not detail what each mitigation plan entails and the expected effects on resource impacts. This has implications for which subset of the commercial fishing sector, for example, will likely be most impacted and in need of financial compensation, even if the overall fishing fleet experiences negligible to minor impacts.
363-8	Require OSW developers to determine “micrositing” of turbines and cables based on transparent negotiations with fishermen who know the ocean best;
363-12	Take clear and decisive action to ensure that any benefits of OSW accrue to the U.S.—not in the future, but now—and that any job creation or coastal redevelopment does not displace existing industries and protects coastal cultures and traditions;

Response to comments: Fishing is an important use of the Exclusive Economic Zone that BOEM must consider in its decision-making. BOEM regularly engages with commercial and recreational fishermen to understand their concerns from both a biological and socioeconomic impact perspective. This has been accomplished through focused engagement with Regional Fishery Management Councils, participation in state-led fishery advisory group meetings, and the convening of a National Academies Fisheries Steering Committee. BOEM incorporates fishing industry recommendations into the leasing process by: issuing guidelines to leaseholders or including lease stipulations to develop and implement a fisheries communication plan, developing a fishing industry webpage, and working closely with state partners to address regional fisheries monitoring associated with potential impacts from offshore wind development.

BOEM is open to working with state partners and the commercial and recreational fishing industries to investigate alternative strategies to negotiate compensatory mitigation agreements. South Fork Wind, LLC has negotiated with the State of New York, the State of Rhode Island and the Commonwealth of Massachusetts to determine compensation packages for fishermen.

Comment theme: Support for cumulative analysis.

Associated comments

Table I-85 provides the full list of comments received as part of this comment theme.

Table I-85. Support for cumulative analysis comments.

Comment Number	Comment
349-4	The DEIS notes that BOEM's NEPA review began before the Council on Environmental Quality updated the NEPA regulations and, in particular, repealed 40 C.F.R. §1508.7, which required federal agencies to conduct a cumulative impacts analysis as part of an environmental impact statement. BOEM states that because its review began before the effective date of the repeal of 40 C.F.R. §1508.7 on September 14, 2020, the DEIS still contains a cumulative impacts analysis. We support BOEM's decision to include a cumulative impacts analysis in the DEIS and our view is that BOEM must retain the cumulative impacts analysis in the FEIS. Under the former 40 C.F.R. §1508.7, "cumulative impact" had the following definition: Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. BOEM's decision to include a cumulative impacts analysis in the DEIS, longstanding case law interpreting NEPA, and recent actions by the Biden Administration all support the need for a robust cumulative impacts analysis in the DEIS.
349-8	In addition to a thorough examination of direct and indirect impacts, as well as mitigation measures, assessing cumulative impacts is essential to understanding the impact of offshore wind on species and ecosystems along the coast. This project is one of the earliest offshore wind projects to undergo NEPA review and provides a key opportunity to guide future analyses, ensure that new information is gathered and incorporated in the assessment of impacts, and establish practices to mitigate those impacts that anticipate this growing industry's needs.
349-9	Critical to a proper cumulative impacts analysis is its scope. In Vineyard Wind 1's (VW) SEIS, BOEM greatly expanded the "scope for future offshore wind development . . . from what was considered in the Draft EIS, which only considered in detail projects that had submitted construction plans (approximately 130 MW) in federal waters at that time)." Likewise, the Project DEIS appropriately uses this broad scope for its cumulative impact analysis. This scope is the state capacity planned commitment for existing Atlantic leases (21.8GW, or approximately 22GW). This is a reasonably foreseeable scope for offshore wind development. Future NEPA analyses for offshore wind projects should continue to expand the scope of the cumulative impact analysis as the industry grows and additional development becomes reasonably foreseeable.
349-10	The DEIS assumes levels of future development are based on state commitments to renewable energy development, available turbine technology, and the size of potential development areas. The DEIS explains a scope of reasonably foreseeable cumulative impacts with currently available technology that suggests that approximately 22 GW of offshore wind development are reasonably foreseeable on the Atlantic outer continental shelf (OCS). This would result in the construction of about 2,000 wind turbines over a 10-year period on the Atlantic OCS, with currently available technology. a. State Clean Energy Commitments Are Likely to Increase

Comment Number	Comment
	Looking at the ten tiers of potential scope of OSW development set forth on page E-5, Scope for Future Possible Development of Offshore Wind of the DEIS, we agree with BOEM's conclusions that tiers seven through ten (full build out of the wind energy potential (tier 10); technical resources potential of all Atlantic call, wind energy, and lease areas (tier 9); pledged state capacity planned commitment (tier 8); and technical resource potential of existing Atlantic resources (tier 7)) need not be included in the current analysis given how speculative they are at present. However, for future projects, it is likely that tiers seven and eight (particularly pledged state capacity planned commitment) may be reasonably foreseeable as well. Given the on-going climate crisis and the fact that states—and now the federal government—are increasingly more aggressive in their offshore renewable energy goals, it would be reasonable to assume that states will take the efforts necessary to meet, or hopefully exceed, their current goals to develop offshore wind. As such, these tiers will become far less speculative. Additionally, these goals may expand as efforts to combat climate change accelerate, moves are made towards increasing electric transportation, and other sectors efforts to decarbonize continue. This effort will make additional offshore wind development more likely and thus more foreseeable. BOEM recognizes that the state pledges for offshore wind capacity is currently about 29 GW and is divided among awarded, scheduled, and planned but unscheduled procurements. BOEM also assumes that the technology available to meet future procurements, although not currently available, may be different in ten years. New technology created daily—including larger and more powerful wind turbines—makes this reasonably foreseeable, which is why it is sufficiently analyzed within the DEIS.

Response to comments: Thank you for your comment. BOEM will continue to update the cumulative analysis in future NEPA documents as new information becomes available.

Comment theme: Cumulative impacts for concurrent pile driving.

Associated comments

Table I-86 provides the full list of comments received as part of this comment theme.

Table I-86. Cumulative impacts for concurrent pile driving comments.

Comment Number	Comment
166-22	In general, the cumulative impacts of pile driving for multiple projects at the same time should be given more emphasis, since construction of these projects could overlap both temporally and spatially.
310-13	The text does not reflect the length of time pile driving is anticipated or the seasons. According to Table D-1, the Maximum-Case Scenario List of Parameter Specifications, up to 16 foundations (15 WTGs and 1 OSS maximum) will take 4 hours each to drive in (total of 60 hours). However, it is unclear whether multiple foundations will be installed simultaneously, whether work will be performed on a 24-hour schedule or only during daylight hours, and in what season the work will be conducted. Relatedly, it is unclear if other wind farms are expected to be using pile driving at the same time, which could further compound noise impacts. According to Tables E-3 and E-4, pages E-8 and E-13, Vineyard Wind 1, Revolution Wind, Sunrise Wind, U.S Wind, and Ocean Wind all have construction dates within a year of the Proposed Action.

Response to comments: Table E-4 has been updated in the Final EIS to disclose the latest project construction schedule. BOEM considered this schedule along with concurrent project impacts in Chapter 3 FEIS analyses. Pile driving for individual turbines within the project area will occur sequentially due to the special vessels required for installation. Mitigation measures are included in Appendix G to address the reduction of impacts from pile driving. The Final FEIS was also updated to incorporate Project-specific pile driving details, by reference, to the SFWF BA and EFH.

Comment theme: Cumulative impact of other energy actions and projects.

Associated comments

Table I-87 provides the full list of comments received as part of this comment theme.

Table I-87. Cumulative impact of other energy actions and projects comments.

Comment Number	Comment
169-27	The DEIS and BOEM fail to analyze the Project's cumulative effects with other projects that have been approved by federal agencies such as the various hydro-electric projects from Canada, which further decimate U.S. onshore renewable energy producers. The DEIS fails to analyze the projected massive increase in Canadian imports of hydroelectricity. The DEIS fails to analyze the impacts on other renewable energy forms of generation. The failure to analyze impacts of wind and solar, with or without storage, and other forms of onshore renewable generation as a reasonably foreseeable alternative is clear error.
169-30	iv. BOEM Has Used Sophisticated Tools To Assess The Environmental Consequences Of Substitutes, And The D.C. Circuit Has Praised Its Modeling. BOEM develops Five-Year Programs to manage the leasing of offshore (or "Outer Continental Shelf" ("OCS")) oil and gas resources. Its most recent past Program covered the years 2012–2017; development of that Program and the related Environmental Impact Statement first began in 2009. See BOEM, Outer Continental Shelf Oil and Gas Leasing Program: 2012–2017— Final Programmatic Environmental Impact Statement, 8-1 (2012). In the decision document for that offshore Program, BOEM explained: In an environment of strong worldwide demand for oil and natural gas, a domestic supply cut equivalent to the production anticipated to result from a new Five Year Program would lead to a slight increase in world oil prices and a relatively larger increase in U.S. natural gas prices. All other things being equal, this would lead to a market response providing..a slight reduction in oil and natural gas consumed, a substantial increase in oil imports, and added supplies provided by onshore hydrocarbon resources. BOEM uses its Market Simulation Model (MarketSim) to estimate the amount and percentage of substitutes that the economy would adopt should a particular program area not be offered to lease. MarketSim is based on authoritative and publicly available estimates of price elasticities of supply and demand and substitution effects -- [I]n the event the NAA [No-Action Alternative] were implemented..68 percent of the oil and natural gas production foregone from this program would be replaced by greater imports, 16 percent by increased onshore production, [10 percent by other energy sources]..and 6 percent by a reduction in consumption. BOEM, Proposed Final Outer Continental Shelf Oil & Gas Leasing Program 2012–2017, 110 (2012)13; see also BOEM, 2012–2017 Final Programmatic Environmental Impact Statement, supra at 4-643 ("With less oil and gas available from the OCS under the No-Action Alternative, consumers could obtain oil and gas from other sources, substitute to other types of energy, or consume less energy overall."). In a recent case challenging the Interior's 2012–2017 offshore oil and gas leasing program, the D.C. Circuit favorably reviewed Interior's modeling of how "forgoing additional leasing on the OCS would cause an increase in the use of substitute fuels…and a reduction in overall domestic energy consumption from greater efforts to conserve in the face of higher prices." Ctr. for Sustainable Economy v. Jewell, 779 F.3d 588, 609 (D.C. Cir. 2015). Importantly, nothing in BOEM's modeling is unique to the offshore oil and gas context. According to BOEM, "MarketSim's economics-based model representation of U.S. energy markets…simulates end- use domestic consumption of oil, natural gas, coal and electricity in four sectors (residential, commercial, industrial and transportation); primary energy production; and the transformation of primary energy into electricity." BOEM, The Revised Market Simulation Model (MarketSim): Model Description 2 (2012). The Interior's sophisticated modeling of the environmental effects of energy substitutes under No-Action Alternatives is the culmination of 35 years of analysis. Interior has used the MarketSim model since at least its 2002–2007 Program for offshore leasing. See Minerals Mgmt. Serv. ("MMS"), Energy Alternatives and the Environment, 10 (2001)16 ("MMS employs the MktSim2000 model to evaluate the impact of decreased OCS production resulting from no action."). Since at least the 1990s, the Interior's Environmental Impact Statements have calculated the percentage of offshore production expected to be substituted by various energy alternatives under a No-Action scenario. MMS Energy Alternatives and the Environment, 13 (1996)17 ("[F]or each unit of OCS gas not produced because of no action . . . conservation will account for about 0.14 units…."); see also id. at 15 ("Significant environmental impacts associated with expanded importation of oil include: the generation of greenhouse gases…."). And going back to the first Five-Year Program in 1980 (when BLM prepared the Environmental Statements), Interior has recognized that not all sources of the same fuel type present the same environmental effects—for example, offshore oil drilling presents lower spill risks than imported oil substituted under the no- action alternative. Interior, 5-Year OCS Leasing Program 13b (1980). Similarly, in a 2001 report on its offshore oil leasing program, Interior declared in no uncertain terms that "Examining other energy sources is an important aspect of the No Action Alternative" under NEPA reviews. MMS, Energy Alternatives and the Environment 1 (2001). The DEIS wholly ignores alternative generation resources that would fill the void. The DEIS assumes that the Project would prevent future natural gas electric generating plants. Such an assumption is absurd and defeats the entire purpose of analyzing viable replacements when the No-Action alternative is selected. It is also a rationale that has been rejected by the courts. The DEIS' analysis is also inconsistent with BOEM and Interior's use of market modeling in other environmental impact statements. Such inconsistent action is itself arbitrary and capricious agency action.
166-36	The relationship between this project and others is important. BOEM should articulate how it will ensure that regional development occurs in a coordinated manner across projects. For example, could a single planning and environmental evaluation process be conducted when multiple projects wish to use similar routes for their export

Comment Number	Comment
	cables? If the effects of installation or operation are found to be unacceptable despite best efforts to mitigate them, will this information be used to alter future projects?

Response to comments: This is a Project-specific EIS, not a Programmatic EIS, and it complies with the requirements of NEPA. Analysis of the entire energy market, along the lines of what BOEM does for the 5 year program, is outside the scope of this EIS. Conclusions about the impacts associated with the No Action alternative take into account reasonable predictions and are based on the best available evidence. Additionally, the environmental analysis and resultant impacts of this project do not necessarily predict the outcome of the next project.

Comment theme: Cumulative offshore studies.

Associated comments

Table I-88 provides the full list of comments received as part of this comment theme.

Table I-88. Cumulative offshore studies comment.

Comment Number	Comment
284-12	We recognize that evaluating cumulative impacts is a challenging and emerging science, but the magnitude of development anticipated in the Atlantic over the next 10-15 years demands an aggressive approach to determining impacts. This is the kind of opportunity that if not addressed now will pass us by and we can be sure that down the road all stakeholders will suffer from not having this information. We point to a few relevant papers describing the challenges and possible approaches to offshore wind cumulative impact analysis, impacts on avian species specifically, and challenges assessing fisheries impacts. Impacts for particularly vulnerable species, such as the critically endangered North Atlantic right whale should be prioritized and expedited thru aggressive funding. This species is already in severe decline even before being impacted by the additional stresses that can be reasonably expected to result from offshore energy development.

Response to comments: Thank you for your comment. BOEM is currently conducting environmental studies independent of this EIS scope. The BOEM website has information about all ongoing and completed studies: https://www.boem.gov/environment/environmental-studies/renewable-energy-research.

Comment theme: Table E-3 updates.

Associated comments

Table I-89 provides the full list of comments received as part of this comment theme.

Table I-89. Table E-3 updates comments.

Comment Number	Comment
296-3	Table E-3 needs to be updated to reflect the current state of affairs and these changes should be incorporated into the cumulative impacts analysis. For example, in January 2021 the Beacon Wind project in OCS A-520 won a contract to supply 1230 MW of generating capacity to New York and will install export cables to bring power from offshore Rhode Island to the NYISO grid. Accordingly, 1230 MW from the Beacon Wind lease area should be moved from the Future to the Active Federal Projects and the values adjusted.

Comment Number	Comment
363-25	Even outside of the NEPA process and information conveyed through the media, it is nearly impossible for the public, much less for fishermen, to access basic information about the status of OSW planning and the large number of projects through trusted channels. Fishermen should be viewed more as co-planners or even directly impacted parties than the general public, and thus deserve especially careful attention. Multiple lease reassignments, project starts and stops, changing project names, and quickly evolving relationships between various states and individual developers or projects have also contributed to the public's difficulty in following the OSW leasing process from start to finish. The DEIS's summary of current status of Atlantic OSW projects in Table E-3 provides no relief; it was sorely outdated at the time of DEIS publication. For example, it does not reflect that CVOW's project in OCS-A 0497 has been built, last year's procurements in NY and NJ, or the submission of COPs by Avangrid and Dominion. The caption of the table notes that the table will be updated, but the public needs current information in order to understand the state of Atlantic OSW development if it is to draft informed comments on the DEIS.

Response to comments: Thank you for your comment. Table E-3 has been updated in the Final EIS.

Comment theme: Technical edits.

Associated comments

Table I-90 provides the full list of comments received as part of this comment theme.

Table I-90. Technical edits comments.

Comment Number	Comment
296-4	Table ES-l would benefit if it were proceeded by an introduction to or definition of the term "cumulative impacts" to help clarify the context. Also, under the entry for recreation and tourism, the final sentence states that overall cumulative adverse impacts would include both adverse and beneficial impacts. We recommend for clarity that the first "adverse" is removed so the sentence begins "Overall cumulative impacts would" ...
322-16	THE DEIS CONTAINS ERRONEOUS STATEMENTS On Page 3-154, in the first full paragraph under "Cumulative Impacts," the DEIS incorrectly states "The FIMP [Fire Island to Montauk Point] Project to control beach erosion and provide hurricane protection would also extend to Hither Hills State Park, opposite Montauk Harbor." In fact, the FIMP extends to Montauk Point, approximately 10 miles east of Hither Hills State Park, and Hither Hills State Park is located approximately seven (7) miles southwest of Montauk Harbor, and not "opposite" the harbor. The misstatements in the aforesaid DEIS sentence should be corrected accordingly.

Response to comments: Thank you for your comment. This edit was made in the FEIS.

Comment theme: Calculation of WTG numbers for the cumulative scenario.

Associated comments

Table I-91 provides the full list of comments received as part of this comment theme.

Table I-91. Calculation of WTG numbers for the cumulative scenario comment.

Comment Number	Comment
301-100	The number of WTGs within the RI/MA WEA is inconsistently reported throughout the DEIS, and should be consistently reported in the FEIS: • pdf pg. 157: “The cumulative HRVEA estimates that the reasonably foreseeable future projects have the potential to develop up to 940 WTGs in the RI/MA WEA….” • pdf pg. 163: “The incremental addition would include up to 15 WTGs with red aviation hazard flashing lights and up to 15 WTGs and 1 OSS with marine navigation lighting… compared to a future potential of up to 955 WTGs in the RI/MA WEA.” • pdf pgs. 204-206: The RI/MA WEA is stated as having “up to 959 structures in the RI/MA WEA, which currently supports only 5 offshore wind turbines associated with the BIWF.” • pdf pg. 209: “The Proposed Action would result in short-term and long-term minor to moderate incremental impacts to military and national security through the installation of 16 structures (15 WTGs and 1 OSS), along with stationary lift vessels and cranes during construction, to conditions under the No Action alternative, for a total of 975 structures within the RI/MA WEA.” The same numbers are presented differently (975 - 16 = 959). • pdf pg. 209-210: “BOEM estimates a cumulative total of 975 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the RI/MA WEA.” • pdf pg. 646: “The placement of 959 WTGs and OSS in the RI/MA WEA would have long-term adverse impacts….”

Response to comments: Thank you for your comment. Turbine numbers were calculated based on the geographic analysis areas, which vary by resource in size. Therefore, the number of turbines that fall within the analysis areas also vary. Appendix E Attachment 4 notes which projects (and associated turbines) fall within each analysis area.

Comment theme: Sufficiency of cumulative analysis.

Associated comments

Table I-92 provides the full list of comments received as part of this comment theme.

Table I-92. Sufficiency of cumulative analysis comments.

Comment Number	Comment
296-5	Tables 3.1-1 through 3.18-1 (pages E3-1 through E3-46) in Attachment 3 Ongoing and Future Non-Offshore Wind Activity Analysis (Part 2) presently include associated impact-producing factors (IPFs) and their characterization under "Ongoing Activities" and "Future Non-Offshore Wind Activities Intensity/Effect." This table is deficient in that it does not address likely IPFs for other categories. Specifically, these tables within Attachment 3 should be modified to include additional columns to accommodate the likely IPFs for "Future Offshore Wind-related Activities Intensity/Effect" and "South Fork Wind Project-related Activities Intensity/Effect." In addition, these tables should include a summary column describing the overall likely results from the associated IPFs. Under the current table configuration it is not possible to determine specific project related impacts or cumulative impacts likely resulting from reasonably foreseeable future offshore wind development.

Comment Number	Comment
147-2	The DEIS estimates that up to 11,748 MW of Atlantic offshore wind development is reasonably foreseeable in light of existing permitting approvals and leases. The SEIS assumes that if the Project is not approved, these other offshore wind facilities will still be constructed and come online. It is not, however, simply a given that offshore wind development will proceed along the Eastern Seaboard. If the Bureau of Ocean Energy Management ("BOEM") declines to approve the Project's Construction and Operations Plan ("COP"), other wind developers will take note and could be discouraged from proposing new facilities, or from continuing with an existing permitting process. The protracted and ultimately unsuccessful effort to build the Cape Wind project, for example, cast a subsequent pall over offshore wind in the United States for many years. A failure to permit the Project at this stage is likely to have a similar impact. A decision imposing new requirements that would render the Project economically nonviable—such as the dismissed alternatives minimizing the number of turbines or using alternative wind turbine foundations—could also act as a deterrent to developers, who may subsequently see no reason to invest in new offshore wind facilities. By contrast, if the Project goes forward, it will represent a crucial precedent and pave the way for wind development along the Eastern Seaboard and in New York in particular. The first offshore wind facility in the United States, the Block Island Wind Farm, has a capacity of 30 MW. The recently completed Coastal Virginia Offshore Wind ("CVOW") pilot project is the country's second offshore wind facility, with a capacity of 12 MW. CVOW will eventually expand to a 2.6 GW development in an adjacent lease site that is expected to be operational by 2026. The Project would be the first operational offshore wind facility in New York. It would have a capacity of up to 180 MW—up to 15 turbines of 6 to 12 MW each—which would be one of the larger projects on the Atlantic Coast. Its approval will signal that the federal government is serious about allowing sensibly sited and environmentally sound large-scale offshore wind development. Equally importantly, if BOEM approves the Project it will confirm that the Eastern Seaboard is open for business, and not only for small-scale or pilot projects.
360-6	In the final EIS, BOEM should be explicit that the impact ratings described in the cumulative analysis are based on worst-case projections rather than what is reasonably foreseeable. This is due to the fact that, for certain cumulative impact assessments, BOEM did not fully account for generally recognized standard mitigation techniques—or the likelihood of incorporating reasonably foreseeable new ones—that will be employed by future offshore wind energy projects and would certainly decrease their impacts. To the extent there are impacts from future projects, the offshore wind industry remains committed to collecting, using, and sharing credible scientific data to ensure that any impacts from future projects are well understood and to using science to inform mitigation to the greatest extent possible—in other words, taking an adaptive management approach. Additionally, the wind industry will continue to work collaboratively with scientists, federal and state agencies, and local communities to ensure responsible coexistence with all users of lease areas.
319-4	The DEIS estimates that up to 11,748 MW of Atlantic offshore wind development is reasonably foreseeable in light of existing permitting approvals and leases. Further, the DEIS assumes that if the Project is not approved, these other offshore wind facilities will still be constructed and come online. While this may be a practical approach for analyzing cumulative impacts, it is simply not a realistic assumption. If the BOEM declines to approve the Project's Construction and Operations Plan (COP) or approves it with onerous conditions such as adoption of the Vessel Transit Lane Alternative, discussed below, other wind developers will take note and could be discouraged from proposing new facilities, or from continuing with the existing permitting process. One need only look to the protracted and unsuccessful Cape Wind project, for example, which cast a cloud over the development of offshore wind for a decade or more. Failure to permit the South Fork project could have similar consequences.
145-5	CUMULATIVE IMPACTS Offshore renewable energy projects must also be thoroughly examined for cumulative impacts and data deficiencies, and allow for adaptive management corrections at a region-wide scale. The various and significant impacts from these projects to the environment, and the potential effects on human uses, should be analyzed broadly and with attention to industry-wide impacts, rather than solely examined project by project. Currently, the offshore wind power generating industry on the East Coast is poised to grow from a few operating turbines to around two thousand in ten years. Seriously considering cumulative impacts allows BOEM to proceed incrementally and cautiously to ensure that impacts from one project are understood before expanding the size of that project or proceeding with additional projects.
362-5	Cumulative Impacts and Combined Transmission CPW commends BOEM for conducting a cumulative impacts analysis and considering 21.8 GW of potential future OSW development as part of the reasonably foreseeable activities subject to analysis in the DEIS. However, BOEM's cumulative impacts analysis did not adequately consider the impacts from the proliferation of reasonably foreseeable OSW export cables along the Atlantic coastline in New York and neighboring states. And relatedly, BOEM failed to consider how those cumulative effects could be minimized through the consolidation of OSW transmission infrastructure. BOEM therefore should revise its cumulative effects analysis and add an alternative in which Cumulative Impacts and Combined Transmission

Comment Number	Comment
	CPW commends BOEM for conducting a cumulative impacts analysis and considering 21.8 GW of potential future OSW development as part of the reasonably foreseeable activities subject to analysis in the DEIS. However, BOEM's cumulative impacts analysis did not adequately consider the impacts from the proliferation of reasonably foreseeable OSW export cables along the Atlantic coastline in New York and neighboring states. And relatedly, BOEM failed to consider how those cumulative effects could be minimized through the consolidation of OSW transmission infrastructure. BOEM therefore should revise its cumulative effects analysis and add an alternative in which the SFWF's power is transmitted to shore via a consolidated export cable to be shared with the neighboring Sunrise Wind development. A. Cumulative Impacts Analysis of Project-By-Project Transmission Lines BOEM's cumulative impacts analysis did not adequately consider the impacts from the reasonably foreseeable proliferation of OSW export cables along the NYS coast, even though BOEM recognizes generally the expected and extensive development of OSW generation on the outer continental shelf in its DEIS cumulative impacts analysis. By recognizing generally the foreseeable extensive OSW development, BOEM should also have considered the specific cumulative impacts of each generation project having its own radial tie-line—as has been proposed for SFWF and the nearby Sunrise Wind development. Under such a scenario, the region's coastline will soon see a large number of export cables feeding power to onshore substations for grid interconnection. Proceeding with this project-by-project approach, rather than building offshore substations that would collect power from multiple OSW farms, would create additional offshore and onshore cumulative effects. BOEM should consider these cumulative effects in its NEPA analysis. Indeed, in discussing the cumulative impacts of undersea transmission lines, pipelines, and other cables, BOEM states that it presumes that all offshore wind projects with a COP under review will "include at least one identified cable route." And the DEIS further states: "BOEM assumes that each offshore wind development would have its own cable (both onshore and offshore) and that future projects would not utilize a regional transmission line." As a result, BOEM should appropriately describe the cumulative impacts from these individual cables and, as discussed below, include in the EIS a planned transmission alternative, at least one that would consolidate transmission for SFWF and Sunrise Wind. European OSW systems have already demonstrated the feasibility and substantial benefits of planned transmission systems that consolidate power at offshore substations. Indeed, New Jersey has already endorsed this approach, with the state legislature and utility regulator adopting development of a planned, offshore electrical transmission network as the state's official public policy. And the New York Department of Public Service and the New York State Energy Research and Development Authority have concluded that creating "a meshed offshore network by linking the offshore substations of several individual OSW plants near each other is valuable because a meshed configuration can achieve a more reliable and resilient delivery of OSW generation." It is therefore unrealistic for BOEM to assume that each future OSW project will have its own export cable and landing site when a neighboring state, with significant and foreseeable OSW development, has already announced a contrary public policy, and New York State appears headed in the same direction. BOEM has already acknowledged in the Vineyard Wind Supplemental EIS (SEIS) that siting more infrastructure in the ocean increases cumulative impacts from OSW development. For instance, the SEIS stated that the cumulative impacts to fisheries are "driven mostly by changes to fish distribution/availability due to climate change, reduced stock levels due to fishing mortality, and permanent impacts due to the presence of structures (cable protection measures and foundations)." Moreover, the SEIS acknowledges that consolidating electrical transmission infrastructure would reduce these effects: "if shared submarine cable were developed in the future, environmental impacts would be reduced for most resources." BOEM's DEIS for the SFWF and SFEC should have considered and built on the cumulative impacts analysis in the Vineyard Wind SEIS and evaluated the potential environmental benefits of adopting the available technology that would consolidate the SFWF's power export infrastructure with neighboring OSW generation projects such as Sunrise Wind. Such analysis would not unduly delay Project commencement and would be particularly important because this DEIS sets a precedent for how BOEM will analyze the environmental impacts of OSW transmission infrastructure ahead of anticipated rapid growth in such infrastructure deployment. There are several distinct cumulative impacts that BOEM ought to consider in this analysis. Some cumulative impacts are directly related to the number and length of the transmission cables. As mentioned, the Vineyard Wind SEIS already established that the amount of transmission infrastructure in the ocean is a primary determinant of the cumulative environmental impacts to fisheries—as well as derivative economic and cultural impacts to the commercial and recreational fishing industries. Similarly, reducing the number and extent of transmission cables directly reduces the environmental, economic, and cultural impacts onshore, including those associated with additional landing sites and more overland cable construction. The stakes of these onshore cumulative impacts are obviously elevated when transmission infrastructure is sited in residential communities and environmentally sensitive areas, as Deepwater Wind proposes with the SFEC.

Comment Number	Comment
	Moreover, BOEM should consider specifically the cumulative effects that relate to the improved efficiency of the electricity grid as a result of planned and consolidated transmission infrastructure. For instance, consolidated transmission infrastructure would permit grid operators to more efficiently interconnect OSW power with the existing onshore grid, requiring fewer onshore upgrades than allowing OSW developers to build the least-cost interconnection available at the time each project is designed. Certain areas, such as New York Harbor, also have a limited number of feasible connections, due to geographic and grid design constraints. Finally, consolidated, planned transmission infrastructure has positive climate-related impacts for minimizing transmission-related energy losses and reducing the need for grid operators to curtail wind power generation.
362-4	CPW commends BOEM for including 21.8 GW of potential development in the scope of its cumulative impacts analysis. However, that analysis does not meaningfully consider the cumulative impacts of (foreseeable) project-by-project export cable construction, absent any broader OSW transmission planning. The failure to include this analysis in the DEIS poses two significant problems. First, the DEIS does not consider the cumulative impacts created by the expected proliferation of project-specific export cables. Second, the DEIS assumes that each future OSW generation development will have its own, separate export cable, excluding the possibility of either planned offshore transmission infrastructure or combined transmission lines from multiple OSW generation projects. This assumption is unrealistic, considering New Jersey has already announced a public policy of building an offshore transmission network. Moreover, planned offshore transmission infrastructure has been proven to work in Europe, where OSW projects far outnumber those currently installed in U.S. waters.
301-18	In the DEIS, Appendix E describes the cumulative analysis scenario employed by BOEM under NEPA. This scenario was designed to consider past, present and reasonably foreseeable future projects and other activities and conditions that could contribute to cumulative impacts. BOEM's cumulative impact analysis concludes that approximately 22 GW of offshore wind development in the Atlantic is reasonably foreseeable (pg. E-6). This analysis is likely over-inclusive in that it assumes all potential projects will be approved, constructed, and operated. Indeed, BOEM relies on a number of assumptions for its analysis, such as: • there will be sufficient transmission infrastructure to support this level of energy production and delivery, • that states will successfully procure this level of offshore wind energy, and • there will be sufficient vessel capacity and supply chain production (pgs. H-106, E4-3, 3-48, F-9). BOEM should more clearly acknowledge that the negative impacts described in the cumulative analysis are the "most conservative," worst-case estimates rather than the reasonably foreseeable scenario (pg. E4-1). The impact of the 22-GW build-out must be considered (as BOEM itself admits [pg. E4-1]) as over-estimating as-constructed project impacts.
299-7	The DEIS covers virtually the entire U.S. East Coast, and appears intended to serve as a template for the evaluation of potential impacts associated with future OSW projects. While it may be appropriate for BOEM to acknowledge the existence of future OSW projects, the Network and its members caution against providing the same weight to the potential impacts of these subsequent OSW projects relative to OSW projects undergoing active federal review. Potential projects, though real, remain unformed, and it is reasonable to infer that those potential projects will adjust to lessons learned from the construction of the first utility-scale OSW projects in U.S. waters. Future OSW projects are likely to use turbines with larger nameplate capacities than those considered in the DEIS, which reduces impacts by decreasing the number of offshore structures. Additionally, there may be adaptive management measures gleaned from the monitoring of constructed OSW projects that could reduce their long-term impacts. In these ways, near-term OSW development is anticipated to evolve to support a lower incremental impact when compared to the Proposed Action. To be clear, the Network is in no way recommending that the cumulative impacts study be re- performed, in fact we adamantly urge against that scenario. We are simply identifying the risks and uncertainties associated with an analysis of this scope and breadth.
299-8	Regarding the prospective template that the DEIS may provide for future evaluation, the Network recognizes that the vast geographic extent of the cumulative analysis presents a substantial workload for federal agencies, developers, and stakeholders to develop and review large volumes of material. This undertaking is above and beyond the substantial diligence already inherent in BOEM's OSW permitting and approvals processes. This added workload could strain existing resources and adversely impact OSW project federal permitting timelines, while providing only a marginal improvement in the identification of potential impacts compared to BOEM's standard processes. This concern is particularly relevant in view of BOEM's current staffing and budgetary constraints. Moreover, imposing additional workload upon BOEM would likely inhibit the agency's ability to auction new OSW lease areas. This includes the leasing of the draft New York Bight Wind Energy Areas, which, as acknowledged by the DEIS, will be necessary for both New York and New Jersey to realize their legislatively mandated OSW targets. Based upon the projections presented by BOEM at its November 2018 Intergovernmental Renewable Energy Task Force Meeting on the New York Bight, which cited the announcement of "Final" Wind Energy Areas in 2019 followed by a Lease Sale in "Early 2020", this process is already significantly delayed.

Comment Number	Comment
349-12	The commenters agree with BOEM's note that "it is difficult to accurately predict future technology for . . . offshore wind." As such, in assessing how future wind sites may be constructed, operated, and sited, it is reasonable to assume that future projects will employ higher output turbines that can generate more power with fewer physical turbines of larger size. This could change impacts around hub height, rotor diameter, and total height of turbines for future projects, as well as, inter alia, the number of turbines and the length of interarray cables. Projects, particularly projects further on the time horizon, may have increasingly larger turbines that could impact the design and layout of the operation. The DEIS notes that for future projects, BOEM should assume that "the largest turbine that is presently commercially available, and 12-MW [Wind turbine generator (WTG)]" be used to evaluate potential impacts. Changes in turbine size could have beneficial impacts (such as fewer turbines spaced further apart) as well as potentially negative impacts (larger rotation zones that could impact certain species like higher flying birds). The Vineyard Wind 1 project is one example of successfully incorporating evolving technological changes. Vineyard Wind is proposing to use 13MW turbines, which are larger than the turbines originally planned for the project, because of rapid technology advancements. We urge BOEM to ensure that future cumulative impact models continue to keep pace with technology.
294-4	The South Fork Wind Farm DEIS does not contain a dedicated Cumulative Impacts Analysis section or methodology. The Vineyard Wind SEIS Section 1.2 was entitled "Methodology for Assessing Cumulative Impacts". The Vineyard Wind SEIS "assesses cumulative impacts that could result from the incremental impact of the Proposed Action and action alternatives when combined with past, present or reasonably foreseeable activities, including other offshore wind activities. To develop the cumulative activities scenario analyzed in this [Vineyard Wind] SEIS, BOEM conducted a thorough process to identify reasonably foreseeable offshore wind development on the Atlantic OCS." No such cumulative impacts methodology or assessment section is present in the South Fork Wind Farm DEIS. This is unacceptable and illogical, particularly considering that the new Administration is supportive of increasing the amount of offshore wind development on the Atlantic OCS, resulting in more, not less, reasonably foreseeable cumulative impact. In the Vineyard Wind SEIS, BOEM assumed 22 gigawatts of offshore wind along the Atlantic OCS for its cumulative impacts analysis; however, recently the Biden Administration has called for a doubling of planned offshore wind development by 2030. Therefore, as part of any cumulative impacts analysis, the South Fork Wind Farm DEIS should reasonably foresee impacts arising from up to 44 gigawatts of offshore buildout if this is in fact the new agency position. BOEM should maintain consistency with earlier documents and analysis regarding cumulative impacts. BOEM should reissue a DEIS or SEIS with a comprehensive methodology and analysis of cumulative impacts taking into account what may now be "reasonably foreseeable." According to the Vineyard Wind SEIS cumulative impacts analysis based on the 22 gigawatts of reasonably foreseeable offshore wind buildout along the Atlantic OCS, there were "Major" cumulative impacts to commercial fisheries, "Major" cumulative impacts on scientific research and surveys, and "Major" cumulative impacts on military and national security uses. To now maintain in the South Fork Wind DEIS that, for example, overall cumulative impacts to commercial fisheries would be only "moderate", particularly when now potentially looking at 44 gigawatts of potential buildout, is ludicrous. Similarly, to maintain in the South Fork Wind Farm DEIS that cumulative impacts to military uses would now be "moderate", is also ludicrous. Even if the goal to newly double offshore wind goals by 2030 did not exist, and estimation of cumulative impact were based on the previously analyzed 22 gigawatts of reasonably foreseeable buildout, BOEM cannot state in one document that impacts are "major" and subsequently state in another document purportedly analyzing the same thing that they are "moderate."
363-30	The DEIS conflates cumulative impacts with the No Action alternative, fails to provide a clear explanation of the cumulative impacts scenario, and utilizes different descriptions of cumulative impacts throughout the document. Section 1.7 of the DEIS briefly describes the methodology for assessing cumulative impacts, which are defined as "the incremental effects of the Proposed Action on the environment when added to other past, present, and reasonably foreseeable future actions…" Key to this definition are what actions are considered as reasonably foreseeable. Therefore, BOEM needs to explicitly spell these out for the purposes of the EIS and the ability for the public to accurately interpret the environmental consequences of the Proposed Action.
363-32	The Scope for Future Possible Development of Offshore Wind figure on page E-5 shows that 5.4 GW of COPs have been submitted or approved. BOEM should make this information available at the beginning of the document where the No Action alternative is first presented, and it should distinguish between what projects have been approved versus what has only been submitted, but not yet approved. BOEM needs to explain how assumptions on what projects are "reasonably foreseeable" were made.
363-33	The logic used for the Cumulative Impacts assessment seems to be that, 'if it's presupposed that there will likely be 2,050 turbines in the future, what's 15 more turbines'? This creates a loophole in the assessment of cumulative impacts where the potentially largest project to date in the U.S. Atlantic could get a free pass because it looks small next to the specter of the thousands of turbines that some would like to build. This is an unacceptable approach for conducting an EIS. Here are a few examples that further illustrate the problem: • The DEIS states that Proposed Action structures represent no more than a 1% increase over total estimated WTG and OSS foundations across the geographic analysis area under the No Action alternative. "BOEM estimates a cumulative total of 975 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore

Comment Number	Comment
	wind projects in the RI/MA WEA. Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would consist predominantly of impacts described under the No Action alternative, which would represent a long-term, minor to moderate impact on military and national security uses." • "The Proposed Action would result in negligible incremental impacts to benthic habitats, finfish, invertebrates, and EFH through the installation of 16 lighted structures (15 WTGs and one OSS). This represents less than a 1% increase to conditions under the No Action alternative. BOEM estimates a cumulative total of 2,066 offshore WTGs and OSS foundations for the Proposed Action plus all other future offshore wind projects in the geographic analysis area. ... Therefore, the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would be similar to those impacts described under the No Action alternative and would be negligible, mostly attributable to existing, ongoing activities." These inconsistent and misleading claims of the cumulative impacts from the No Action Alternative are completely uninformed. This analysis should not shoehorn in cumulative impacts where it is convenient for a project the size of the SFWF but fail to analyze any real cumulative impacts of large scale buildout of the entire RI/MA leases where inconvenient.
363-34	BOEM must also reconcile the differences in cumulative impacts rankings between the SFWF DEIS and Vineyard Wind I (VW) SEIS. The DEIS state "[c]umulative impacts are the incremental effects of the Proposed Action on the environment when added to other past, present, and reasonably foreseeable future actions, regardless of which agency or person undertakes the actions." Considering the DEIS analyzes the installation of no more than 15 turbines out of an expected approximately 2,050 turbines along the east coast, and the cumulative activities scenario for two projects analyzed mere months apart in the absence of additional leasing should be roughly similar, it defies all logic that the cumulative impacts across the valued ecosystem components would be given a lower magnitude of impacts in the SFWF DEIS compared to the VW SEIS analysis
363-35	In summary, the Draft EIS does not provide a reasonable assessment of cumulative impacts, and the information presented is hard to follow. BOEM needs to clarify its methodology and on the actual predicted impacts, while making it clear that there are significant unknown impacts that still need to be investigated.
363-31	Considering the problems with the No Action alternative (discussed below), the Cumulative Impacts assessments are very inaccurately portrayed. Whereas previously BOEM maintained that cumulative impacts were negligible because one project is, essentially, not that large or significant, in short, BOEM's new (highly flawed and misleading) argument is that the No Action Alternative would include "the addition of up to 2,050 new WTG and OSS foundations in the geographic analysis area" (cited throughout in the No Action Alternatives sections including with this language on p. 3-13), so one project is still not significant in light of this larger picture. But nowhere does it fully analyze a possible 2,050 WTG compared to the present day status quo. First, the installation of such a large number of turbines is not a guarantee, and the No Action Alternative treats it as such in numerous places throughout the DEIS. While we understand that states are working to meet clean energy goals by 2030 and beyond, an assumption that upward of 2,050 offshore wind turbines will be installed in the Northwestern Atlantic ocean within a very short time frame, compared to the 7 that currently exist, is speculative at best. It is highly misleading to characterize impacts from the proposed South Fork Wind Farm against these hypothetical estimates of WTGs.

Response to comments: Thank you for your comment. The South Fork Wind Farm EIS Cumulative Activities Scenario is presented in Appendix E of the EIS and is based on the same BOEM 2019 study (National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf) as the Vineyard Wind EIS, and mirrors the Vineyard Wind Methodology for Assessing Cumulative Impacts.

The South Fork Wind Farm Proposed Action allows for up to 15 wind turbine generators whereas the Vineyard Wind Proposed Action allows for up to 106 wind turbine generators. This 7-fold difference in number of wind turbine generators, among other quantifiable and qualifiable differences in project design, allows for differences in impact determinations between the two projects.

BOEM determined that it is reasonable to predict that, if the proposed Project is not built, another project or projects would be constructed because of the need to meet mandates/demand. This also allowed BOEM to assess the maximum-impact scenario in terms of potential impacts. The framework for BOEM's cumulative analysis is appropriate.

Comment theme: Updates to the cumulative action scenario.

Associated comments

Table I-93 provides the full list of comments received as part of this comment theme.

Table I-93. Updates to the cumulative action scenario comments.

Comment Number	Comment
338-20	Climate Change 15. Table E-6 - Climate Change Plans and Policies on p. E-21 of Appendix E - Cumulative Activities Scenario should be updated to include more recent NYS policies and initiatives, including but not limited to: a. The Climate Leadership and Community Protection Act (CLCPA), enacted on July 18, 2019, signed into law in July 2019 and effective January 1, 2020. CLCPA establishes economy-wide targets to reduce greenhouse gas (GHG) emissions by 40% of 1990 levels by 2030 and 85% of 1990 levels by 2050. b. 2020 Offshore Wind Solicitation - NYSERDA has provisionally awarded two offshore wind projects, totaling 2,490 megawatts – more information can be found at: https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Focus-Areas/Offshore-Wind-Solicitations/2020-Solicitation. c. Updates to the Clean Energy Standard – more information can be found at: https://www.nyserda.ny.gov/All%20Programs/Programs/Clean%20Energy%20Standard. d. Update the Governor Cuomo State of State Address. The references from 2017 and 2018 do not reflect the State's current offshore wind mandate (see prior comments).
338-53	64. Table E-9 (p. E-25), add the USACE Lake Montauk Harbor Feasibility Study. 65. Table E-9 (p. E-26), update the description of New York State port investments to include Governor Cuomo's announcement during the January 13, 2021 State of the State Address to partner with developers to create five dedicated wind energy port facilities.
364-7	Plans for a cumulative impact analysis that considers the impacts of the project in conjunction with pending and anticipated projects in other offshore lease areas.

Response to comments: Thank you for this information. The SFWF Cumulative Activities Scenario is described in Appendix E of the FEIS. BOEM considered these actions during the preparation of the Final EIS.

Comment theme: Cumulative impacts associated with offshore wind landings and transmission infrastructure.

Associated comments

Table I-94 provides the full list of comments received as part of this comment theme.

Table I-94. Cumulative impacts associated with offshore wind landings and transmission infrastructure comment.

Comment Number	Comment
362-2	CPW is also concerned about the precedent that this EIS—the first to consider an offshore wind (OSW) ocean cable landing in New York State—will set for the environmental review of the many future generation facilities planned for the New York coast. The DEIS does not adequately consider the cumulative offshore and onshore impacts of the foreseeable development of additional project-specific transmission infrastructure, leaving such future scenarios to a site-by-site analysis rather than a cumulative impact analysis as required by the National Environmental Policy Act (NEPA). BOEM should therefore consider the cumulative effects of the numerous cable landings to come and include in its NEPA analysis an alternative that would connect the SFWF to a combined, ocean OSW transmission system. Specifically, BOEM should consider electric transmission that would combine the export cables for both SFWF and the proposed nearby Sunrise Wind development. This analysis would likely show that it is not justifiable to construct two transmission systems running side-by-side on the ocean floor from adjoining wind development areas to the same onshore Long Island Power Authority electric transmission system, when one would suffice.

Response to comments: Thank you for your comment. The South Fork Wind Farm and South Fork Export Cable Project is responsive to a power purchase agreement with the Long Island Power Authority, which requires the power to enter the grid in East Hampton. The cable cannot be combined with other projects and still meet the contractual obligations.

Comment theme: Future OSW Project Construction Schedule.

Associated comments

Table I-95 provides the full list of comments received as part of this comment theme.

Table I-95. Future OSW Project Construction Schedule comment.

Comment Number	Comment
363-18	The “Future OSW Project Construction Schedule" in Table E-4 under the cumulative activities scenario shows construction for both Vineyard Wind and SFWF commencing in 2021. Not only is this a logistical impossibility given the timeline of review for each project, but a recent letter ruling from the U.S. Customs and Border Protection states that installation of scour protection for the Vineyard Wind project is scheduled to occur from February to December of 2023. There are multiple other examples of recent information from federal, state, and OSW developer sources that similarly provide contradicting project plans and timelines.

Response to comments: Thank you for your comment. Table E-4 has been updated in the Final EIS.

Comment theme: Concurrent pile-driving.

Associated comments

Table I-96 provides the full list of comments received as part of this comment theme.

Table I-96. Concurrent pile-driving comment.

Comment Number	Comment
371-5	Third, was there a consideration of the cumulative impacts that may result from pile-driving from other offshore wind projects that may be under construction at the same time as the Project? Could these construction activities be coordinated to reduce negative effects?

Response to comments: Yes, the DEIS considered the potential effects of concurrent pile driving activities from planned projects. This analysis is updated in the FEIS to account for changes in project construction schedules since the DEIS was completed.

Air and Climate

Comment theme: Air quality information updates.

Associated comments

Table I-97 provides the full list of comments received as part of this comment theme.

Table I-97. Air quality information updates comments.

Comment Number	Comment
141-2	Updated air quality information available Updated information is available to characterize the air quality of nearby areas in the affected environment section. Specifically, EPA released air quality design values for 2019 available at https://www.epa.gov/air-trends/air-quality-design-values. Similarly, more recent data for emissions inventories are available than the 2014 National Emissions Inventory (NEI) presented in the report. See https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data. Recommendations: •We recommend that the FEIS incorporate the updated information referenced above into the FEIS. •Additionally, we recommend comparing the maximum impact of air emissions for the Proposed Action Alternative against updated information in the 2017 Emissions Inventory and noting if the location of maximum impact will no longer be expected to be Salem County, New Jersey. Additionally, while the percent increase relative to the county is an informative metric for this alternative, including the emissions in tons per year as part of the discussion on page H-7 as well would be helpful.
141-1	Characterization of Ozone Air Quality The characterization of current ozone air quality in nearby affected areas mischaracterizes existing conditions. For example, the ozone concentrations for monitors in coastal Connecticut are reported as average levels in the 40-50 ppb range. In contrast, the current 8-hour ozone "design values," a statistic EPA uses when comparing pollutant concentrations to the ambient air quality standards, at these Connecticut monitors are above 70 ppb, more than 20 ppb higher than what is currently included in the discussion to represent existing conditions. Furthermore, the discussion of ozone impacts at these locations mentions only local source emissions; but ozone is a regional pollutant, resulting from the interaction of both local and regional pollutant precursor emissions under certain meteorological conditions. Recommendations: •We recommend that the FEIS include a description of what the "design value" is for the 2015 8-hour ozone standard, namely the annual fourth-highest daily maximum 8- hour ozone concentration averaged over three years. A design value is a statistic that describes the air quality status of a given location relative to the level of the National Ambient Air Quality Standards (NAAQS). Design values that could be included in the discussion are at: https://www3.epa.gov/airquality/greenbook/jbca.html#Ozone_8-hr.2015.Connecticut •We recommend that the FEIS air quality discussion characterize ozone more accurately as a regional pollutant. This is important because ozone, unlike the other criteria pollutants, is not emitted directly into the air by any one source.
141-3	Documentation of Class I Area Consultation The DEIS indicates that because no Class I areas are within 100 km of the lease area, no visibility or deposition modeling was conducted as part of the analysis. EPA notes that the applicant submitted both an air quality analysis for Class I areas and a visibility analysis for Class II areas near the project site in support of its air quality permit application. In addition, the applicant submitted documentation for its consultations with Federal Land Managers with both the U.S. Forest Service and the U.S. Fish and Wildlife Service regarding proposed air emissions for the project. Recommendation: •We recommend that the FEIS reference and summarize the findings of the visibility and deposition modeling and agency consultations.

Comment Number	Comment
338-21	16. Appendix H – Assessment of Other Resources, the following edits should be made: a. Table 3.3.1-1 on p. H-3 presents the total emission inventory in tons per year for select regulated pollutants in non-attainment counties in 2014. More recent inventory data (2017) is available from EPA and should be included in this Table. b. On p. H-4, the GHG emissions data that is referenced is from 2016. This information is outdated. The DEIS should instead use more recent data, including EPA's 2018 emissions data (https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2018).

Response to comments: The FEIS is updated with the more recent data.

Comment theme: Air and water quality impacts due to construction and maintenance vehicles.

Associated comments

Table I-98 provides the full list of comments received as part of this comment theme.

Table I-98. Air and water quality impacts due to construction and maintenance vehicles comments.

Comment Number	Comment
145-12	BOEM must also analyze impacts to air and water quality from construction and maintenance vehicles, including pollutant emissions and chemical leachates.

Response to comments: In Appendix H, see section 3.1.2.3 including Tables 3.3.1-6 and 3.3.1-7. This includes emissions from construction and maintenance vehicles.

Comment theme: Severe weather events, including category 3 or above hurricanes.

Associated comments

Table I-99 provides the full list of comments received as part of this comment theme.

Table I-99. Severe weather events, including category 3 or above hurricanes comments.

Comment Number	Comment
169-1	Hurricane Sandy was a Category 2 hurricane off the coast of the Northeastern United States in 2012 that caused significant and lasting damage. However, according to a January 2020 report done for the Nuclear Regulatory Commission (see Exhibit A) [figure included: "Figure 4.11. Track ensembles for (a) past, (b) current, and (c) future paths of Hurricane Sandy, derived from 6-day WRF simulations initialized 0000 UTC 26 Oct. The black line represents the National Hurricane Center best track; lighter colored lines represent ensemble members, and darker colored lines represent ensemble means for past (green), current (blue), and future (red). (Source: Lackman 2015)], a future Sandy would arrive as a category 4 or 5 storm and directly hit the Rhode Island/Massachusetts Wind Energy Area, potentially resulting in an oil spill off the coast of Connecticut, Rhode Island and Massachusetts in excess of the Exxon Valdez's oil spill in 1989 if all the wind turbines that the DEIS sees as foreseeable are built.

Comment Number	Comment
	In the almost seven hundred pages of the South Fork Wind Farm DEIS, the word “hurricane” appears three times, none of them being significant. The word hurricane emerges once to identify an existing project whose goals include controlling beach erosion and hurricane protection [“The FIMP [Fire Island Montauk Point] Project to control beach erosion and provide hurricane protection would also extend to Hither Hills State Park, opposite Montauk Harbor.” See, DEIS 3-154.], once in citing the 2018 New York Rising Community Reconstruction (NYRCR) plan which aims to help communities plan and prepare for extreme weather events [“NY Rising Community Reconstruction (NYRCR) (2018) - $20.4 million in projects on Long Island to help flood-prone communities plan and prepare for extreme weather events as they continue projects to recover from Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee.” See, DEIS E-22.], and once to state that “Section 4.2.4 of the COP provides additional weather information, including wind and extreme weather events (cyclones, hurricanes).”[See, DEIS H-4.] Why is there no discussion whatsoever of future hurricanes in the South Fork Wind Farm DEIS? Because Deepwater South Fork LLC (“South Fork”) simply has no plan for what will happen to its wind turbines after such a hurricane occurs. There is no plan to address the next Hurricane Sandy or any future hurricanes that will reach the Northeastern United States. There is no plan to address the take and possible extinction of endangered species from the destruction of the wind turbines from winds above their survival speeds. There is no plan for compensating fisherman for the loss of the fisheries off the Northeast coast from such a catastrophic event and massive oil spill that will result from a hurricane. By the time the next hurricane reaches the shores of the Northeast, there may not be any insurance to cover the losses. “The capacity to insure that risk is there now, but will it be there in a couple of years' time when a huge super typhoon has smashed all the construction sites? Time will tell.” [See, “Hurricanes could make US and Asian offshore projects uninsurable”, August 1, 2019: [The risk from typhoons] is a big concern for us and, frankly speaking, that's why the Taiwanese projects are costing twice as much to insure than the European projects,” says Robert Bates, underwriter at GCube Insurance Services, adding that US projects are a third more expensive than North Sea ones. “The capacity to insure that risk is there now, but will it be there in a couple of years' time when a huge super typhoon has smashed all the construction sites? Time will tell.] What will be left are bankrupt offshore wind companies, rolling blackouts in the Northeast, and oil covered shorelines.
169-4	The most glaring error is the fact that the DEIS fails to take any look, much less a hard look, at the likelihood that a single category 3 or greater hurricane could result in an oil spill off the coast of New York and Rhode Island equivalent to the Exxon Valdez’s oil spill in 1989. Current wind turbines generators (“WTGs”) cannot survive a category 3 hurricane. As a result, an adverse weather event of a category 3 or greater hurricane could lead to a catastrophic release of the oil and contaminants from all WTGs, roughly the equivalent of the Exxon Valdez oil spill, thus causing the take of, and possibly extinction of, multiple endangered species, and destroying the fishing grounds off the coast of Block Island, Rhode Island, and Montauk Point, New York for generations. Not once in the DEIS is there a substantive mention of the word “hurricane.” Yet the evidence is overwhelming that climate change will result in more frequent and more intense tropical cyclones in the Atlantic Ocean. As discussed below, a report prepared last year for the U.S. Nuclear Regulatory Commission forecasts a repeat Hurricane Sandy would arrive this time as a category 4 or 5 hurricane and be a direct hit on the wind energy area. The question then is not if there will be a catastrophic event, but when.
169-14	Not once in the DEIS is there a substantive mention of the word “hurricane.” The word hurricane emerges once to identify an existing project whose goals include controlling beach erosion and hurricane protection [Footnote: “The FIMP [Fire Island Montauk Point] Project to control beach erosion and provide hurricane protection would also extend to Hither Hills State Park, opposite Montauk Harbor.” See, DEIS 3-154.], once in citing the 2018 New York Rising Community Reconstruction (NYRCR) plan which aims to help communities plan and prepare for extreme weather events [Footnote: “NY Rising Community Reconstruction (NYRCR) (2018) - $20.4 million in projects on Long Island to help flood-prone communities plan and prepare for extreme weather events as they continue projects to recover from Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee.” See, DEIS E-22.], and once to state that “Section 4.2.4 of the COP provides additional weather information, including wind and extreme weather events (cyclones, hurricanes).”[Footnote: See, DEIS H-4.] Current WTGs cannot survive a category 3 hurricane. Such an adverse weather event could lead to a catastrophic release of the oil and contaminants from all WTGs or over 10 million gallons roughly the equivalent of the Exxon Valdez oil spill. Unlike this DEIS, the BOEM draft EIS published for the Vineyard Wind Offshore Wind Energy Project considered the wind speeds that WTGs can endure – “The WTGs would be designed to endure sustained wind speeds of up to 112 mph (182.2 kph) and gusts of 157 mph (252.7 kph).” [Footnote: BOEM Draft EIS prepared for Vineyard Wind Offshore Wind Energy Project, December 2018, page 2- 18.] It is certainly not a “low” probability that the Northeast would experience a category 3 or above hurricane over the next 30 years and yet the DEIS prepared for the South Fork Wind Farm does not even discuss the sustained wind speeds that the WTGs can sustain.

Comment Number	Comment
	As a result, an adverse weather event of a category 3 or greater hurricane could lead to a catastrophic release of the oil and contaminants from the WTGs, roughly the equivalent of the Exxon Valdez oil spill, thus causing the take of, and possibly extinction of, multiple endangered species, and destroying the fishing grounds off the coast of the Northeastern United States. The evidence is compelling that climate change will result in more frequent and more intense tropical cyclones in the Atlantic Ocean, making the occurrence of a category 3 or higher hurricane in the WEA during the next 30 years a certainty. See, e.g., http://www.nytimes.com/2020/05/18/climate/climate-changes-hurricane-intensity.html. See, LR Leung and R Prasad, Potential Impacts of Accelerated Climate Change 4th Annual Report of Work for NRC Agreement, NRC-HQ-60-14-D-0025, January 2020, p. iii, available at: https://www.osti.gov/servlets/purl/1605280: "North Atlantic hurricanes are projected to increase in intensity, rainfall, and storm size. Projections of extratropical cyclone activity changes remain uncertain but theory suggests that convection associated with extratropical cyclones will become more vigorous even if extratropical cyclone activity may decrease. With warmer temperatures and more moisture, an increase in mesoscale convective system track density and intensity is projected for the mid-Atlantic/northeast region. The northeast region is a hotspot of accelerated sea-level rise in recent decades." Leung and Prasad also analyze the projected path of a repeat of Hurricane Sandy under future conditions. The new path is a direct hit on the WEA. Id. at 4-14. [figure included: "Figure 4.11. Track ensembles for (a) past, (b) current, and (c) future paths of Hurricane Sandy, derived from 6-day WRF simulations initialized 0000 UTC 26 Oct. The black line represents the National Hurricane Center best track; lighter colored lines represent ensemble members, and darker colored lines represent ensemble means for past (green), current (blue0, and future (red). (Source: Lackman 2015)] Leung and Prasad also conclude “in the future, Sandy’s intensity is significantly enhanced,” see id. at 4-14, 4-15 as shown in Figure 4.12 below. [Figure included: Figure 4.12. Time series showing ensemble intensity plots for (a) past, (b) current, and (c) future simulations. Enhanced horizontal line corresponds to landfall intensity of 940 hPa. (d) The ensemble means together to facilitate comparison. (Source: Lackman 2015)] Figure 4.12 [included] shows a future Sandy projected to be a Category 4 or 5 hurricane. The failure of the DEIS to take a hard look at the likelihood of a category 3 or greater hurricane and the likelihood that such an event would result in an oil spill the size of the Exxon Valdez in the WEA renders the DEIS fatally flawed. The failure of the DEIS to take a hard look at the likelihood of a category 3 or greater hurricane and the likelihood that such an event would destroy the WTGs resulting in the elimination of generating capacity in the ISO-New England grid for years, which in turn would result in devastating economic, safety and health consequences for the Northeast, is clear error.
169-20	The DEIS fails to take a hard look at the increased likelihood of a catastrophic hurricane, category 3 or above, directly hitting the Project and the resulting discharges. The DEIS fails to properly analyze the effects of climate change on hurricane activity in the Northeast and the Project area over the next 30 years, which could cause catastrophic failure of the turbines, and leave turbine parts and oil and chemical spills in the Atlantic and reaching the shores of New York, New Jersey, Rhode Island, Martha’s Vineyard, Nantucket, Cape Cod, and Connecticut. Being built to survive maximum sustained wind speeds of up to 112 mph means that the WTGs are only designed to survive a category 2 hurricane. It is certainly not a “low” probability that the Northeast would experience a category 3 or above hurricane over the next 30 years. It is likely that one or more such events would occur. Fourth National Climate Assessment (the “Climate Report”). See, https://nca2018.globalchange.gov/, USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA. doi:10.7930/NCA4.2018. The likelihood of impact of hurricane activity in the Project area is inadequately analyzed.The likelihood of a category 3 or greater hurricane and the likelihood that such an event would destroy the WTGs resulting in the elimination of generating capacity for years, which in turn would result in devastating economic, safety and health consequences for the Northeastern United States, shows that the proposed Project is not in the public interest.
169-37	V.FAILURE TO PROPERLY ANALYZE THE EFFECT OF CLIMATE CHANGE ON HURRICANES THAT MAY IMPACT THE PROJECT. The DEIS’ analysis of severe weather events is seriously flawed. The DEIS fails to properly analyze the effects of climate change on hurricane activity in the Northeast and the Project area over the next 30 years, which could cause catastrophic failure of the turbines, and leave turbine parts and oil and chemical spills in the Atlantic, reaching the shores of New York, Rhode Island, Connecticut, Martha’s Vineyard, Nantucket, and Cape Cod. It is certainly not a low probability that the Northeast would experience a category 3 or above hurricane over the next 30 years. To the contrary, it is virtually certain that one or more such events would occur. The WTGs cannot be buried. In fact, the taller they get the more susceptible they are to higher wind speeds.

Response to comments: *Potential Impacts of Accelerated Climate Change*, the fourth annual report prepared for the U.S. Nuclear Regulatory Commission, cites climate modeling from Knutson et al. (2015)

when describing expected future trends in tropical cyclone intensity and frequency. A more recent paper from 2020 is largely in agreement with the findings of Knutson et al. (2015). The Knutson et al. (2020) paper expresses medium-to-high confidence that global average intensity of tropical cyclones will increase between 1% and 10%; the proportion of tropical cyclones reaching Category 4 or 5 strength will increase. Frequency of tropical cyclones overall is projected to decrease globally, with low-to-medium certainty expressed by the authors. Taken in context with the historical record of hurricanes affecting New England, the return rate for Category 3 hurricanes may become more frequent than the historical 50 years, and the future probability of a Category 4 or 5 hurricane affecting New England will likely be higher than the historical probability of these events. This analysis is consistent with that for the Vineyard Wind FEIS (Appendix E, Section E.2.4). While Category 4 or 5 storms are unlikely, the actual outcomes and impacts would be similar as other nonroutine events already considered in the EIS. Therefore, storms of this magnitude are not analyzed separately.

The engineering specifications of the turbines and their ability to sufficiently withstand weather events is independently evaluated by a certified verification agent (CVA) when reviewing the Facility Design Report (FDR) and Fabrication and Installation Report) according to international standards, which include withstanding hurricane-level events. One of these standards calls for the structure to be able to withstand a 50-year return interval event, which in the case of the project area, would correspond to a Category 3 hurricane. An additional standard also includes withstanding 3-second gusts of a 500-year return interval event, which would correspond to Category 5 hurricane windspeeds.

The Exxon Valdez incident resulted in the release of more than 11 million gallons of crude oil. BOEM estimates a total of approximately 2.3 million gallons of coolants and 10.5 million gallons of oils and lubricants could be stored within WTG foundations and the OSS across all projected offshore wind projects along the Atlantic coast; the likelihood of all of the containers simultaneously releasing these chemicals is remote. For the South Fork Wind Farm, the maximum chemical spill would be 119,230 gallons of oils and lubricants for 15 WTGs and the OSS. For specific wind facilities, BOEM anticipates that the likelihood of a major spill of these chemicals is very low (once per 1,000 years) due to vessel allisions, collisions, O&M activities, or weather events (Bejarano et al. 2013).

Comment theme: No Action Alternative impacts to air quality.

Associated comments

Table I-100 provides the full list of comments received as part of this comment theme.

Table I-100. No Action Alternative impacts to air quality comments.

Comment Number	Comment
169-28	ii. Federal Agencies, Including Interior—During Previous NEPA Reviews— Properly Analyzed The Supply And Demand Of Resources And Resulting Climate Effects And Effect On Resource Values. In NEPA reviews for over the past 35 years, the Department of the Interior (the “Interior”) has consistently understood that a decision not to take action related to energy production will affect that energy resource’s supply and price and thus trigger other actions. The Interior has further analyzed how such triggered actions generate different consequences for air pollution, climate change, and overall environmental quality. The U.S. Court of Appeals for the D.C. Circuit has praised the Interior’s analysis of these substitution effects. As far back as 1979, the Interior has assessed the different environmental effects of energy substitutes under a No- Action Alternative—including different levels of carbon dioxide emissions.

Comment Number	Comment
	Other agencies, such as the Surface Transportation Board, the United States Forest Service ("USFS"), the State Department, the Office of Surface Mining Reclamation and Enforcement (another Interior sub-agency), the Federal Energy Regulatory Commission ("FERC"), and the Nuclear Regulatory Commission, have also properly analyzed the effects of their energy management decisions in NEPA reviews, consistent with the advice of the U.S. Court of Appeals for the Eighth Circuit and the U.S. District Courts of Colorado and Minnesota. The DEIS's mistaken assumption that taking no action on the Project, compared to approving it, yields no net effects on greenhouse gas emissions, fisheries, endangered species, marine mammals and other resource values represents a substantial break with a 35-year history of proper analysis by the Interior and its sister agencies, and is inconsistent with the Interior's actions in other reviews.
169-12	On E2-2 of the DEIS, the assumption regarding the No Action Alternative is flawed. "The No Action Alternative without implementation of other future offshore wind projects would likely result in increased air quality impacts regionally due to the need to construct and operate new energy generation facilities to meet future power demands. These facilities may consist of new natural gas-fired power plants, coal-fired, oil-fired, or clean coal-fired plants. These types of facilities would likely have larger and continuous emissions and result in greater regional scale impacts on air quality."

Response to comments: Taking no action on the project means the project would not be built. However, currently anthropological effects on greenhouse gas emissions, fisheries, endangered species, marine mammals and other resource values are occurring and would continue to occur in absence of the project, but those effects are not directly caused by the project. If the no action alternative is taken, it is possible that additional energy demands will be met with non-renewable, fossil fuel-dependent energy generation. This is not a certainty, but the potential GHG emissions that would be produced if the energy generated by the Project was instead generated by existing fossil fuel-dependent energy sources are quantified in Table 3.3.1-3 in Appendix H.

Section 3.3.1.2.2 of the FEIS does acknowledge the role of other renewable energy sources as a potential replacement of traditional fossil fuel power generation in the region, as offshore wind cannot fully meet future energy demand. The FEIS was revised to add a footnote specifically addressing these other renewable energy options.

Comment theme: Avoided emissions.

Associated comments

Table I-101 provides the full list of comments received as part of this comment theme.

Table I-101. Avoided emissions comments.

Comment Number	Comment
169-29	iii. Federal Agencies (Including Interior) Analyzed The Connections Between Supply, Price, Substitutes, Conservation, And Emissions. Before the 1982 creation of a sub-agency within the Interior responsible for offshore resources, the Office of the Secretary of the Interior developed the federal offshore oil and gas leasing program, and the Bureau of Land Management ("BLM") prepared environmental impact statements on leasing actions (then called simply "environmental statements"). In BLM's 1979 Final Environmental Statement on a proposed lease sale off the coast of Southern California, the agency analyzed the No-Action Alternative of withdrawing the sale: [I]f the subject sale were cancelled, the following energy actions or sources might be used as substitutes: Energy Conservation; Conventional oil and gas supplies; Coal; Nuclear power; Oil shale; Hydroelectric power; Solar energy; Energy imports; . . . . Vigorous energy conservation is an alternative that warrants serious consideration. The Project Independence Report of the Federal Energy Administration claims that energy conservation alone can reduce energy demand growth by 0.7 to 1.2 percent depending on the world price of oil. The environmental impacts of a vigorous energy conservation program will be primarily beneficial.

Comment Number	Comment
	Final Environmental Statement, OCS Sale No. 48, Proposed 1979 Outer Continental Shelf Oil and Gas Lease Sale Offshore Southern California, 1508–09 (1979). See also BLM, Draft Environmental Statement, Proposed Five-Year OCS Oil and Gas Lease Sale Schedule 63 (1980) ("An alternative . . . to cease leasing...would result in the need to meet national energy needs through other sources, or to reduce energy consumption...."). Thus, as early as 1979, the Interior recognized that canceling even a single oil and gas lease would cause the market to respond by substituting not just oil and gas from other sources, but alternative fuel types as well as increased energy conservation. BLM further recognized that the extent of energy conservation as a response depended on the price of the resource being replaced. BLM explained in 1979 to decision-makers and the public, over the course of 25 pages of analysis, how each possible substitute for the foregone offshore leasing carried its own environmental effects: net beneficial to the extent increased energy conservation or renewable energy offset the lost offshore oil and gas; a more mixed or net negative effect on environmental quality with switches to other types and sources of fossil fuels. BLM, Final Envtl. Stmt. on Sale No. 48, supra at 1508– 1532. BLM even noted in this 1979 analysis that different energy substitutes generated different carbon dioxide emissions: "A number of gases are associated with geothermal systems and may pose health and pollution problems. These gases include carbon dioxide However, adverse air quality impacts are generally less than those associated with fossil-fuel plants." Id. at 1525.
141-5	Avoided Emissions We appreciate the approach outlined in Appendix H to summarizing the avoided emissions of fossil fuel powered energy sources relative to potential offshore wind development. The development of renewable energy generation results in an expected overall net air quality benefit over the life of the projects resulting from the displacement of fossil fired EGUs that would otherwise be used to provide electricity. However, the footnote referring to how the upper and lower limit estimates were calculated for the estimate of future avoided emissions from additional offshore wind projects is unclear. EPA requests more detail on how these projections were modeled to confirm that AVERT was used properly and with the recognition of limitations embedded in the AVERT model, particularly for the different use cases described in the DEIS. Recommendation: •We recommend that the FEIS clarify how AVERT's inputs were adjusted to suit this application of the tool in the footnote to Table 3.3.1-3 or delete the footnote altogether. EPA recommends that relevant BOEM and EPA staff meet to discuss how the AVERT model was used for the South Fork Wind analysis and how it may be used in an appropriate and documented manner for future offshore wind project reviews. Please contact Colby Tucker at 202-564-6005 or tucker.williamc@epa.gov for additional discussions regarding the use of AVERT.

Response to comments: Thank you for your comment. Table 3.3.1-10 in Appendix H estimates the annual and lifetime avoided emissions for the operation of the SFWF in lieu of the same amount of energy being produced by existing fossil fuel-dependent energy sources. The inputs used were the capacity of the proposed action using the offshore wind option and selecting the interconnection region.

Comment theme: Climate change.

Associated comments

Table I-102 provides the full list of comments received as part of this comment theme.

Table I-102. Climate change comments.

Comment Number	Comment
299-11	B. 22 GW of Offshore Wind in the U.S. Will Have a Significant Positive Impact The DEIS considers approximately 22 GW of U.S. Atlantic OSW capacity to be reasonably foreseeable. These OSW GWs will be injected into the onshore electricity systems operated by ISO New England, NYISO, and PJM. Based on the annual CO2 emissions and net generation for these three grid operators, the interconnection of 22 GWs of OSW would result in an estimated 8 percent reduction in carbon emissions in those regions. On a planetary scale, the total emissions reductions from these projects might be considered small, but the reduction is quite significant in terms of decarbonizing the electricity supply of the Eastern Seaboard. Relative to other renewable energy technologies, OSW is a cost-effective and viable means of delivering large quantities of clean electricity to coastal load centers. Approving the SFW project sends the right signal: that America is addressing climate change and taking a leadership role in this global clean energy industry.

Comment Number	Comment
299-12	C. Vessel Transit Lanes Reduce Area Available for WTGs, Thereby Constraining a Significant Mechanism for Mitigating Climate Change The addition of all six of the 4 nm transit lanes proposed by Responsible Offshore Development Alliance (RODA) would reduce the technical capacity of the Rhode Island and Massachusetts (RI and MA) Lease Areas by approximately 3,300 MW or enough to power about 2 million homes. As delineated in the January 27, 2021 EO, climate change must be a principal consideration in the decision to approve SFW. Climate change impacts present an existential threat to commercial fishing interests, not only in southern New England but along the entire Eastern Seaboard. The deployment of 22 GWs of U.S. Atlantic OSW capacity that the DEIS assumes to be reasonably foreseeable will provide a significant positive cumulative impact by providing significant climate mitigation benefits. Given the uniform 1x1 nm Joint Developer Agreement Layout, USCG has made a final determination that transit lanes are unnecessary. In fact, the inclusion of vessel transit lanes will directly constrain the U.S. OSW industry's ability to mitigate climate change, the end result being even greater negative impacts upon fisheries in southern New England and along the Eastern Seaboard.
349-18	BOEM also correctly observes that offshore wind generation is likely to directly displace fossil fuel generation. As BOEM explains, "[t]he No Action Alternative without implementation of other future offshore wind projects would likely result in increased air quality impacts regionally due to the need to construct and operate new energy generation facilities to meet future power demands." These facilities "may consist of new natural gas-fired power plants, coal-fired, oil-fired, or clean coal-fired plants." Moreover, the No Action Alternative is likely to delay the retirement of existing fossil fuel generation resources, which are typically less efficient and more polluting than new fossil resources. Due to offshore wind's ability to displace more highly polluting fossil resources, the climate impacts of the proposed offshore wind buildout would be net climate beneficial, as BOEM recognizes in the DEIS. BOEM notes that "[i]ncreasing energy production from offshore wind projects will likely to decrease GHGs emissions by replacing energy from fossil fuels." Consequently, cumulative effects of offshore wind development will result in long-term, low-intensity beneficial cumulative impacts on marine mammals and sea turtles and long-term beneficial impacts on demographics, employment and economics. "
349-21	Even absent direct quantification through the social cost of carbon, the DEIS correctly identifies adverse economic impacts from climate change associated with the No Action Alternative. As the DEIS explains, "[c]limate change could have impacts on demographics, employment, and economics." These impacts include: • Property or infrastructure damage and increased insurance costs and reduced economic viability of coastal communities resulting from sea level rise and increased storm severity/frequency; • Damage to structures, infrastructures, beaches, and coastal land, with numerous economic impacts resulting from erosion and deposition of sediments; • Adverse impacts on commercial and for-hire fishing, individual recreational fishing, and sightseeing resulting from ocean acidification, altered habitats, altered migration patterns and increased disease frequency in marine species.

Response to comments: Thank you for your comment.

Comment theme: Significance threshold language.

Associated comments

Table I-103 provides the full list of comments received as part of this comment theme.

Table I-103. Significance threshold language comments.

Comment Number	Comment
301-62	In Table 3.3.1-2, Significance Criteria column for minor to moderate impacts should be corrected to state "Impacts from project emissions would not exceed NAAQS."
301-63	In Table 3.3.1-2, Significance Criteria column for major impacts should be corrected to state "Impacts from project emissions would exceed NAAQS."

Response to comments: It is BOEM's opinion that EIS language in the significance criteria column is accurate and does not require an EIS revision.

Comment theme: Sufficiency of air quality analysis - GHGs.

Associated comments

Table I-104 provides the full list of comments received as part of this comment theme.

Table I-104. Sufficiency of air quality analysis – GHGs comments.

Comment Number	Comment
294-14	Additionally, the DEIS states that the impacts to climate change from the proposed project "may not be measurable", but that the Project "could" contribute to a net decrease in GHG emissions. Yet the DEIS then settles on up to a "minor to moderate impact on air quality due to emissions" and a "long term minor beneficial impact to climate change". This is in direct contradiction to the Vineyard Wind SEIS, which states that "construction of offshore wind facilities are not expected to impact climate change" and "overall, it is anticipated that there will be no impact on climate change as a result of offshore wind projects alone." It is uncertain how BOEM arrived at a beneficial impact in this document particularly with such uncertainty in assumptions, and is inconsistent with previous but recent BOEM analysis.
169-25	The DEIS's assumption that, compared to No Action, approving the proposed Project would have a positive impact on total greenhouse gas emissions is wrong and departs from basic economic principles and vastly overstates the Project's purported positive climate impacts.
169-10	The DEIS fails to take the required hard look at the direct, indirect, and cumulative greenhouse gas ("GHG") emissions from offshore wind activities and the impacts of those emissions on climate change. The DEIS fails to sufficiently quantify and account for direct GHG emissions, and fails to analyze the effect of those emissions on other resource values. The DEIS only compares GHG emissions from offshore wind projects to the GHG emissions of fossil fuel- powered generating facilities, stating that there will be less emissions from offshore wind than fossil fuels. However, this misses the point – GHG emissions from offshore wind should be compared to GHG from other renewable energy sources, such as solar energy
161-2	The DEIS also claims that the proposed Project -- both individually and cumulatively -- will reduce emissions of criteria pollutants and GHGs by substituting "clean" wind energy for energy generated by fossil fuel combustion. The DEIS, however, makes this assertion without (i) demonstrating that the Project will displace any fossil fuel energy plant; (ii) showing that actual usage of fossil fuel-generated energy will go down, and/or (iii) accounting for the emissions from the 1,500 new construction jobs and 90 new operational jobs that the Project will generate. Simple arithmetic shows that the mobile emissions from such new FTEs (full-time employment) would outstrip and outpace the promised emission reductions from the proposed Project. The DEIS does not disclose this fact or otherwise provide a full inventory of the direct and indirect air pollutant and GHG emissions of the Project. For this reason, among others, the DEIS fails NEPA's "hard look" test and is thus legally defective.

Response to comments: Thank you for your comment. In Appendix H, direct GHG emissions are quantified in tables 3.3.1-6 thru 3.3.1-9 and tables 3.3.1-11 and 3.3.1-12 and potential impacts of GHG emissions associated with the proposed Project are discussed in section 3.3.1.2.3. The GHG emitted by solar energy plants depend on various factors and are not compared in this EIS.

Additional power will be required as population increases. Table 3.3.1-10 shows the emissions avoided by the operation of the Project over a 25-year period assuming the energy requirements would have otherwise come from traditional fossil fuel-fired power plants. Emissions from the jobs generated by the Project are included in the emission estimates for the Project, see section 3.3.1.2.3 of Appendix H.

The conclusions of the Vineyard Wind EIS are not in direct contradiction to the SFWF EIS. Overall, neither project alone would impact climate change. The benefit mentioned comes in analyzing the offshore wind project potentially replacing other non-renewable sources of energy. If increases to the power grid in the Project area required additional power generating facilities and if those facilities were natural gas-fired power plants, coal-fired, oil-fired, or clean coal-fired plants, the creation of the Project in lieu of those facilities would result in a beneficial impact to climate change.

The minor to moderate impact on air quality due to emissions was in regard to pollutant emissions resulting from construction of the Project and the statement is focused on immediate air quality, not climate change. Construction of the Project is not itself expected to impact climate change.

Comment theme: Sufficiency of air quality analysis –Miller and Keith study.

Associated comments

Table I-105 provides the full list of comments received as part of this comment theme.

Table I-105. Sufficiency of air quality analysis – Miller and Keith study comments.

Comment Number	Comment
169-23	BOEM and the cooperating agencies have failed to take a hard look at the direct, indirect, and cumulative impacts to the climate from warming caused by the Project from their alteration of wind flow, and fail to discuss the severity of these impacts. The DEIS fails to sufficiently quantify and account for the warming that is generated by the Project. See, Harvard Wind Study explaining that wind turbines generators over the next critical ten years are worse for the climate than natural gas. ""The direct climate impacts of wind power are instant, while the benefits accumulate slowly,"" says Keith. ""If your perspective is the next 10 years, wind power actually has -- in some respects -- more climate impact than coal or gas.” See, Cell Press. ""Large-scale US wind power would cause warming that would take roughly a century to offset."" ScienceDaily, 4 October 2018. The DEIS fails to explain how the adverse effects of the Project would be offset over the next century. The DEIS must make an informed decision, and it cannot ignore the adverse climatic impacts of the Project over the next ten or longer years.
169-22	BOEM and the cooperating agencies fail to take the required hard look at the direct, indirect, and cumulative GHG emissions and the impacts of those emissions on climate change. BOEM and the cooperating agencies fail to sufficiently quantify and account for direct GHG emissions, and fail to analyze the effect of those emissions on other resource values. BOEM and the cooperating agencies also fail to analyze the cumulative environmental effects of the proposed Project and reasonably foreseeable projects. To comply with NEPA, BOEM and the cooperating agencies are required to take a hard look at the direct, indirect, and cumulative GHG emissions and the severity of the impacts of those emissions on climate change for the proposed Project. BOEM and the cooperating agencies have never taken a comprehensive hard look at the climate impacts of the proposed Project, which NEPA requires it to do. It is reasonably foreseeable that the proposed Project could result in the inability to reduce global warming in the next 9 years as U.N. scientists have said must be done, further endangering the Earth’s climate, as it nears the tipping point. Where information relevant to foreseeable adverse impacts is unavailable, agencies must nonetheless evaluate “such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.” 40 C.F.R. § 1502.22(b)(4). Specifically, the DEIS and BOEM and the cooperating agencies fail to analyze the GHG and other impacts. The DEIS fails to analyze the cumulative and life cycle GHG impacts of offshore wind projects. The DEIS assumes without enquiry that the ability of utilities to purchase electricity from an offshore wind facility is desirable. The DEIS assumes, without analysis, that the offshore wind generation from the Project is renewable, sustainable, does not emit atmospheric pollutants, and does not itself add to global warming over the next decade. Such an assumption does not pass the muster of informed decision making. The DEIS assumes, without analysis, that the offshore wind generation from the Project does not displace other forms of renewable energy generation that would come online but for the Project. Such an assumption does not pass the muster of informed decision making. The DEIS assumes, without analysis, that the offshore wind generation from the Project would displace a future electric generating plant that would use natural gas as fuel. Such an assumption does not pass the muster of informed decision making.

Comment Number	Comment
	The DEIS and BOEM and the cooperating agencies also fail to consider the potential for other adverse climate effects of the Project. BOEM and the cooperating agencies' failures are "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law," in violation of NEPA, 42 U.S.C.§ 4332(C)(ii), its implementing regulations at 40 C.F.R. §§ 1508.7, 1508.8, 1508.25, 1508.27, and the APA at 5 U.S.C. § 706(2)(A).
169-15	The DEIS fails to take the required hard look at the direct, indirect, and cumulative climate impacts of the Project on climate change. The DEIS fails to sufficiently quantify and account for the warming that is generated by the Project. A recent study ("the Harvard Wind Study") conducted by Harvard University Professor David Keith shows that a wind energy facility over the next critical ten years is worse for the climate than a natural gas fired electric generating facility. "The direct climate impacts of wind power are instant, while the benefits accumulate slowly," says Keith. "If your perspective is the next 10 years, wind power actually has -- in some respects -- more climate impact than coal or gas." See, Cell Press. "Large-scale US wind power would cause warming that would take roughly a century to offset." ScienceDaily, 4 October 2018. With U.N. scientists stating that the next nine years is determinative, adding yet another energy facility that has significant adverse marine and other impacts and that does not reduce climate impacts is unwise and not in the public interest. In any case, the DEIS must make an informed decision, and it cannot simply ignore the adverse climatic impacts of the Project over the next ten or longer years.
169-2	BOEM are acting as "blind environmentalists" – assuming without analysis that electricity from an offshore wind facility is desirable. The DEIS assumes, without enquiry, that the offshore wind generation from the Project would be renewable, sustainable, not emit atmospheric pollutants, and not itself add to climate change over the next decade. Such an assumption does not pass the muster of informed decision making.

Response to comments: Wind is a source of renewable, sustainable energy naturally produced by the earth. In Appendix H, direct GHG emissions are quantified in tables 3.3.1-6 thru 3.3.1-9 and tables 3.3.1-11 and 3.3.1-12 and potential impacts of GHG emissions associated with the proposed Project are discussed in section 3.3.1.2.3. Additional pollutants emitted by an offshore wind facility are also analyzed in section 3.3.1.2.3 of Appendix H.

As part of the EIS process, BOEM has reviewed the Miller and Keith research and others for potential negative impacts related to wind farm deployment. While this research shows localized heating in the vicinity of land-based wind farm deployments based on observed data, the localized heating is caused by a redistribution of heat in the boundary layer, not the creation of additional heat-capturing greenhouse gasses or additional heat itself. The Miller and Keith study, in particular, asserts that "The climate impacts of wind and solar are small compared with the impacts of the fossil fuels they displace, but they are not necessarily negligible." It also found that "While these impacts differ from the climate impacts of GHGs in many important respects, they should not be neglected." The assertion by the commenter stating that the addition of wind based energy does not reduce "climate" impacts or is worse for the "climate" is a misnomer. The study shows that the redistribution of heat caused by wind turbines can cause surface temperatures to increase when the windfarm is operating, primarily at night. This is different than the suggestion that such heating potentially contributes to global climate change more than fossil-fuel generated energy. Additionally, the continental turbine array that was modeled was entirely on land with no offshore components and did not model effects from offshore wind.

Comment theme: General conformity determination.

Associated comments

Table I-106 provides the full list of comments received as part of this comment theme.

Table I-106. General conformity determination comment.

Comment Number	Comment
338-14	Section 3.3.1.1 on p. H-1 states, “The activities for which BOEM has permitting authority are outside of any non-attainment area and therefore not subject to the requirement to show conformity.” Since the DEIS covers all activities for the Proposed Action, the paragraph should be amended to read, “While the activities in the lease area are outside of any non-attainment area, a number of activities covered by this DEIS and described in the COP are within the non-attainment area and therefore must comply with the general conformity requirements of 40 CFR Part 93.” According to § 93.154, “Where multiple Federal agencies have jurisdiction for various aspects of a project, a Federal agency may choose to adopt the analysis of another Federal agency or develop its own analysis in order to make its conformity determination." The DEIS should identify the Federal agency responsible for the general conformity determination for those areas of the Proposed Action that are within the non-attainment area.

Response to comments: Conformity to a SIP means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of such standards. The activities for which BOEM has permitting authority are outside of any maintenance and/or non-attainment area and therefore not subject to the requirement to show conformity. In addition, the EIS has been updated to address the applicability of general conformity requirements to emissions that happen outside BOEM’s jurisdiction and are beyond BOEM’s authority to control such as those emissions that will occur at staging areas, port facilities, or elsewhere.

Comment theme: Editorial comments.

Associated comments

Table I-107 provides the full list of comments received as part of this comment theme.

Table I-107. Editorial comments.

Comment Number	Comment
338-15	10. The following corrections (shown as underlined italics and strikeout) should be made to Appendix H - Assessment of Other Resources, Section 3.3.1.1: a. On p. H-1, bullet 3 should be modified as follows, “The New York-Northern New Jersey-Long Island area, also known as the New York Metro Area, which encompasses Middlesex County, Connecticut, and Suffolk County, New York, is currently in serious non-attainment with the 2008 8-hour O3 standard and moderate non-attainment with the 2015 8-hour O3 standard. Suffolk County is also maintenance for the 2006 24-hour NAAQS for fine particulates (PM2.5).” b. On p. H-2, paragraph 1 should be modified as follows, “Connecticut, New York, and Massachusetts have and will continue to all adopted SIPs to mitigate the impact that regulated air pollutant emissions have on air quality.” c. On p. H-2, paragraph 2 should be modified as follows, “Depending on the final Project design, Project air emissions could affect seven non-attainment areas in the analysis area: Hartford, Middlesex, New London, Tolland, and Windham Counties, Connecticut; Dukes County, Massachusetts; and Suffolk County, New York. The EPA classifies these seven counties as being in non-attainment for both the 2008 and the 2015 8-hour O3 standards. The EPA reports no other pollutants in non-attainment status in these counties. In addition, Suffolk County is also maintenance for the 2006 24-hour NAAQS for PM2.5.” d. On pp. H-2 through H-3 the text should be modified as follows: “Suffolk County is an area with a high population density and a large industrial base. Emissions from the New York Metro Area, outside of Suffolk County, heavily affect the county’s air quality. For this reason, changes to pollutant emissions by sources within Suffolk County have little impact on overall air quality trends. Monitoring data have shown little improvement in O3 levels over time. The monitored ambient O3 concentration level observed at the Riverhead air monitor in Suffolk County was 72.7 ppb averaged from 2014 to 2016, 76.7 ppb averaged from 2015 to 2017, and 75.3 ppb averaged from 2016 to 2018 (EPA 2018b). Thus, the EPA currently classifies Suffolk County as being in moderate serious non-attainment for 2008 8-hour O3 NAAQS according to both the 2008 and moderate non-attainment for the 2015 8-hour O3 standards. Suffolk County is also maintenance for the 2006 24-hour NAAQS for PM2.5. The EPA reports that on-road vehicles are the primary source of NOx emissions in Suffolk County; non-road engines used for industrial purposes are the second-largest source. Solvent use in industry, vegetation sources, off-highway engines, and highway vehicles provide the most VOC emissions in Suffolk County.”

Comment Number	Comment
301-60	There is a typo in the following sentence: "Final regulations implementing the authority for renewable energy leasing under OCSLA (30 CFR Part 585) were promulgated on April 22, 20094" - this should be 2009.
301-61	In Appendix H, (p H-2), the DEIS incorrectly indicates that Dukes County, MA was in non-attainment with the 2015 ozone standard. Dukes County was deemed ozone non-attainment for the 2008 ozone standard and was deemed in attainment with the 2015 ozone standard. Appendix C, Figure C-1 also indicates that Dukes County, MA was only deemed in ozone non-attainment with the 2008 standard.
301-67	The VOC emissions for decommissioning for the following ports are listed as zero and should be corrected as shown below as per the emissions included in the COP: Port of New Bedford, MA: o Emissions within 25 nm of MA: 0.5 tons VOCs o Emissions within 25 nm of NY: 5.1 tons VOCs Port of Providence, RI: o Emissions within 25 nm of NY: 5.1 tons VOCs Port of New London, CT: o Emissions within 25 nm of CT: 0.5 tons VOC o Emissions within 25 nm of NY: 5.1 tons VOC Paulsboro Marine Terminal, NJ: o Emissions within 25 nm of NJ: 2.9 tons VOC o Emissions within 25 nm of NY: 5.9 tons VOC Sparrows Point, MD: o Emissions within 25 nm of MD: 2.1 tons VOC o Emissions within 25 nm of NY: 5.4 tons VOC Port of Norfolk, VA: o Emissions within 25 nm of NY: 5.4 tons of VOCs
301-68	In Appendix H, the cumulative impacts section on air quality lists the cumulative impact from all of the wind farms proposed in the area, instead of just the Project. It lists 13,326 tons of NOx, 102 tons of SO2, 462 tons of PM10 and 856,233 tons of CO2, whereas the Project only accounts for 521.5 tons of NOx, 3.6 tons of SO2, 17.5 tons of PM10 and 33,772 tons of CO2. A similar comparison is made for O&M emissions, which also makes Project emissions seem higher because they are combined with other proposed projects. SFW suggests the language be changed as follows: "Therefore, total cumulative construction-related air emissions from all of the planned wind projects, including the proposed Action in the OCS Air Permit Area would consist of..."
141-4	General Conformity EPA notes the mention of general conformity in section 3.3.1.1 on Air Quality in the DEIS. The paragraph ends with the following language "Conformity to a SIP means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of such standards. The activities for which BOEM has permitting authority are outside of any non-attainment area and therefore not subject to the requirement to show conformity." Recommendation: •EPA recommends adding the words "or maintenance" after "non-attainment" so that the section properly reflects the general conformity requirements at 40 CFR Part 93 Subpart B as applicable to both nonattainment and maintenance areas. Please contact Gary Rennie of EPA's Air Quality Planning Unit at (617) 918-1525 to discuss this comment further. •Furthermore, as stated in the DEIS, this language appears to only address general conformity requirements for the subset of project emissions that occur on the OCS lease area. EPA recommends that BOEM address the applicability of general conformity requirements to project emissions that happen outside the bounds of the permitted area such as those emissions that will occur at staging areas, port facilities, or elsewhere so that all emissions caused by this Federal action are addressed as required by 40 CFR Part 93 Subpart B. Please contact John Rogan at 617-918-1645 with any questions regarding general conformity.

Response to comments: The FEIS has been revised.

Comment theme: Editorial comments about units.

Associated comments

Table I-108 provides the full list of comments received as part of this comment theme.

Table I-108. Editorial comments about units comments.

Comment Number	Comment
301-66	In Tables 3.3.1 -11 and 3.3.1-12, units should be changed from "tpy" to "tons." The decommissioning period is for one year and these emissions are for the entire period.
301-65	In Tables 3.3.1-6 and 3.3.1-7, units should be changed from "tpy" to "tons." These emissions are tons that would be released over the entire construction period, which may be 1 or up to 2 years.
301-64	In Table 3.3.1-5, units should be changed from "tons" to "tpy" (tons per year).

Response to comments: "Tons" is correct. These emissions are emitted from 2022 to 2030, similar to Table 3.3.1-4. Additionally, "Tons" or "tpy" works since the period is one year. A revision is not required.

Comment theme: Social cost of carbon / health impacts.

Associated comments

Table I-109 provides the full list of comments received as part of this comment theme.

Table I-109. Social cost of carbon / health impacts comments.

Comment Number	Comment
349-20	These climate benefits can also be monetized using the social cost of carbon to illustrate differences between the social benefits of the Project and the relative social cost of the alternatives. The social and environmental costs of GHG emissions are readily quantifiable and BOEM should consider them in evaluating project impacts and impacts of alternatives. For example, the Interagency Working Group on Social Cost of Carbon has produced estimates for the social cost of carbon in order to “allow agencies to incorporate the social benefits of reducing carbon dioxide (CO2) emissions into cost-benefit analyses of regulatory actions that impact cumulative global emissions.” The working group presents values for social costs from 2015 to 2030, assuming discount rates of 5%, 3%, 2.5% and the 95th percentile of the 3% discount rate. These values range from $11 to $212 (in 2007 dollars per metric ton of CO2). These values could be used to monetize the costs imposed by the net greenhouse gas emissions associated with failing to procure the full 22 GW of offshore wind contemplated by this DEIS. Using the working group values, annual climate costs of procuring electricity from 22 GW of coal rather than 22 GW of offshore wind range (assuming a 50% capacity factor in both cases) from just over $1 billion/year (in 2007$) using a 5% discount rate and the 2020 social cost of carbon to more than $8.3 billion/year (in 2007$) using a 2.5% discount rate and the 2050 social cost of carbon of $95/ton.
329-3	The total lifetime health impacts of the 132 MW SFWF project as well as the cumulative impact for continuing expansion of offshore wind power to a total of 22 GW (per DEIS, Appendix E) are both calculated here. Again the DEIS analysis for cumulative impacts lacks any quantitative analysis of human health impacts, in violation of CFR 40 §1508.8. For these calculations, I assume a project size of 132 MW and I use the stated project lifetime of 30 years. Peer-reviewed studies estimate the emission savings the first 0.5 - 4 years break even with manufacturing emissions (Nugent and Sovacool 2014), so I here count pollution reduction for only 27 years of the 30 year project life. To extend from project to cumulative impact, I scale from 132 MW to 22 GW per the DEIS, sec 1.2.1. The cumulative impact is included because blocking the Proposed Action, or eliminating turbines so as to make it economically non-viable, is likely to have a dampening effect on investment and further development, and delay or block subsequent project builds. Worker deaths from land-based wind are subtracted from pollution-reduction health benefits by Kempton 2006, but since that time worker safety has improved, especially for offshore. For example, Richard 2018 reports zero deaths from offshore wind construction plus maintenance in all Europe. Thus I do not tabulate worker deaths as an impact in the table. The DEIS did not consider work injury or death as a negative impact, but failed to justify this omission. In Table 1 below, health benefits in $M and averted mortality in lives are given per MW of capacity or per project, and are per year or per project life (27 years) — the specific units are given in column headings. The rightmost column will be explained in Environmental Justice section. (“n.a.” means data not available). [Table 1. Avoid health impact calculated here, based on peer-reviwed studies Health benefit in $M/ year or $M/project Mortality averted per project over proj. life EJ impact averted (Black+hispanic)*

Comment Number	Comment
	Buonocore et al (NJ, 1100 MW) Table 1 (per year) $95M/year/1100MW 13/year/1100 MW n.a. Proposed Project (Adjust for size of SFWF project (132MW), & over project life (per 27 years) $308M/132MW 42/132 MW $0.760M health benefit, 11 avoided deaths* Cumulative impact for 22 GW of development, with life of (per 27 years) $51,300M/22GW 7,020/22 GW $12,819M health benefit, 1,800 avoided deaths * avoided deaths or costs for population * 21% black+hispanic population * 1.19 increase due to EJ issues = 11 lives and $760K] In sum, the Proposed Project over its 30 year lifetime, compared to No Action, will reduce health impacts of power plant pollution by $308 million, and will prevent 42 premature deaths from pollution. These figures are consistent with other epidemiological studies which have calculated the health cost of power plant pollution, and the corresponding benefit of displacing that with low-emission electricity sources. The cumulative impact, of the projected industry through 2030, is a health benefit of $51B and averted mortality of 7,020 lives. The DEIS not only lacks this quantitative analysis of health benefit. In fact, the calculations above show that the health benefits omitted from the DEIS are very large. Worse, the DEIS incorrectly summarizes the project impact and the cumulative impact as “minor” or “negligible”. This is incorrect as an impact assessment, and in violation of 40 CFR §1508.8.
329-2	The requirement to include human health impacts is explicit in the enabling legislation. Specifically, 40 CFR § 1502.16 “Environmental consequences” requires addressing both Direct effects and indirect effects, per §1508.8. Indirect effects are defined in CFR 40 §1508.8 as follows (emphasis added): (b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. … Effects include … health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects. Two peer-reviewed publications give quantitative measures of the health impacts of building offshore wind projects and the resulting reduction in fossil criteria pollutants due to displaced power generation. Both are more directly relevant to this EIS than the DEIS-cited Thind et al (2019). Health impact calculation requires understanding the time of wind power production, the criteria for dispatching or turning down existing plants, the air dispersal from those plants, and the health impact of those changes in power plant pollution. Of the two studies cited, Kempton et al 2005 estimates for two power plants in Southern Massachusetts. Better, Buonocore et al 2016 calculates based on all these factors, for an offshore wind generator off Northern New Jersey. Since the 2016 study is more complete, mortality is calculated here from that study. Both mortality and health impact in dollars are scaled by project size in MW to develop health cost and premature deaths averted of the Proposed Action. Health costs are calculated in $ based on standard epidemiology measures (Buonocore et al). The Buonocore article shows that health benefits do not scale precisely by project size, and vary with region, these epidemiological studies are scientifically valid and well documented; also such statistical studies necessarily have error bars around point estimates. Nevertheless, such studies should have been cited in the DEIS and should have been used to judge impact for the Proposed Action versus No Action. As a corrective, such calculations are used in this comment.
329-4	In Table ES-1, row “Air quality,” SFWF is described as “minor beneficial” and the overall cumulative AQ impact is ranked “minor adverse and minor beneficial”. I know of no logic nor moral system that would label a Proposed Action that saves 42 lives and reduces health impact by $308 million to be “minor beneficial”. Even more stunning, the DEIS evaluation of “Cumulative impacts” as “minor adverse minor beneficial”, is an egregious mislabeling of a $51 Billion health benefit, reducing mortality by 7,020 lives. These descriptions should be replaced with “Major beneficial” in both cases. Let us hope to not again see an EIS that so cavalierly minimizes billions of dollars of health benefits and thousands of lives saved.
329-1	Health and air quality Impacts The DEIS for South Fork Wind Farm (SFWF) has no tabulation nor quantitative analysis of human health impacts of the project, which are substantial. Improved air quality is evaluated in Table ES-1 under “Air quality” describe the project as having as “minor to moderate adverse air impacts ... and minor beneficial... health impacts”. The Proposed Action is a 132 to 180 MW power generation facility, that from day one of operation will reduce a corresponding amount of power from mostly fossil generation, resulting in immediate reduction of GHG and criteria pollutants. It is implausible prima face that the health and GHG benefit of this would be “minor adverse and minor beneficial” (Table ES-1). This comment will provide quantitative analysis of this, as the DEIS fails to do so.

Comment Number	Comment
141-6	Health Benefits We appreciate the approach outlined in Appendix H to summarizing the health benefits associated with avoided emissions from fossil fuel powered energy sources due to the potential offshore wind development. We agree that the development of renewable energy generation results in an expected overall net air quality benefit which translates to quantifiable health benefits. However, the section describing the COBRA model is not clear in describing the model inputs, as the table preceding the relevant text references both annual and lifetime emissions, and therefore what the model outputs describe—annual or lifetime health benefits. EPA requests additional detail on how these projections were made to confirm the COBRA model was properly applied and used to its full capability. Recommendation: •We recommend that the FEIS clarify the COBRA inputs used and the outputs reported in the analysis described on page H-14. Also, EPA recommends that the FEIS also recognize broader regional or national health impacts associated with air quality changes. •EPA also recommends that relevant BOEM and EPA staff meet to discuss how the COBRA model was used for the South Fork Wind analysis and how it may be appropriately and effectively applied to future offshore wind project reviews. Please contact Colby Tucker at 202-564-6005 or tucker.williamc@epa.gov for additional discussions regarding the use of COBRA.

Response to comments: Thank you for your comment. We used the EPA's CO-Benefits Risk Assessment (COBRA) screening model to estimate the health impacts of avoided emissions in the geographic analysis area in our impact analysis. Please see page H-14 in Appendix H for a monetized estimated health benefit. The EIS language is updated.

Comment theme: Project-related air quality benefits/ GHG reductions.

Associated comments

Table I-110 provides the full list of comments received as part of this comment theme.

Table I-110. Project-related air quality benefits/ GHG reductions comments.

Comment Number	Comment
363-103	The DEIS does not explain why there are no long-term moderate to major benefits across the VECs from the proposed alternative. This is especially surprising for air quality. The DEIS concludes that there will be temporary negative impacts to air quality but cumulative impacts would range from minor adverse to minor beneficial. OSW has been sold to the public as a key energy source to mitigate climate change, yet, the DEIS doesn't include a climate analysis outlining for the public the reduction in greenhouse gases this WEA would allow. This is a major gap in the impacts analysis, which prevents the public from properly understanding the tradeoffs of this project. The public is left to guess what benefit, if any, this WEA, and cumulatively with the other planned WEAs, would have on greenhouse gases at the expense of local ecosystems, as discussed above. If we use air quality as a proxy for greenhouse gases, the construction of approximately 2,000 turbines along the east coast could cumulatively have minor beneficial impacts. We then must ask, why are we risking harm and modifying marine ecosystems for little benefit?
363-84	The public should also be able to evaluate the interconnectedness of OSW to the oil and gas industry. The DEIS contains multiple uncorroborated claims such as that the project would provide the benefit of "[p]romotion of renewable energy to help ensure geopolitical security; combat climate change; and provide electricity that is affordable, reliable, safe, secure, and clean." While RODA unequivocally supports efforts to address climate change, the DEIS provides no analysis to show what mitigative benefits to climate change are offered by the proposed project—or even cumulatively from all proposed U.S. OSW projects—din order to evaluate the veracity of conclusions such as this one. Serious questions have been raised as to the net energy, economic, and environmental impacts of OSW that BOEM has not made even a cursory attempt to answer in this DEIS (or elsewhere to our knowledge). This is especially important in order for the public to evaluate whether there are in fact net benefits, or whether the primary driver behind the rush to develop is a motivation by the oil and gas industry to continue to make profits.

Comment Number	Comment
363-89	As stated above, the DEIS (and all public messaging associated with this and other proposed U.S. OSW projects) touts their benefits of minimizing the effects of climate change by replacing fossil fuel-based energy sources with a renewable energy source. This is a desirable goal--however, this DEIS contains no information on the net greenhouse gas (GHG) reductions. Any such analysis should include all stages of an OSW project, from surveying to decommissioning of turbines. This should be specific to the materials used for a project as the larger projects would require more source materials, potentially having a greater environmental impact, and different materials carry their own ramifications. A simple approach to calculate net carbon dioxide emissions from OSW projects has been developed and concluded that OSW had lower net carbon dioxide emissions compared to fossil fuels but it was higher than that onshore wind.
363-90	carbon emissions of an OSW project itself may also be difficult to calculate without knowing how much of the grid will actually be in operation. Some available literature considered a lot of the carbon dioxide emissions associated with construction and operations to be mitigated by recycling of the turbines after decommissioning. However, it is impossible to know whether components will be recycled after SFWF is decommissioned since no details are provided. Buried in one of the Appendices, the DEIS notes “The construction, operation, and decommissioning of offshore wind projects would produce GHG emissions (nearly all CO2) that can contribute to climate change; however, these contributions would be minuscule compared to aggregate global emissions. CO2 is relatively stable in the atmosphere and generally mixed uniformly throughout the troposphere and stratosphere. Hence the impact of GHG emissions does not depend upon the source location. Increasing energy production from offshore wind projects will likely decrease GHGs emissions by replacing energy from fossil fuels.” Yet provides no evidence for this or references for the public to investigate further to ensure this claim is accurate. No decision can be made from the analyses in this document. It is important to understand both what amount of GHG would be offset by these projects, as well as what additional emissions may be produced. The DEIS acknowledges that the activities associated with renewable energy including offshore wind will contribute to carbon emissions but again, no information is provided on the scale of this contribution. It predicts up to 2,600 vessel trips over the life of the project, many of which could presumably come all the way from Europe or elsewhere. It also notes that turbines may be equipped with diesel generators as they “require power to keep out moisture, run lights, and direct the blades into the wind in the event of strong winds.” Resource-intensive activities associated with production of turbine components and batteries will have further impacts.
349-19	BOEM characterizes the climate benefits of the offshore wind buildout as moderate. The DEIS asserts that “the Proposed Action when combined with past, present, and reasonably foreseeable projects would result in negligible to minor cumulative impacts to benthic habitats, EFH, invertebrates, and finfish.” BOEM also finds the impacts are anticipated to qualify as moderate for those fishing operations targeting species adversely affected by climate change. The buildout of offshore wind is a key component of meeting the goals of the Biden-Harris administration, such as rebuilding domestic infrastructure for a sustainable economy, creating economic opportunity, and reducing GHG emissions to mitigate climate change. Offshore wind can play a bigger role in meeting the challenge of climate change than the DEIS acknowledges. BOEM’s conclusions regarding climate impacts do not appear to be based on a full quantification of emissions benefits. A simple calculation shows that the adverse climate impact of the No Action Alternative and failure to move forward with the full 22 GW of Atlantic wind alternative are considerable. BOEM provided an analysis of greenhouse gas (GHG) impacts from 5,939 MW of offshore wind from 593 foundations within its air quality analysis area. For that approximately 6 GW of offshore wind capacity, it found total carbon dioxide (CO2) emissions of around 2 million tons. This 6 GW of offshore wind would displace an equivalent amount of fossil generation. Assuming a 50% capacity factor, if this wind were displacing coal, it would displace approximately 24 million metric tons of CO2 annually. Assuming a 50% capacity factor, if this wind were displacing coal, it would displace approximately 24 million metric tons of CO2 annually. The Project has an estimated lifespan of about 24 years. Extrapolating that lifespan to the full 6 GW of offshore wind projects, over a 30-year period these wind turbines operating at a 50% capacity factor would displace approximately 716 million metric tons of CO2. Even if the generation being displaced were exclusively gas, the climate benefits would still be significant. Direct combustion emissions from gas plants in lb CO2/MWh vary greatly, but are roughly half of those for coal plants, indicating a 360 million metric tons of CO2 benefit from the 6 GW of offshore wind over 30 years. But the actual climate benefits of displacing this gas generation would be much greater because combustion emissions represent only a piece of the lifecycle GHG emissions of gas generation. High global warming potential methane (84 times that of CO2 on a 20-year time frame) is leaked into the atmosphere at the point of extraction and in the transmission and compression of gas resulting in far greater lifecycle GHG impacts, closer to those of coal plants. Moreover, the climate benefits are far greater when the full 22 GW of offshore wind is considered. Indeed, if the full 22 GW of offshore wind displaced coal generation, over a 30-year period this would result in a net reduction in CO2 emissions of 2.89 billion tons. If it were displacing gas, it would still be displacing nearly 1.5 billion tons of CO2 emissions and, as discussed above, significant methane emissions as well.
329-8	An EIS must compare Proposed Action with No Action, on health impact and GHG reductions, in addition to other criteria now in the DEIS. The DEIS fails to do so, yet without analysis ranks these benefits as “minor”. Health impact could affect the Decision in favor of the Proposed Action, as it is a very large beneficial impact relative to other negligible to minor negative impacts now prevalent in the DEIS.

Comment Number	Comment
329-5	The climate change impact of No Action is qualitatively mentioned, for example under no action alternative (page 3-66). Similarly to the DEIS treatment of health, there is no quantitative assessment at all. Rather the DEIS states that, presumably because GHG reductions from power plants are diffuse, GHG reductions “may not be measurable” but that the Proposed Action “would result in moderate impacts”. Contrary to the DEIS statement, GHG reduction can be easily calculated based on displaced power and the local generation mix. The cumulative GHG impact of 22 GW in reducing GHG is mentioned on page E-20, but the DEIS gives no calculation nor assessment. By any science-based evaluation of impacts, this is a massive omission. I appreciate that this DEIS was written under the prior Administration, which put a very low price on carbon. As we evaluate this EIS, per guidelines of the Biden Administration, Tons of carbon and a $/Ton impact should be calculated so that GHG reduction can be quantitatively evaluated against other negative and positive impacts. If there is any doubt about approving the Proposed Action based on this DEIS, the economic value of GHG reductions should be calculated and included in the decision. I will not quantitatively evaluate the GHG reductions and their economic benefit in this comment, but my judgment is that, by the NAS and Obama value of $60 ton, the benefits of the Proposed Action are very large, surely much more than all negative impacts combined.
133-7	A section that illustrates the names and quantities of greenhouses gases that will be avoided by building a wind farm to meet the South Fork’s increased energy demand instead of a fossil fuel power plant.

Response to comments: Thank you for your comment. In Appendix H, please see section 3.3.1.2.2 including Table 3.3.1-3, as well as Table 3.3.1-10 in section 3.3.1.2.3 for potential GHGs that would be avoided if the Project is implemented and replaces energy from fossil fuels.

Table 3.3.1-10 estimates the annual and lifetime avoided emissions for the operation of the SFWF over a 25-year period. While it's true that combustion emissions represent only a piece of the lifecycle GHG emissions of gas generation, installed wind turbines harnessing the wind for electricity generation is also only a piece of the wind power lifecycle. We have compared the emissions at the point of electricity generation rather than the entire lifecycle since lifecycle emissions can vary greatly depending on project specifications.

Also see page H-14 in Appendix H for a monetized estimated health benefit and the estimated statistical lives saved for CY2023 using the EPA’s CO-Benefits Risk Assessment (COBRA) screening model.

Comment theme: Turbine winterization.

Associated comments

Table I-111 provides the full list of comments received as part of this comment theme.

Table I-111. Turbine winterization comments.

Comment Number	Comment
380-22	Barbara Hafner: Hi, this is Barbara Hafner. B-A-R-B-R-A H-A-F-N-E-R., I am a retired educator. I serve on the Long Island Federation of Labor Board, and I also serve on the Long Island NYSERA Environmental Committee, and I was thinking back—this is how old I am—I attended the first Earth Day convention or rally in New York City. I cut high school classes with my friend and we went to support how we could save our Earth. And so here we are 50 years later, and we are taking baby steps, but we're getting there. And so thank you for doing this. It's so important, we, we can't lose sight of what needs to happen in order for us to save our Earth and everything that we hope our children and grandchildren will soon appreciate. I just have a quick question based on what happened in Texas, with their wind energy and their loss of electricity. Is that something that we should be aware of and concerned about, since we are in New York? I mean this was a phenomenon in Texas, that their wind turbines would be frozen, but is this, something that we need to think about as we move forward? And I thank you all for everything you do, and I’m here to support you 100% and my Labor sisters and brothers, or who are looking to be a part of this construction.
171-2	Fishing boats ice up during the winter on Georges Bank,that's why they have white plastic hammers to break up the ice.Can't waite to see helicopters deiceing them at sea!

Response to comments: Thank you for your comment. When properly winterized, wind turbines can function in very cold environments, even Antarctica. In Texas the wind turbines were not winterized to save money since conditions involving extreme cold are rare there.

Alternatives (Comparing, Range)

Comment theme: Opposition to the Transit Alternative.

Associated comments

Table I-112 provides the full list of comments received as part of this comment theme.

Table I-112. Opposition to the Transit Alternative comments.

Comment Number	Comment
360-13	In addition to increasing navigation safety risks, the Vessel Transit Lane Alternative further complicates the South Fork project, at no benefit to vessel navigation. First, implementing the Vessel Transit Lane Alternative would require eliminating certain WTGs and relocating the OSS, which could delay proposed project construction as significant additional survey work would be required. Namely, there would be additional site characterization surveys for the Vessel Transit Lane Alternative with the attendant environmental impacts. The potential construction delays from the Vessel Transit Lane Alternative could also create more overlap with other future offshore wind project construction schedules, potentially leading to increased cumulative impacts on resources (such as installation vessels) that are sensitive to overlapping construction activities. Additionally, relocation of the substation may require additional undersea cabling (particularly additional miles of export cables if the substation is moved north), which is a sizable component of project costs.
319-5	The Vessel Transit Lane Alternative should be rejected. This alternative would effectively eliminate the South Fork project’s southern row of foundation locations and would adversely impact the project’s economic viability. Orsted and Eversource, along with other developers of the New England wind energy areas, have agreed to advance all projects in these lease areas, including the South Fork project, with a 1x1 nautical mile layout. This layout provides ample room for safe navigation and was adopted to minimize the impact on commercial fishing. Importantly, the United States Coast Guard concluded that 4 nautical mile wide navigation corridors would make navigation more challenging and increase the risk for vessel interaction. To the extent that the South Fork project, or Vineyard Wind 1 which is also under review, set a precedent, the Vessel Transit Lane Alternative would adversely impact all other projects in these lease areas and would reduce their overall generating capacity by 3,300 MW, which in turn would dramatically reduce emission reductions, public health benefits, economic investments and employment opportunities
323-2	WindServe Marine is a premier offshore wind support services provider on the U.S. Atlantic Coast. Building upon more than 97 years in the maritime industry, WindServe is committed to providing excellence in all stages of the offshore wind farm lifecycle. With offices and waterfront facility locations in Massachusetts, New York and Rhode Island, WindServe Marine are local experts and trusted solution providers. Our first vessel, WINDSERVE ODYSSEY, was built in North Kingstown, RI at Senesco Marine. This vessel alone, created approximately 35 shipyard jobs, four vessel crew positions, and various shoreside support jobs. Economic growth in the offshore wind farm industry through local job creation and development of local expertise is critically important to WindServe and the Reinauer Group of Companies, and to those who support the creation of US offshore wind infrastructure, as well as those who benefit from its renewable energy output. WindServe Marine supports the project as proposed by Ørsted/Eversource, which is the proposal for 1x1 nautical mile spacing in a uniform east-west grid layout. This reflects the joint proposal of all wind farm developers holding a lease in the area south of Martha’s Vineyard, and it is the proposal that the Coast Guard determined would facilitate navigation safety and search-and-rescue in its MARIPARS report. Furthermore, WindServe Marine’s parent company, Reinauer Transportation, has operated offshore near these proposed lease areas supporting critical commerce in marine transportation between New York and Canada for over 97 years. In our review, we have determined that the project as proposed will have no adverse effects to marine safety and navigation. Conversely, the alternatives, which would impose 4-mile wide vessel transit lanes within wind farms, is not supported by the industry nor the U.S. Coast Guard, which determined such lanes could actually reduce navigation safety and increase danger and risk to mariners.
345-2	BOEM also evaluated the environmental, technical and practical consequences of the Vessel Transit Lane Alternative and the full six transit lanes proposed by RODA related to assessment of cumulative impacts. The selection of the Vessel Transit Lane Alternative would set a damaging and unnecessary precedent for the inclusion of all six four nautical mile transit lanes for the WEA. The result of this would be: “the technical capacity of [the WEAs] would be reduced by approximately 3,300 MW, which is 500 MW less than the current state demand.”; Drastically reducing the benefits including emissions reductions, improved health, economic investment, and jobs that will come from this industry’s growth.

Comment Number	Comment
320-4	Conversely, the alternatives, which would impose 4-mile wide vessel transit lanes within wind farms, is not supported by the industry nor the U.S. Coast Guard, which determined such lanes could actually reduce navigation safety and increase danger and risk to mariners.
360-14	The space required for implementation of the transit lane could reduce the area available to construct future projects within the lease area. BOEM indicates that the remaining turbines would be 12 MW under the Transit Lane Alternative. Even so, the transit lane requires removing turbines from the design envelope. Therefore, the technical capacity of offshore wind power generation assumed in the DEIS could be in danger of not being met. The magnitude of the diminished technical capacity would depend on the turbine selected by the developer, but ultimately, this would likely lead to less clean energy being produced. The final EIS should determine that since Vessel Transit Lane Alternative is not technically and economically feasible, it is not a reasonable alternative for the purpose and need of the Proposed Action and therefore should be rejected as unreasonable. The area was leased and bid, and the South Fork project was selected by a New York to supply offshore wind energy to meet state clean energy targets. The proposed broader transit corridor in the Vessel Transit Lane Alternative would potentially limit the ability to locate additional WTGs in the lease area (in response to New York or other state goals), preventing the area from helping to achieve those targets. The Vessel Transit Lane Alternative is clearly not technically and economically feasible for meeting the purpose and need of the action. Thus, BOEM should adopt the Proposed Action as the Preferred Alternative and reject the Vessel Transit Lane Alternative in the final EIS.
301-12	From a commercial standpoint, implementation of transit lanes is also not reasonable. The final designation of the MA/RI WEA, and subsequent bidding process to acquire leases within it, were the result of a robust public involvement process that accounted for the concerns of many stakeholders, including fishermen, and reduced the size of the MA/RI WEA from the size that was originally proposed. Lessees who bid on and procured leases had the expectation that they would have the opportunity to utilize the area granted in the lease.9 If the RODA transit lane proposal were adopted across the MA/RI WEA, it is estimated that more than 200 WTG positions (assuming the 1-NM x 1-NM grid layout) would be lost. Assuming a 12-MW wind turbine capacity, that is equivalent to a loss of more than 2.4 GW of renewable energy capacity, directly undercutting federal and state clean energy targets. Removing 2.4 GW of offshore wind capacity would be equivalent to maintaining 6 million metric tons of CO2 emissions per year.10 If the Vessel Transit Lane concept was expanded to future leases in the region or to other current lease areas the losses would be substantially greater. One of the advantages of the Project Design Envelope (PDE) approach is to allow developers a certain amount of flexibility during the environmental review process that can last several years. As the environmental review process progresses, developers continue to evaluate and select project components within the PDE based on a variety of interrelated and dynamic factors including technology and engineering, market conditions, supply chain development, anticipated permitting conditions, contractual project schedule obligations (driven by state energy mandates), and energy infrastructure feasibility studies. This results in an incredibly complex decision-making process that must run concurrently with the environmental review and federal and state permitting schedules. In this alternative, BOEM indicates the southern row of WTG locations would be eliminated and that SFW would develop the remaining WTG positions with a 12-MW capacity turbine. This presents several development challenges and is contrary to the intended flexibility of the PDE approach. A critical component of project development is successful completion of extensive interconnection studies with the transmission system operator, in this case the New York Independent System Operator (“NYISO”). A request to change the WTG at any point in time, but especially when close to the conclusion of the interconnection studies, may be rejected by NYISO, resulting in major impacts to project design and schedule. In addition, turbines are acquired under turbine supply agreements, often signed in advance of the completion of the federal permitting process. These agreements specify the technical characteristics of the turbine being purchased and contain detailed schedule milestones and negotiated commercial terms. If BOEM were to require use of a turbine that differs from those turbine supply agreements, it could have significant negative ramifications on projects including schedule delays, changes in commercial terms of the supply agreements, and potential loss of deposits or other economic penalties resulting from the need to change executed contracts.
311-2	The vessel transit lane alternative in the DEIS should be rejected. This alternative would effectively eliminate the SFWF southern row of foundation locations and could substantially affect the project’s economic viability. Developers in wind energy areas have agreed to advance all projects in these lease areas, including South Fork, with a 1x1 nautical mile layout that provides ample room for safe navigation and was adopted to minimize the impact on commercial fishing. Importantly, the U.S. Coast Guard concluded that four nautical mile wide corridors would make navigation more challenging and increase the risk for vessel interaction.
311-3	To the extent that SFWF sets a precedent, the vessel transit lane alternative would adversely affect all other projects in these lease areas and would reduce their overall generating capacity by 3,300 megawatts, which in turn would dramatically reduce emission reductions, public health benefits, economic investment, and employment opportunities.

Comment Number	Comment
313-2	One alternative identified in the review, the 4 nautical mile transit alternative, we believe BOEM should reject and instead approve the 1 X 1 nautical mile compromise.
301-10	The DEIS assesses the Vessel Transit Lane Alternative, which BOEM developed in response to a proposal suggested by the Responsible Offshore Development Association ("RODA") on January 3, 2020 (RODA Proposal). This BOEM alternative assesses a single transit lane 4 NM wide through the lease area within which no surface occupancy would be permitted. The DEIS concludes that the Vessel Transit Lane Alternative would have negligible to minor long-term impacts (pg. 2-17). In assessing cumulative impacts of the Vessel Transit Lane Alternative, BOEM concludes that such impacts are negligible to moderate and short term. The Vessel Transit Lane Alternative has several limitations, including navigational safety, commercial and technical concerns, and therefore is not a reasonable alternative and should not be further considered in the FEIS.
299-9	VI. Vessel Transit Lane Alternative, Which Includes a 4 nm Vessel Transit Lane, is Unnecessary and has Significant Negative Impacts BOEM should reject the Vessel Transit Lane Alternative and adopt the Proposed Action in the Final EIS.
299-10	A. Vessel Transit Lanes Are Unnecessary with a Uniform 1x1 nm Spacing In addition to the Proposed Action (which represents the SFW as proposed), the DEIS includes several alternatives, including a No Action Alternative (that assumes the project is not permitted) and a Vessel Transit Lane Alternative (which comprises an east-west 4 nm transit lane intersecting with the southern portion of the SFW lease area (OCS-A-0517), effectively eliminating the southern row of foundation locations. The Vessel Transit Lane Alternative should be rejected by BOEM in the Final EIS. It impacts overall design flexibility without providing any corresponding benefits from a navigational safety perspective. In late 2019, SFW, along with other developers of the New England Wind Energy Areas (WEAs) proposed to advance all future projects in their respective lease areas with a uniform 1 x 1 nm layout. This spacing is already greater than that of any existing OSW project in the world. The United States Coast Guard (USCG) has since determined that this type of "standard and uniform grid pattern" layout would "maximize safe navigation" in the WEAs. (Massachusetts and Rhode Island Port Access Route Study (MARIPARS), 32). The USCG has endorsed the 1 x 1 nm layout, finding that the standard and uniform grid pattern "would allow for safe navigation and continuity of USCG missions through seven adjacent wind farm lease areas over more than 1,400 square miles of ocean." (MARIPARS, 33) The USCG has clearly stated that not only would transit lanes as proposed in the Vessel Transit Lane Alternative fail to preserve navigation safety, such lanes would actually increase risk and make navigation more dangerous. Indeed, in its Federal Register notice announcing the availability of its final MARIPARS report, the USCG stated: "[a]lthough these larger navigation corridors may appear to provide more area for navigation, they actually provide far less area than the numerous corridors that result from the recommended array and spacing," that recommended array and spacing being the Proposed Action in the DEIS (emphasis added). Additionally, the USCG goes on to say that transit corridors as proposed in Vessel Transit Alternative would make "navigation more challenging, [as] most traffic would then be funneled into the corridors, thereby increasing traffic density and risks for vessel interaction." The USCG further concluded that the spacing and layout as recommended in the MARIPARS report—and as reflected in the Proposed Alternative—would "provide sufficient space for certain vessels that fish in the WEA to continue fishing after the wind farms are constructed." Moreover, the USCG found that wider transit lanes, as proposed in the Vessel Transit Lane Alternative, would "largely preclude fishing in the WEA." The USCG, in the Final Report on The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study, Docket Number USCG-2019-0131, dated May 14, 2020 (MARIPARS), gave the following Final Recommendation: • That the MA/RI WEA's turbine layout be developed along a standard and uniform grid pattern with at least three lines of orientation and standard spacing to accommodate vessel transits, traditional fishing operations, and search and rescue (SAR) operations, throughout the MA/RI WEA. The adoption of a standard and uniform grid pattern through BOEM's approval process will likely eliminate the need for the USCG to pursue formal or informal routing measures within the MA/RI WEA at this time. • Lanes for vessel transit should be oriented in a northwest to southeast direction, 0.6 nm to 0.8 nm wide. This width will allow vessels the ability to maneuver in accordance with the COLREGS while transiting through the MA/RI WEA. • Lanes for commercial fishing vessels actively engaged in fishing should be oriented in an east to west direction, 1 nm wide. • Lanes for USCG SAR operations should be oriented in a north to south and east to west direction, 1 nm wide. This will ensure two lines of orientation for USCG helicopters to conduct SAR operations. • In the event that subsequent MA/RI WEA project proposals diverge from a standard and uniform grid pattern approved in previous projects, the USCG will revisit the need for informal and formal measures to preserve safe, efficient navigation and SAR operations.

Comment Number	Comment
	Final MARIPARS at p. 38 [emphasis in the original]. The Joint Developer Agreement Layout and the COP submitted by SFW are consistent with both the Draft and Final MARIPARS as well as BOEM's assumptions for future OSW development of up to 22 GW described in the DEIS. SFW submitted an update to its COP in February 2020 to outline its commitment to the 1 x 1 nm layout and to address concerns from the fishing industry regarding the need for safe navigation as identified during extensive public outreach. Importantly, SFW's layout is aligned with adjacent projects, forming columns and rows in a uniform grid. Adding transit lanes to a uniform 1 x 1 nm turbine spacing layout — would threaten the viability of all OSW projects in the region and their ability to meet the country's clean energy supply goals. Moreover, the Vessel Transit Lane Alternative is unnecessary because there is already an existing corridor of between 1.2 – 2 nm between the southern boundary of the OCS-A-0517 and the northern boundary of OCS-A-0487. As stated by a BOEM representative during the February 16, 2021 SFW public comment meeting, there will be at least 2 nm between structures in lease OCS- A-0517 and OCS-A-048, as BOEM requires a 2 nm distance between structures in adjacent lease areas. (See transcript to public hearing dated February 16, 2021.) This corridor between lease areas serves the purpose and purported intent of the Vessel Transit Lane Alternative, thereby nullifying the underlying basis for the claim that such alternative is necessary. The selection of the Vessel Transit Lane Alternative would set a damaging and unsupported precedent. Further the DOI does not have the authority to regulate safety of navigation relating to vessels engaged in OCS activities (i.e., commercial fishing vessels). As agreed in a Memorandum of Understanding (MOU) between DOI, USCG and Bureau of Safety and Environmental Enforcement (BSEE), the USCG "regulates the safety of life and property and the safety of navigation and protection of the environment on OCS units and vessels engaged in OCS activities." (MOU dated January 10, 2017, emphasis added). As the USCG has opined that there is no need for the inclusion of four nm transit lanes in the WEA, BOEM is precluded from issuing a ruling on an issue with the USCG's jurisdiction and therefore BOEM must reject the Vessel Transit Alternative. For these reasons, the Vessel Transit Lane Alternative should not be selected.
22-2	South Fork Wind submitted its Construction and Operation Plan to BOEM in 2018 and has continued to work hard to collect data to provide all agencies and stakeholders with information on the benefits and potential environmental impacts of the project. We understand that the majority of the impacts in the DEIS are moderate or below; and the developer is committed to addressing higher rated impacts through mitigation and discussions with stakeholders. For example, South Fork Wind has gone through an exhaustive process to establish a 1 x 1 Nautical Mile layout based on stakeholder feedback. The 1 x 1 NM layout eliminates a significant portion of the federal lease area's potential energy production but addresses the main comments from the commercial fishing industry regarding the need for transit lanes to ensure safe navigation. The 1 x 1 NM uniform layout creates safe transit lanes that the United States Coast Guard (USCG) has determined this type of "standard and uniform grid pattern" layout would "maximize safe navigation" in Wind Energy Areas (WEAs). (MARIPARS, 32) We ask you to reject the alternative, which calls for a 4 x 4 Nautical Mile layout. The 4x4 NM layout threatens the viability of this industry and provides no benefit. Additional transit lanes will result in substantial technical challenges, delays, cost increases to consumers, and more environmental impacts from offshore wind development. It offers marginal gains, and, as USCG identifies, potentially greater conflict among transiting and fishing vessels that are "funneled into the corridors thereby increasing traffic density and risks for vessel interaction." (MARIPARS, 7). The 1 x 1 nautical mile layout is already greater than that of any existing offshore wind project in the world.
281-5	The 1X1 nautical mile Compromise CJNY supports the 1X1 nautical mile turbine layout compromise that responds to commercial fisheries' concerns in the Areas Offshore of Massachusetts and Rhode Island Port Access Route Study. Not only does the Coast Guard approve of this mitigation effort, but adding additional mileage to the layout would only take away from the efficiency and carbon reduction potential the project is meant to address (MARIPARS, 32). We ask BOEM to reject the transit lane alternative which threatens the overall success and viability of not only this project, but future offshore wind projects.
360-12	The Vessel Transit Lane Alternative proposes a new 4-NM wide vessel transit lane through the Lease Area where no surface occupancy would occur. BOEM developed this alternative in response to the January 3, 2020, Responsible Offshore Development Association (RODA) layout proposal. Under this alternative, one lane intersects the Lease Area and requires eliminating certain (up to six, as indicated by Figure 2.1.3-1) WTGs within the transit lane and move the offshore substation north of the currently proposed location and install it in one of the remaining WTG locations. In addition, BOEM indicates that the remaining WTGs would be 12 MW, and that the offshore substation must be relocated within the South Fork lease area.

Comment Number	Comment
	The DEIS correctly points out that although the "transit lane direction is oriented to assist common commercial fishing transit routes, though its orientation would not necessarily provide a useful route for all recreational vessels." In addition, "there would be no formal designation of the transit lanes prohibiting other activities from occurring within them," which "could result in a simultaneous mixture of transiting and fishing activities. Due to this concern, BOEM found that the Vessel Transit Lane Alternative "could increase the potential for allision, collision, and other navigation conflicts." The DEIS thus makes clear that the Vessel Transit Lane Alternative will not improve navigation safety. The DEIS thus makes clear that Vessel Transit Lane Alternative will not improve navigation safety. This conclusion is consistent with the USCG's conclusion in the MARIPARS report—that such broad transit lanes would increase risks to navigation safety. That report found that the transit corridors in the Vessel Transit Lane Alternative would make "navigation more challenging, [as] most traffic would then be funneled into the corridors thereby increasing traffic density and risks for vessel interaction." The report also concluded that the spacing in Proposed Action would "provide sufficient space for certain vessels that fish in the WEA to continue fishing after the wind farms are constructed." On the other hand, wider transit lanes in the Vessel Transit Lane Alternative would "largely preclude fishing in the WEA.

Response to comments: Thank you for your comment.

Comment theme: Support for the Transit Alternative.

Associated comments

Table I-113 provides the full list of comments received as part of this comment theme.

Table I-113. Support for the Transit Alternative comments.

Comment Number	Comment
366-21	The development of these WEAs without the RODA transit lane alternative would also pose a significant and major Navigation and Safety risk to New York's commercial vessels, who would be unable to traverse directly to their homeport if severe weather appeared or boat repairs were required, forcing New York vessels to take a 50-nautical mile jog around the RI-WEA to their home port or another port for repairs.
352-5	These effects will be cumulative as the wind footprint expands. We will be forced into a narrow ribbon of Continental Shelf, if all the proposals by States in the Mid-Atlantic and New York Bight areas are eventually built out. This makes rational, safe transit to the fishing grounds that will remain available to us, after inshore wind development occurs from Cape Hatteras to Cape Cod and into the Gulf of Maine, a critical element of the potential for commercial fishing and wind development coexisting in the region, daily. The establishment of designated, directional traffic lanes will mitigate costs in crew time, fuel, CO_2 emissions and help maximize product quality.
380-28	Meghan Lapp: I do support the RODA transit lane alternative, the four-nautical-mile wide transit lane alternative, as previously stated by Mr. Farnham, that is extremely necessary for safe transit in the area. Our vessels transit that area frequently, and without wide enough transit lanes, there is not going to be any transit through one-nautical-mile spacing because it is extremely dangerous and the marine radar interference makes it impossible to see.
294-17	BOEM's analysis on p. 2-15 of the DEIS that "BOEM is unaware of any studies justifying" a 4 nm wide transit lane does not include the fact that the transit lane alternative was developed at a RODA sponsored transit lane workshop with developers present. It also ignores the fact that other Traffic Separation Schemes such as the Narragansett and Boston TSS quoted by the document on p. 2-15 exist without fixed structure on both sides of the traffic lanes. Recommendations for traffic lanes without fixed structure on both sides are very different from those for traffic lanes with fixed structure on both sides, a phenomenon which currently does not exist in open ocean conditions on the East Coast of the United States. The TSS approaching New York Harbor also mentioned on p. 2-15 fail to recognize that, while those TSS are designed for large 800+ foot vessels, those TSS in open ocean on the approach to NY are actually 10 nautical miles wide: a 2-mile wide eastbound lane, a 2 mile wide westbound lane, and a 6-mile wide separation in between (See Ambrose/Nantucket traffic lanes). The 10-mile wide Ambrose/Nantucket TSS exists in close proximity to the MA/RI lease areas in open ocean, south of the WEA, and actually widens to 13 miles before approaching NY Harbor. This 10-mile and 13-mile wide TSS for large vessels exists in open ocean without fixed structure on one or both sides. Therefore, it is reasonable to request a 4-mile wide transit lane for smaller vessels that does have fixed structure on one or both sides of the lane. Reliance on the MARIPARS analysis for safe transit between a 1x1 n turbine spacing is inadequate due to the flaws discussed in above and contained in Dr. Sproul's attached letter in regards to that study. Therefore, a transit alternative is necessary. This is compounded by the lack of a BOEM radar interference analysis, discussed below.

Comment Number	Comment
	BOEM's logic regarding the 4 nm wide Transit Lane Alternative is flawed and provides only a limited comparison to existing TSS. The DEIS omits information on TSS existing in open ocean conditions, which are substantially larger at 10 to 13 miles wide, and exist without fixed structure on one or both sides of the lanes. As the Transit Lane Alternative would have fixed structure on one or both sides of the lane, a 4 nm wide lane is reasonable. We support the Transit Lane Alternative.
352-4	We will be unable to use our mobile fishing gear to continue to harvest seafood within these planned wind arrays, even with the one-by-one nautical mile layout that has been discussed for Vineyard Wind. Safe, two-way traffic lanes of a minimum distance of 2 nautical miles are absolutely needed to safely minimize our transit times to areas where we may still be able to fish. BOEM's support for this outcome is critical to establishing a basis for coexistence with seafood producers and the planned wind farm expansion. Unfortunately, what we heard on last week's webinar is that BOEM has no plans to support regional outcomes like this, which would confine us to a future of more checked boxes without any real progress in preserving our livelihoods and those of our fishermen and plant employees.
339-6	Transit Lanes: The SFWF DEIS analysis of the transit lane alternative fails to fully capture the importance of the RODA alternative to the fishing communities of Eastern Long Island, Rhode Island and Massachusetts. When reviewing with the cumulative effects of the surrounding projects in the RI/Mass WEAs, a failure to implement the four-mile transit lane alternative as proposed by RODA would cause major disruption to the fishing industry in each of these communities. BOEM must analyze the cumulative effect of all present Wind Energy Lease Areas as they affect commercial fishing transit and ports of record throughout the Eastern Seaboard. Vessels leaving from Montauk NY, New York's largest commercial fishing port, would have to go south around the entire RI-WEA to reach their lucrative squid grounds off of Martha's Vineyard, Nantucket and further east creating a loss of income and productivity due to increased transit time and fuel expenditures. Without the RODA Vessel Transit Lane configuration proposal chosen as a preferred alternative, New York vessels could see an additional 12 hours in transit time in each direction (24 hours round trip). In particular, the Illex squid fishery valued at $24 million annually could be decimated, as vessels must offload the ilex squid within 48 hours of catching it, an additional 12 hours in transit time would significantly decrease the viable fishing window for these vessels. Other million-dollar-fisheries to New York in that area that must be accessed include the loligo squid ($6 mil. annually), scup ($3 mil.) and whiting ($1.5 mil.) fisheries. The development of these WEAs without the RODA transit lane alternative would also pose a significant Navigation and Safety risk to vessels. Vessels would not have a quick and direct line to get back to port in the event of foul or inclement weather, or boat repairs, effectively stranding them on the far side of the RI-WEA or forcing vessels to take a substantially longer route, 50 nautical miles, to their home port or port for repairs. While the threat of serious harm due to engine failures, along with the routine dangers of transit by sea, the effects of scatter upon traditional commercial fishing radar and the inability of the United States Coast Guard's (USCG) Search and Rescue Operations (SAROPS) to possibly locate those that may be in harm's way without a transit lane would also be issues for BOEM to further analyze. The USCG discussed the major negative effects to SAROPS by radar interference by Wind Turbine Generators (WTG) during a Department of Energy (DOE) series on Wind Turbine Radar Interference Mitigation (WTRIM) seminars in July of 2020. Without safe and wide transit lanes, such as the RODA-TLA, allisions and collisions may happen more frequently within the SFWF WEA.
366-19	Safe access to fishing grounds and home to our New York ports must be the paramount decision maker, with 4 nm-wide transit lanes that take the least amount of time to go from port to grounds and back, and allow for safe widths of corridors without the need to discern radar scatter and be able to transit safely without concern for ice throw from the turbines themselves. BOEM must analyze the cumulative effect of all present Wind Energy Lease Areas as they affect commercial fishing transit and ports of record throughout the Eastern Seaboard, and analyze both continued radar clutter and scatter plus the compounding concern of ice throw from turbine blades.
363-45	To repeat, the need for safe transit lanes of 4 nm has been raised time and again by fishermen and other fisheries experts. The full history of these requests is detailed in RODA's comments to BOEM on the Vineyard Wind SEIS. It was also clearly raised in the scoping process for this SFWF DEIS. Despite these repeated requests for analysis, the DEIS contains absolutely no mention of the impacts of this alternative to the following crucial topics: fishing economics, product quality, markets, fisheries management, and living marine resources that may benefit from migration corridors. It also contains no reference at all to the history of collaboration and negotiation that led to the transit lane proposal. Indeed--in contrast to the other alternatives and standard NEPA format for presentation of alternatives--it provides no rationale for its conclusion in the DEIS except that it "could facilitate transit of vessels through the Lease Area from southern New England and eastern Long Island ports to fishing areas in the region." The DEIS does contain a perfunctory safety analysis but it is flagrantly inadequate, as described below. For these reasons, we urge BOEM to conduct and release for public comment a comprehensive analysis of the transit lane proposal across all project areas.

Comment Number	Comment
363-3	In the meantime, should BOEM move forward with the approval of individual projects before such a critical plan is developed, the following should be adopted as minimum conditions: • Provide adequate transit lanes of 4 nm through the MA/RI wind energy areas (WEA), and similarly adequate widths for other leases that may merit different site-specific requirements;
337-1	I support 4 nautical mile transit lanes in the lease area, in order to preserve safe passage for vessels.
333-1	It is imperative that there be four mile transit lanes throughout any/all wind array areas
336-1	We support four nautical mile transit lanes in the lease area, which are important to preserve safe passage for fishing vessels.
176-2	Transit lanes of 4nm is extremely important for fishermen to safely navigate through the wind farms. Almost every fisherman has expressed this and it is not right that the USCG and other “experts” dispute this. We didn’t just make this up and they should be included in the overall layout of the entire wind lease areas. Fishermen have been exposed to certain practical situations out on the ocean that may not come up in technical analysis and their concerns should absolutely be incorporated, regardless of how unbelievable you feel it is.
154-13	Navigation and vessel traffic. BOEM (in the Vineyard Wind EIS) has identified major cumulative impacts to navigation safety from offshore wind development, “due to increased accident frequency and loss of life.” Accident risks that will be made worse by the presence of turbines include vessels striking the turbines themselves or vessels striking one another due to increased navigational complexity within the turbine array. Accidents will also increase due to crowding that can result from vessel displacement. Wind turbines are expected to disrupt marine radar, contributing to increased navigation complexity and reduced reaction times available for accident avoidance. This is a concern not only for RIFAB but for radar operators, generally. These radar effects and resulting navigation safety impacts are expected to be compounded by weather (especially “black fog” during summer peak fishing months) and also by the micro-siting allowance for turbine placement which allows substantial deviations from the 1x1-nm grid. Turbines existing in a non-uniform array will be more difficult to distinguish from radar clutter and false targets, and they will increase the risks of nearby vessels going undetected. The level of mitigation for navigation and traffic safety is inadequate even with all of the proposed mitigation measures in DEIS Table G-2. Orsted has made it apparent that they do not take navigation safety issues seriously when it comes to impacts on commercial and recreational fishing. In an attempt to disclaim responsibility for radar impacts, Orsted introduced a ""simulator"" which aims to show fishermen not to worry about radar. Thus far, the consensus among RI fishermen is that this simulator is a waste of everyone’s time, mere window dressing allowing Orsted to claim they care rather than take serious action. This simulator is an unacceptable measure to provide any reassurance to mariners that safety issues will be addressed. This is not the only instance of Orsted avoiding the serious issues with navigation safety. During our mitigation conversations within Rhode Island, we were told by Orsted’s attorney, "if you are not happy with navigation safety then you can file a public comment with the Coast Guard." This statement was made with full knowledge that Orsted hired away Ed LeBlanc from the USCG while he was running the MARI Port Access Route Study (MARIPARS). Please see our letter and the letter of the RI Lobstermen’s Association (Docket USCG-2019-0131) regarding the suspicious timeline of Mr. LeBlanc’s employment with Orsted and the subsequent endorsement by the MARIPARS of the developers’ joint proposal for a 1x1-nm grid with no transit lanes. There has still not been any public disclosure of what happened during this process. We wish to re-emphasize the findings in those letters: navigation safety is compromised without transit lanes. In the event that the project is allowed to go forward, we urge BOEM to impose the VESSEL TRANSIT LANE ALTERNATIVE in order to preserve navigation safety.
363-43	RODA and our members remain appreciative of BOEM’s inclusion of an alternative in the DEIS that would provide safe transit lanes for vessels, and urge it to require the preservation of historic fishing transit routes as requested by fishermen since the earliest days of OSW planning. We urge you to adopt this alternative if the project is approved. For the commercial gear types found in the SFWF project area, 1x1 nautical mile spacing between turbines is too narrowly spaced for most fishing operations. Thus, if spacing remains prohibitive, resulting in full (or even majority) functional fishing closures, access to viable and safe transit options becomes the single most important mitigating factor to the project design. Failure to include measures that would preserve fishermen’s ability to safely transit the Southern New England lease areas would unreasonably interfere with fishing operations. This directly conflicts with the Department of the Interior’s statutory mandate to prevent offshore wind energy’s interference with fishing as determined by the internal legal memo dated December 14th, 2020.

Comment Number	Comment
380-30	Bonnie Brady: Bonnie Brady, Long Island Commercial Fishing Association. I'm, am going to echo some of the comments by Daniel Farnham and Meghan Lapp regarding this project, which I've been working and having meetings around since 2015. First of all, when it comes to this project, the document uses out-of-date fisheries data, omits crucial analyses, and some of the analyses are very inconsistent. There's an out-of-date fisheries communication plan, and that doesn't have information on site assessment or early project proposals, or early versions of the COP, which, to my recollection, there have been six different versions of the COP submitted, resubmitted, and you cannot find that anywhere on the BOEM website, nor any of the relevant project details, in order to understand this project. I feel the DEIS is the same time both rushed and outdated, and I've addressed these issues and many more in past communications to BOEM in webinars like this. I did not see any mention of the Department of the Interior's legal memorandum outlining that offshore wind renewable energy projects cannot interfere with the legal right to fish. And that the DOI secretary must act to prevent interference. I was curious regarding the transit considerations. The RODA recommended transit lane proposal should be approved. It would be the only proposal that would provide safety at sea and reduced economic impacts to fishing. East-west transit is extremely important to New York fishermen going parts east to travel the lucrative squid, scuf, and whiting grounds.
380-23	Dan Jr Farnham: Alright, yes, my name is Daniel Jay Farnham. I am a commercial fisherman from Montauk, New York, and New Bedford, Massachusetts. And, speaking on behalf of the three vessels that I work with, that we provide year-round employment for 27 individuals, both in the East Hampton community and the bedroom communities. And we fish within the Rhode Island/Mass and Massachusetts wind energy areas, and also we have to transit through those areas year-round. I'm speaking to please implore BOEM to request that the South Fork Wind Farm developers use the vessel transit lane alternative. The reason for this is that when BOEM first designated the Rhode Island/Mass Massachusetts wind energy areas, that they did not properly realize how large of an area this is. It is actually larger than the state of Rhode Island and it's a continuous wind energy area, meaning that there is no separation between the subleases of all the individual developers. And due to the RODA request for transit lanes, this is the only way we'll be able to safely navigate through this wind energy area. Without these vessel transit lanes, you will have to instead take a long route around these, the entire wind energy area, which has an average speed of eight or nine knots that our vessels maintain will take roughly close to a day to get around. Now when you're out there in the dead of winter, with a heavy winter storm or summer hurricane coming on you, you need to get home safely and effectively. You will not be able to do so in the one-by-one nautical mile grid pattern as is planned throughout this whole wind energy area, without a transit lane going through it. This is the way that we can effectively get to our fishing grounds and get home safely. We are ready and looking at these wind energy areas as a loss for our fishing activity, we will not be able to effectively fish within them. But all we are now asking for is that we no longer have to risk our lives by trying to navigate through these things. When we look at the cumulative effects of the full buildout of this area, there will be close to 2,000 turbines in this whole entire area, and a veritable forest that we will have to navigate of large structures over 800 feet tall. If we do not have this initial buildout of the South Fork Wind Farm follow this vessel transit lane alternative, then it will effectively crush the future of having vessel transit lanes throughout the rest of the projects. That is because even though it is only a small project, this is at the western terminus of the main primary east-west transit lane, from effectively dead-ends the transit lane. So even if all the other developers do follow this pattern and put a transit lane you will come down a four-mile-wide transit lane and right smack in the middle of another wind turbine buildout and will not be able to see if we navigate through there. It seems like it will not have that large impact for them to just move the location of those five turbines that are required, or five or six turbines that are required to do so. And the tradeoffs, for that would, it would greatly enhance the safety of navigation and safety on seas for all commercial traffic, as well as recreational traffic in the area, and any and all shipping, too. This is a highly trafficked area, and without these transit lanes, we will see a very detrimental impact to the commercial fleets and also all the other users of this ocean. Thank you for your time, and I appreciate the ability to comment.
366-18	The only transit lane alternative that New York fishermen could support would be the RODA Traffic Lane Alternative as proposed by RODA. Without the safe and wide 4 nm transit lane east and west alternative, New York fishermen would be forced to go around the RI-WEA, at a great loss of time, and effort.
355-3	However, it was disturbing after numerous transit lanes meeting and workshops and knowing how importing these transit lanes are to the industry, to have heard that the developers got together, without industry input (therefore lacking the transparency we were promised) and submitted a proposal to BOEM that eliminated all transit lanes. I am happy to find in this document that the RODA transit lanes are an option. This is an alternative we are in full support of.
352-3	Regarding specific elements of the DEIS, we strongly support the alternative that would plan for a 4-mile wide, West to East transit lane to allow for safe passage through the area to fishing grounds that would otherwise not be impacted by this development.
355-2	Transit lanes We support RODA's transit lane proposal. The industry had worked very hard over many meetings to come up with transit lanes that work for most if not all of the industry. Everyone sacrificed something to make it work. The industry worked in a transparent manner WITH the wind energy companies to try to come up with lanes that could work for everyone, with everyone giving something up. The fishing industry giving up their fishing grounds and the wind energy sector moving turbines around, all in an effort to coexist.

Comment Number	Comment
335-3	Lastly, when considering safety, NSC supports four nautical mile transit lanes. Based upon the experience of our members this alternative seeks to preserve safe passage.
316-5	The GSSA supports the alternative being considered of a 4nm transit lanes proposed in the document to support the safe transit of vessels through the 1400 sq/mile lease area. Based on our experience transit corridors are necessary in order to keep our state's fishermen safe at sea. It is also worth noting that without transit corridors there is a significant impact to fishermen who operate under a day's at sea quota. Specifically, in the case of Scallop fishery identified a lack of a transit corridor would have direct impact on the time constrained permit of the industry with a limited number of days at sea and running 24-hour clocks. Therefore, we strongly support this alternative.
154-2	In the event that BOEM insists on allowing DWSF to proceed, we hope you will consider the VESSEL TRANSIT LANE ALTERNATIVE and barring that, the FISHERIES HABITAT IMPACT MINIMIZATION ALTERNATIVE. Both of these alternatives will serve the purpose of limiting the number of turbines, preserving navigation complexity at safer levels, limiting harmful, unmitigated impacts on commercial and recreational fishing, and preserving essential fish habitat on Cox's Ledge.

Response to comments: Thank you for your comment.

The USCG is a cooperating agency to the FEIS and is the leading agency on navigational matters; and, therefore, BOEM relies on - and gives deference to - the USCG's expertise and analyses for purposes of informing the navigational impacts in the EIS. The FEIS has been updated, in appropriate sections, to reflect the Final MARIPARS results. Dr. Sproul's studies were provided to USCG as comments on their Draft MARIPARS. USCG considered those comments in formulating the Final MARIPARS, which did not adopt Dr. Sproul's recommended transit lane widths.

Comment theme: O&M alternatives.

Associated comments

Table I-114 provides the full list of comments received as part of this comment theme.

Table I-114. O&M alternatives comment.

Comment Number	Comment
287-4	If the whole idea of building windmills is to eliminate carbon emissions and burn less fossil fuel then Quonset Point is a more appropriate choice.

Response to comments: Thank you for your comment.

Comment theme: Landing site alternatives.

Associated comments

Table I-115 provides the full list of comments received as part of this comment theme.

Table I-115. Landing site alternatives comments.

Comment Number	Comment
362-1	CPW generally supports development of the SFWF on the outer continental shelf. However, CPW is concerned that the DEIS does not adequately analyze the onshore and offshore impacts of Deepwater Wind's preferred route for the SFEC. Deepwater Wind's proposed routing of the SFEC as identified in the COP would run a high-voltage transmission cable through a residential Wainscott neighborhood with an ocean cable landing on Beach Lane. CPW is of the view that the absence of meaningful review in the DEIS of alternative landing sites and routing results in a failure to fully analyze the Project's impacts to ecological, human and cultural resources, despite the availability of substantially less impactful alternative alignments of the SFEC. CPW therefore objects to the choice of a landing site that minimizes neither onshore nor offshore impacts and provides in support of this comment detailed and substantive information regarding alternative landing sites and onshore routing for the SFEC.
380-1	Michael Mahoney: Hi, it's Michael Mahoney filling in for Pamela Mahoney again, and I want to thank BOEM for these chances to speak. In that regards, I want to ask that, when you're evaluating this project to please take notice that the cable route that the developer wants to use is the longest sea route, and there are shorter routes that they have proposed, as an alternative, plus there's an even shorter route. And the route that they're planning, it also requires the installation of a new onshore cable that is going to be driven down the middle of a heavily used street. And they say they're doing it off-season, but even off-season, this street is the only access for many homes along that, and it's a very narrow street. The other route has a much larger working site, doesn't require it to go down the middle of the street, it would be safer for the public to access the beach, which people do here all year-round. In addition to that, it would be much safer for the workers, so I'd like you to take a look at that. You know the Hither Hills route, Indian Wells is actually the shortest route to hook it up to the grid using the existing transmission routes that are available to them along the Long Island Railroad. It's a straight shot up the short street and the little jog down Windmill and then they're right in the Long Island Railroad right-of-way.

Response to comments: Thank you for your comment.

Comment theme: Support for Beach Lane landing site.

Associated comments

Table I-116 provides the full list of comments received as part of this comment theme.

Table I-116. Support for Beach Lane landing site comments.

Comment Number	Comment
12-3	The Landing Site: The opposition to the preferred Landing Site of Wainscott has received a great deal of publicity due to the near-celebrity status of uber-rich residents who object to the transmission line which would be introduced to the shoreline by Horizontal Directional Drilling which will install the cable at least 30 feet below the surface of the beach. The cable will then travel underground to the Cove Hollow distribution center and will have no visual impact other than a few "man hole covers" in the road. The Beach Lane, Wainscott, landing site is, by far, the better site with minimal disruption to the public. The distance from land-fall to the Cove Hollow substation is approximately one-half the distance that would be required by the alternative site. The developers have agreed to severe restrictions on the months (only during the winter off-season) and the time-of-day when construction activity is permitted. The residents of Wainscott have been unduly alarmed by a ceaseless barrage of misinformation from a small group of wealthy second-home owners. However, the Beach Lane, Wainscott landing site enjoys a significant majority of support both by local government agencies, the Town Board and the Town Trustees, and, more importantly, by the general public.
123-2	The SFWF has already been delayed, due to controversy over its cable route via Wainscott. But that route would mean the least amount of disruption to the East Hampton community. as a whole. The alternative, Hither Hills, would add at least another year to construction; the greater length of the route and its location on the sole major highway, RT 27 between East Hampton and Montauk would mean terrible disruption to traffic affecting far more people for far longer than the Wainscott route.

Comment Number	Comment
	It would also mean the loss of badly needed community benefits from Orsted, like burying electric power cables in Wainscott, making that hamlet more resistant to the effects of storms or providing discounts and incentives to community members for adopting clean energy like electric vehicles and battery storage, making the whole community more resilient in the face of severe weather or other climate change-caused disruptions.
281-4	The Beach Lane Route is the Best Onshore Cable Route Not only has the project developer worked with local stakeholders on construction-related and community-benefit agreements, but Ørsted/Eversource has thoroughly vetted and studied cable-landing options which has resulted in the best onshore cable route. The Beach Lane route for the South Fork export cable mitigates community and environmental impacts as demonstrated in numerous geotechnical field surveys, samplings, and studies both on land and in the water. As noted in the DEIS, the Beach Lane route onshore construction activities would “result in localized, short-term, minor incremental impacts on land use and coastal infrastructure” (BOEM DEIS, 3-154). However, the alternative Hither Hills route would result in construction activities that “could coincide with the projected East Hampton Railroad Station improvements and could increase traffic delays; result in additional traffic rerouting; and increase short-term, construction-related vehicular and equipment emissions that would impact area residents” (BOEM DEIS, 3-154). The Beach Lane route is the clear option to responsibly construct the onshore activities and would be the least impactful to local residents. This route and related infrastructure upgrades will increase the resilience of Long Island’s transmission infrastructure and inject clean, renewable energy into the grid.
346-3	In addition to the proposed action by South Fork Wind, the DEIS includes several alternatives, including a Vessel Transit Lane Alternative, but it is clear that the proposal put forth by South Fork Wind is the best option that will cause the least impact to the environment. Additionally, the Town leaders in East Hampton have been clear they believe the route from Beach Lane is the best option because it minimizes impacts to the whole community. The project would actually improve the landscape on Beach Lane because utility poles and electric distribution and communication lines would have to be buried to accommodate construction. The local easements also contain robust requirements for restoration. We urge the Vessel Transit Lane Alternative to be rejected, and for the project to continue with its original plan to use Beach Lane.
369-1	My comments are exclusively directed to “present new information relevant to your analysis “ that will support the preferred cable access landing at Beach Lane in Wainscott, the most western hamlet closest to the PSEG substation. In a recent poll, 70% of our respondents support the cable access at Beach Lane. This access is also the preferred access for Orsted/Eversource, East Hampton Town and Trustees. Two alternative locations have been submitted by a group called Citizens for the Preservation of Wainscott (CPW) living along the Beach Lane route. I will submit the reasons that their alternatives are prohibited. East Hampton has adopted local, state and federal regulations to prohibit any structure from impacting primary barrier dunes. All alternative cable routes submitted from Montauk’s Hither Hills and Atlantic Avenue beach in Amagansett disturb the protected primary dunes. (Citation: East Hampton Town Code – Protection of Natural Resources – 255-4-10€; 255-4-15(A) (B) (C). BEACH LANE IS THE ONLY ACCESS THAT DOES NOT DISTURB THE BARRIER DUNES BECAUSE IT IS LOCATED AT THE ROAD ENDING LEADING TO THE OCEAN THAT OVER THE YEARS HAS ERODED THOSE IMPORTANT DUNES. The COASTAL OVERLAY DISTRICT ZONE ONE states that …” the construction, placement or installation of new structures …through barrier dunes is prohibited. (255-3-81) (A)(1)(2); (B) (1)(a). East Hampton has worked with the NYS Dept.of State (DOS) to adopt the Local Waterfront Revitalization Plan (LWRP) and to meet Article VII of the Public Service Commision regulations that a facility (structure) must find that it represents the minimum adverse environmental impact considering the state of available technology and the nature of the various alternatives. The CPW has insisted that their submission alternatives for the land access routes are less impactful on the environment and population. Yet their recommended routes are longer, impact more homes, pass through preserved land consisting of dunes, wetlands, impact more traffic and pedestrian flow at two very popular beaches and do not have permission from East Hampton Town, Trustees and New York State to use their property. The BEACH LANE ROUTE DOES NOT HAVE ANY OF THESE IMPEDIMENTS. Therefore according to the regulations found at the federal, state and local jurisdictions the ONLY CABLE ROUTE THAT REPRESENTS THE LEAST ADVERSE ENVIRONMENTAL IMPACTS IS CLEAR – BEACH LANE.

Comment Number	Comment
380-17	Bob DeLuca: To this end, it is a function of our review, we have supported the evaluation of alternate landing sites for the South Fork export cable. Today, based upon further assessment of these landing sites, we conclude the Beach Lane landing site represents the best option from the standpoint of reducing overall environmental and local community disruption from this phase of the project. We should also mention that, while the financial benefits associated with the host community agreement were an important consideration for some, we focused solely on the comparative disruption associated with each landing alternative and consistently arrived at Beach Lane as the most viable and least environmentally harmful option. Looking to the cable placement and magnetic field implications, from our analysis and not only of the work that BOEM produced, but also a parallel review of related research, we have a high level of confidence that any potential negative magnetic field implications will largely be negligible over time. That said, we urge the developer to make every effort to fully bury the cables and minimize any potential impacts with vessels or fishing here.

Response to comments: Thank you for your comment.

Comment theme: Opposition to the Fisheries Impact Minimization Alternative.

Associated comments

Table I-117 provides the full list of comments received as part of this comment theme.

Table I-117. Opposition to the Fisheries Impact Minimization Alternative comment.

Comment Number	Comment
133-5	We applaud the stated intent of the Fisheries Habitat Impact Minimization alternative; however, it is duplicative and unnecessary. Extensive fisheries mitigation efforts and siting surveys have been completed to reduce impacts to marine life, productive ongoing stakeholder meetings continue to further reduce risks to fisheries, birds, and marine mammals, and this additional measure would not create significant additional benefits. In fact, like the transit alternative, it may only serve to further delay this project and hinder our transition to renewable energy, further endangering our wildlife and coastal communities.

Response to comments: Thank you for your comment.

Comment theme: Support for the Fisheries Impact Minimization Alternative.

Associated comments

Table I-118 provides the full list of comments received as part of this comment theme.

Table I-118. Support for the Fisheries Impact Minimization Alternative comments.

Comment Number	Comment
380-10	Nick Krakoff: Yeah, hi, my name is Nick Krakoff. I'm a staff attorney speaking on behalf of the Conservation Law Foundation, otherwise known as CLF. I thank BOEM for the opportunity to speak tonight. CLF also plans to submit written comments in response to the DEIS. CLF has long supported responsibly developed offshore wind energy. In our view, the transition to clean energy economy is urgently needed to combat effects of climate change. Offshore wind presents a tremendous opportunity to fight climate change, reduce greenhouse gas emissions, and grow a new industry that supports tens of thousands of well-paying jobs. Without significant offshore wind development off the coast of New England, we will not be able to achieve net zero greenhouse gas emissions by 2050. However, offshore wind development must be developed responsibly, meaning offshore wind development based on science and meaningful stakeholder input, and that includes effective mitigation to avoid and minimize impacts on marine wildlife and habitat. CLF recommends that BOEM select the fisheries habitat management alternative as the preferred alternative for the project. It is the most, as it is the most environmentally responsible option that's been proposed for the South Fork Wind Project. The habit alternative would avoid siting in complex habitats in the area of the South Fork Wind Farm. South Fork Wind Farm overlaps in part with Cox's Ledge, which contains vital benthic resources and provides essential fish habitat for a number of species, including the vulnerable and overfished Atlantic cod. Cox's Ledge contains complex hard-bottom habitats that are important for Atlantic cod spawning and growth and support high biodiversity. Studies from the Block Island Wind Farm have shown that complex habitats take longer to recover from offshore wind construction than non-complex habitats consisting mostly of sand and mud. Because the fisheries habitat management alternative would avoid siting in complex hard-bottom habitat areas they're important to several species all still achieving the expected power generation capacity and the South Fork Wind Farm, it is the best option for the project.
380-18	Bob DeLuca: Finally, as we looked at the proposed action alternatives with respect to the wind farm itself, we believe the most suitable configuration would be the one that provides for the maximum energy potential of the overall project but seeks to follow the design goals outlined in what is called the fisheries habitat alternative. Through this general approach, attention to the protection of complex fisheries habitats will have increased importance in the final design configuration, and we believe this is the appropriate priority given the value of limited resources we all strive to protect.
378-7	Mila Buckner: Good afternoon, can you hear me? Yes. Great. Mila Buckner on behalf of the Trustees of East Hampton. We are going to submit our comments by writing as well, I think I'd just like to summarize them at a high level. To start, the trustees have participated in the BOEM review and the preparation of the DEIS from the start and have continuously called for an alternative recognizing the importance of Cox's Ledge as an essential fish habitat area for fish species, marine resources and other wildlife particularly vulnerable to project construction. And after reviewing the DEIS, the trustees feel strongly that among the four alternatives listed, the fisheries habitat impact minimization alternative is really the only and best option that will protect this critical habitat. We strongly urge BOEM to move forward with this alternative, and in doing so, also consider some additional mitigations and, in particular, we would like to see the use of micro-siting for the turbines within the selected area, to ensure that as little impact on Cox's Ledge is occurring as possible. And in addition, there have been some technological updates and improvements in wind turbine design technology since this project was first submitted for review. So, if possible, we'd like there to be a consideration of whether the project could be built so that it still produces 130 megawatts of energy but possibly with fewer turbines. So currently the project is slated to have 15 turbines, but if possible, if we could use bigger turbines and a fewer number, that could greatly reduce the impacts of the project and provide quite a few benefits. And the rest are, the rest of our comments are rather detailed questions about the analysis that was conducted and whether certain species were taken into account. And, and just sort of very specific product-level details that I think would be better to submit over writing. So with that, I will stop there, thank you.
284-1	We appreciate the efforts made by the USCG, the developers/lease holders, and the stakeholders that productively contributed to agreements to construct all the projects proposed to occur in the southern New England offshore wind energy areas using a 1X1 nautical mile (nm) east-west and north-south grid with diagonal transit lanes of at least 0.6 nm. We understand that this alternative is not universally supported by all the stakeholders. We therefore qualify that our support for advancing this alternative forward through to the Final EIS is based on the USCG determination that if turbine layout is developed along this standard and uniform grid pattern, additional formal or informal vessel routing measures would not be required because this proposed grid pattern will result in the functional equivalent of numerous navigation corridors that can safely accommodate both transits through and fishing within the wind energy area.

Comment Number	Comment
	It is worth noting that while adherence to this spacing structure still allows for some flexibility for WTG and inter-array transmission micro-siting, it undoubtably reduces micro-siting flexibility by eliminating siting options that would deviate outside of the grid standards. Consequently, for South Fork and other future projects in the southern New England wind energy areas, adherence to the grid layout design is likely to result in circumstances where one or more otherwise eligible spaces within the grid design becomes ineligible for locating a WTG either because the bottom conditions are structurally unsuitable for a foundation from an engineering perspective, or are found to be undesirable because of a siting-specific conflict with the presence of cultural or natural resources. The Fisheries Habitat Impact Minimization Alternative (Habitat Alternative) is designed to address circumstances where the presence of complex fisheries habitat that is not significant enough to represent an engineering obstacle to foundation installation but is undesirable because of the impact that would occur to complex fisheries habitat that is already present at the proposed installation location.
371-7	Coxes Ledge is an invaluable and irreplaceable ecological resource that should be protected to the greatest extent possible. The Fisheries Habitat Impact Minimization alternative will reduce impacts to this environmentally sensitive area to the greatest extent possible making it the best choice among those listed in the DEIS. However, BOEM should make every effort, including carrying out micrositing or turbine reductions, to ensure this Project has the least amount of environmental impacts.
371-1	Throughout this process the Trustees have called for an alternative recognizing the importance of Coxes Ledge as an essential habitat area for f1Sh species, marine resources and other wildlife particularly vulnerable to Project construction impacts. This alternative would carefully examine the impacts that construction would have on Coxes Ledge and develop alternative layouts for the Project that would reduce or eliminate siting within this essential area so as to reduce adverse environmental impacts. Examining the four alternatives included in the DEIS, the Trustees find that the Fisheries Habitat Impact Minimization alternative provides BOEM with the greatest flexibility to reduce impacts on the environment. While this alternative should be selected, BOEM should also utilize micrositing to the greatest extent possible in order to avoid impacts to complex fisheries habitats and areas of environmental sensitivity.
352-6	We also support the DEIS alternative that would avoid complex habitat in siting these structures in the South Fork (and all other) developments. While wind developers appear to view the ocean bottom simply as engineers, employing massive equipment to sweep boulders away in some cases, we, along with our fishery management partners, view this same complex habitat as critical and essential fishery habitat.
349-3	Additionally, the undersigned support the selection of the Fisheries Habitat Impact Minimization alternative (referred to as the Habitat Alternative) since this alternative will protect important complex habitat while not diminishing the Project's ability to supply clean energy.
349-31	The DEIS presents a detailed description of the anticipated impacts of the Project on benthic resources, finfish, invertebrates, and essential fish habitat (EFH). However, as stated above, we recommend that BOEM select the Fisheries Habitat Management Alternative (Habitat Alternative) as the preferred alternative for the project.
349-36	Next, because of the importance of complex habitats in the Project area to overfished Atlantic cod, as well as other groundfish species, and the lack of recovery for complex habitats from offshore wind construction as demonstrated by research at the Block Island Wind Farm, BOEM should adopt the Fisheries Habitat Minimization Alternative. By avoiding siting in complex habitats, the Habitat Alternative would reduce impacts to complex habitats when compared to the Proposed Action. Specifically, avoiding siting foundations in complex habitats would result in fewer acres of complex habit disturbed by WTG construction and cable burial, which would decrease the overall impacts to EFH and lessen the direct mortality of fish and invertebrates. Although BOEM gives the Habitat Alternative the same impact level for benthic resources, invertebrates, EFH, and finfish as the other alternatives (negligible to minor), BOEM expects that the impacts resulting from the Habitat Alternative would be lower than under the Proposed Action. Because BOEM has not yet completed its full assessment of the impacts to complex habitats from the project, it is possible that inclusion of the complete evaluation in the FEIS will result in the Habitat Alternative reducing impacts even more than what is currently anticipated. In sum, because shifting WTGs and cables from being sited in complex habitats to non-complex habitats would avoid and minimize the impacts to EFHs that are crucial for the growth and spawning of vulnerable species, such as Atlantic cod, and would improve post-construction recovery, BOEM should select the Habitat Alternative as the preferred alternative.
310-2	MA DMF supports the Habitat Alternative. Turbines should be micrSited or eliminated to avoid sensitive habitats including cod spawning areas.

Comment Number	Comment
159-1	It is my desire to express support for the 2.1.3 Fisheries Habitat Impact Minimization Alternative. This alternative restricts the construction of WTG and associated cabling in complex fisheries unless micrositing is possible. The proposed expansion of this project further impedes coastal complex fisheries and has been linked to modifying benthic habitats which have caused changes in biodiversity (Causon and Gill, 2018). Coastal fisheries are already at risk from global warming, dead zones, and overfishing. Further loss of biodiversity in complex fisheries can have a detrimental effect on tourism revenue gained through sport fishing and commercial fisheries, along with overall ecosystem health and services. The agency's initial DEIS outlines proposed action would have negligible to minor effects on benthic habitat, and negligible to moderate impacts on water quality. These impacts have the potential to cause short term and long-term damage to complex fisheries in the proposed site lease area. The effects can be the cause of noise disturbances, spills, accidental discharges, or trash. Modification of benthic habitat due to piling construction or WTG installation or decommissioning can have irreversible damage during and after construction. The alternative requires micrositing to ensure benthic habitat, and this will also ensure minimal damage to complex fisheries.
162-2	In closing, Coxes Ledge is a sacred place of extreme environmental significance. We all have a legal and moral responsibility to protect places like this. The applicant clearly has alternatives that permit them to proceed with the project and to minimize environmental impacts in the process. Please consider alternative D, "The Fisheries Habitat Impact Minimization Alternative", including recommendations from the Rhode Island Coastal Resource Management Council when you deliberate on the Deep Water Wind/ South Fork Wind Farm project.
145-1	We support the Fisheries Habitat Impact Minimization Alternative for the South Fork Wind Project, coupled with the highest level of mitigation possible to reduce negative environmental and recreational impacts.
279-1	The South Fork Wind Farm (SFWF) overlaps Cox Ledge, an ecologically significant area that is of importance to a variety of commercial and recreational (both private and for-hire) fisheries. The complex, hard-bottom habitat attracts demersal species such as black sea bass and the overfished Atlantic cod, and also serves as a spawning area for the latter. The New England Fishery Management Council proposed including Cox Ledge as a habitat management area in its Omnibus Essential Fish Habitat Amendment 2 in order to prohibit destructive bottom-tending gears from operating there, a testament to the area’s significance. In addition, Cox Ledge attracts key forage species such as herring and mackerel, thereby making the area a popular recreational fishing destination for highly migratory species such as bluefin tuna, sharks, and dolphinfish. Given the importance of Cox Ledge, of the four alternatives described in the DEIS for the SFWF, we are supportive of the Fisheries Habitat Minimization alternative. Minimizing negative impacts to complex natural bottom through turbine micrositing and/or a reduction in the overall number of turbines is imperative, as this benthic habitat is the reason why Cox Ledge is such a productive area for finfish and invertebrates. As the DEIS notes, manmade hard-bottom structure in the form of monopiles and associated scour protection could provide an artificial reef effect with similar ecological and fishery benefits to natural bottom. However, in the absence of knowledge that this will be the case, we are in favor of a risk-averse approach to siting that puts turbines in sand and mud bottom, which not only avoids damaging existing habitats but could potentially augment the area’s existing productivity. Comparing the ecosystem benefits associated with natural and windfarm habitats, as well as cumulative impacts associated with the addition of the new complex habitat to the general SFWF area, should be a research priority following construction.

Response to comments: Thank you for your comment.

Comment theme: Support for the No Action Alternative.

Associated comments

Table I-119 provides the full list of comments received as part of this comment theme.

Table I-119. Support for the No Action Alternative comment.

Comment Number	Comment
366-26	A greener future for us all as a nation depends on us methodically making sure scientifically that with each step we take, we do no harm, while preparing for the future and learning from the mistakes of our collective past. We hope that BOEM will choose the “No Action” alternative so that all scientific and economic issues may be thoroughly analyzed and resolved before a Construction and Operations plan is approved.

Response to comments: Thank you for your comment.

Comment theme: Viability of the No Action Alternative.

Associated comments

Table I-120 provides the full list of comments received as part of this comment theme.

Table I-120. Viability of the No Action Alternative comment.

Comment Number	Comment
133-3	The Proposed Alternatives A “no action alternative” is not a viable option for Long Island’s south fork. The South Fork Wind Farm was selected as the result of an RPF from LIPA to fill a growing need for additional energy on the South Fork of Long Island. A plan is needed to generate more power; therefore, it is not reasonable to present to the public that there a “no action alternative” as a genuine option. The choice was between a wind farm and a new fossil fuel fired power plant. The South Fork Wind Farm was determined to be the best proposal for ratepayers, community members, and our shared environment.

Response to comments: Per 40 CFR 1502.14, NEPA requires the analysis of a no action alternative.

Comment theme: Transit Alternative map.

Associated comments

Table I-121 provides the full list of comments received as part of this comment theme.

Table I-121. Transit Alternative map comment.

Comment Number	Comment
294-16	Regarding the Vessel Transit lane Alternative, DEIS Figure 2.1.3-1 of the Transit alternative layout is extremely misleading. While it includes other proposed transit lanes on the chart, it does not include the adjoining lease areas expected to be part of the full MA/RI lease area buildout. This is not realistic; surrounding “open ocean” areas on the chart would be covered with turbines if other project approvals move forward. This figure should be updated to include all MA/RI leases and anticipated turbine layouts/spacing.

Response to comments: Figure 2.1.3-1 of the Final EIS has been updated to include BOEM RI/MA lease areas traversed by the proposed vessel transit lanes.

Comment theme: Support for the Proposed Action.

Associated comments

Table I-122 provides the full list of comments received as part of this comment theme.

Table I-122. Support for the Proposed Action comments.

Comment Number	Comment
329-7	The DEIS provides one Alternative for vessel transit, and one Alternative for fisheries habitat, both of which would reduce the amount of renewable power generated. These alternatives would therefore reduce the health, GHG emission, and EJ benefits estimated above. The DEIS provides no justification or quantitative benefit for either of these modifications. These Alternatives would reduce clean power output by removing turbines, approximately reducing those benefits by the proportion of turbines removed. Or, by replacing the Proposed Action with the Alternatives, the Alternatives' requirements would decrease the economic viability of the Proposed Action, possibly causing it to not be built. In either case, the health and GHG benefits estimated above would be reduced or eliminated. In my judgement, it is implausible that the benefit of either alternative would justify the lost benefits in health and GHG emission reduction. I cannot quantitatively compare these because no convincing benefit from these alternatives has been given in the DEIS.
147-3	The Project is proposed to be built in Win With Wind's backyard, off the South Fork of Long Island. As such, Win With Wind is particularly interested in and knowledgeable about the circumstances surrounding the Project. New York State critically needs offshore wind energy. In fact, New York cannot meet its statutorily mandated renewable energy targets without significant offshore wind resources. The Climate Leadership and Community Protection Act ("CLCPA") came into effect in January 2020. The CLCPA mandates that a minimum of 70% of statewide electric generation be supplied by renewable energy by 2030, and that 100% be derived from zero-emission sources by 2040. The CLCPA also requires the development of at least 9,000 MW of offshore wind electricity generation by 2035. Recognizing the urgent need to scale up renewable energy capacity, in April 2020 the New York Legislature enacted and Governor Cuomo signed the Accelerated Renewable Energy Growth and Community Benefit Act to streamline the siting of renewable energy facilities in order "to meet the state's renewable energy goals." New York cannot meet its statutory mandates without massive and rapid offshore wind development. Although New York State has contracted for two other wind farms off the coast of Long Island – the Empire Wind project and the Sunrise Wind project – neither would come online until the mid2020s, whereas the South Fork Wind Farm is expected to be operational before that. The success or failure of the Project will have a significant impact on the offshore wind industry in New York and along the entire Eastern seaboard. On a local level, the Town of East Hampton Town Board adopted a resolution setting two clean energy goals in 2014: (1) to meet 100% of community-wide electricity consumption with renewable energy by 2020; and (2) to meet the equivalent of 100% of economy-wide energy consumption using renewable energy sources by 2030. The Project will be critical in meeting those goals. In an important show of support, the Town has formally endorsed the Project and has granted the necessary easements for it to proceed.
358-2	BOEM now has the opportunity to more broadly solidify regulatory certainty by carefully considering the alternatives presented in the DEIS and ultimately approving the Proposed Action alternative. We consider it significant that the US Coast Guard has approved the turbine spacing provided in the Proposed Action alternative and has said that the transit lanes in the Transit alternative are not necessary for safe navigation. Implementation of the unneeded transit lanes would remove significant portions of the lease area from potential wind turbine siting, thus reducing the benefits of job creation and greenhouse gas mitigation.

Comment Number	Comment
315-1	The Northeast Clean Energy Council ("NECEC") appreciates the opportunity to provide comment to the Bureau of Ocean Energy Management (the "Bureau") on Deepwater South Fork LLC's Proposed Wind Energy Facility (the "South Fork Project") Draft Environmental Impact Statement ("Draft EIS"). The Bureau's thorough review of the South Fork Project, taking into account subsequent projects, has laid the groundwork upon which the emerging offshore wind industry must be built. The expansion of offshore wind capacity is essential for decarbonization and for realizing the greenhouse gas emission reduction commitments of New York. The South Fork Project will not only play a key role in reducing carbon emissions in New York, but will also make a meaningful contribution to New York's requirement of procuring 9,000 MW of offshore wind energy by 2030. This development will also create well-paying jobs in a rapidly expanding industry. NECEC supports the advancement of offshore wind industry within the northeastern United States because it is key to our regional clean energy strategy. NECEC is a clean energy business, policy, and innovation organization whose mission is to create a world-class clean energy hub in the Northeast, delivering global impact with economic, energy and environmental solutions. NECEC is the only organization in the Northeast that covers all of the clean energy market segments, representing the business perspectives of investors and clean energy companies across every stage of development. NECEC members span the broad spectrum of the clean energy industry, including clean transportation, energy efficiency, wind, solar, energy storage, microgrids, fuel cells, and advanced and "smart" technologies. NECEC supports the development of offshore wind to reduce carbon emissions in the region, while also improving air quality for residents. In the Northeast, electric sector emissions have already dropped substantially since 1990, largely due to cheap and abundant natural gas. In order to further decarbonize the electric sector, the region must turn to zero-emissions resources. Today, offshore wind provides significant opportunity for emissions reductions due to high capacity factors, technological advancements, and economies of scale. Last year, the use of wind energy avoided 198,000,000 metric tons of carbon emissions, 1while also delivering significant reductions in local pollutants. 2 As proposed, the South Fork Project balances a wide variety of environmental, commercial and socioeconomic interests into a thoughtfully designed project. NECEC notes that the Draft EIS concludes that, for many resources, the overall impacts of the South Fork Project are anticipated to be negligible to moderate. We expect that higher rated impacts will the addressed and mitigated going forward. Moreover, the DEIS recognizes that the proposed layout reflects a careful consideration of multiple uses of our important ocean resources, and concludes that the South Fork Project would not result in impacts that would place significant limits on future ocean uses. We note that the layout proposed for the South Fork Project is part of a coordinated effort from a number of developers within the New England Wind Energy Areas that propose a 1x nautical mile layout for projects within this geography. Supported by the US Coast Guard, the 1x1 layout spaces turbines further apart than any other offshore wind project and the uniform grid pattern would "maximize safe navigation." Quite simply, the proposed layout is the best configuration for multiple ocean uses.
360-7	The evidence in the record, including the USCG final MARIPARS report, makes clear that the Proposed Action is the best choice from the perspective of navigation safety and other factors, including economics. In fact, of all the alternatives in the DEIS, the Proposed Action has the fewest conflicts with regard to impacts on navigation with the maximum flexibility to size turbines to promote efficient use of energy. Accordingly, the final EIS should identify the Proposed Action as the Preferred Alternative.
360-8	Under the proposed action alternative, the construction and installation, O&M, and conceptual decommissioning of up to 15 WTGs in the 6- to 12-MW range and an offshore substation (OSS) within the Lease Area (including the expanded area) and associated export cables would occur within the range of design parameters outlined in the South Fork COP, subject to applicable mitigation measures. BOEM finds that relative to the larger geographic area, there is less vessel traffic near the Lease Area. The WTGs would be spaced in a uniform east–west and north–south grid with 1 × 1 nautical-mile (nm) spacing between WTGs and diagonal transit lanes at least 0.6 nm wide, consistent with other surrounding lease areas. BOEM concludes that "this configuration would still allow micro-siting of WTGs to avoid sensitive cultural resources and marine habitats." This layout aligns with the spacing recommendations set forth in the final MARIPARS report for leases in this area. The record demonstrates that this layout would lead to less impacts on navigation and vessel traffic and provide numerous benefits to commercial fishermen and for-hire recreational fishing compared to other alternatives. As discussed in the next section, the imposition of overly broad transit lanes (i.e., Vessel Transit Lane Alternative) is unnecessary and will pose a greater risk to navigation than the uniform grid layout proposed in the Proposed Action, as more traffic is likely to be funneled into the larger transit lanes.

Comment Number	Comment
378-13	Vincent Albanese: My name is Vincent Albanese with the New York State Labor's organizing fund. I'm the director of policy and public affairs. New York State Labor's organizing fund represents over 40,000 working men and women, the LIUNA members in the State of New York, many of which whose Members live and work here on Long Island. I wanted to just touch on a few quick things regarding our support for this project. I think the first that should not be understated is how, both Orsted and Eversource have worked, not just within the community or within the labor community specifically, within the building trades, with building trades councils, with individual Union affiliates and trade affiliates, with our signatory contractor base and to ensure that these jobs would be good, Union, middle-class-families-sustaining jobs, right here on Long Island. And I would say that, as we make this transition, the so-called just transition, we must do this in a way that provides the maximum amount of opportunities to replace the phasing out of fossil fuel jobs all across the state and specifically on Long Island. Without moving forward with a project of this scale magnitude, we will not come anywhere near replacing the good, current existing jobs that are relying on fossil fuel infrastructure. It's imperative that this project move forward. I would just add one other piece to this. The Beach Lane route is the route to go. East Hampton Town and Trustees have overwhelmingly supported this route. They voted for it last month, formally. I would say the 1.1 nautical mile compromise should be adhered to, and we ask BOEM to reject transit lane alternative. It is critical we move forward with this project for the workers on Long Island, for our environment, and to continue to build not just an offshore wind industry in Long Island, but a renewable industry that is here to stay and thrive. Thank you very much.
360-9	Under the Proposed Action, the wind turbine layout would have a minimum spacing of 1 x 1 NM between turbines and allow vessels to travel in an unobstructed path between them in an east-west and north-south direction—respecting the ability of commercial fisherman and other vessels to transit, reducing navigational complexity, improving vessel traffic safety, utilizing a regular and predictable layout (thereby allowing vessel operators to set predictable courses), and allowing the USCG to set predictable search and rescue patterns and successfully complete more search and rescue missions. Because of the low frequency of incidents (less than 1% of which would be collisions or allisions) and Project EPMs, BOEM determined that the expected risks to navigation would be negligible; most deep draft vessel traffic already avoids the area and would not need to meaningfully reroute, and for cargo vessels that travel through the Project, only slight reroutes would be necessary to avoid Project components. This conclusion has been confirmed by the USCG, which has the statutory authority and expertise to create and enforce regulations affecting the navigation safety of vessels. The MARIPARS report was initiated by that agency with public support to determine what, if any, navigational safety concerns exist with vessel transits in the study area; whether to recommend changes to enhance navigational safety by examining existing shipping routes and waterway uses with respect to all of the lease areas within the Massachusetts and Rhode Island wind energy areas; and the need for establishing vessel routing measures. In the final MARIPARS, the USCG determined that uniform 1 x 1 NM spacing should be preferred over either a 4 NM transit lane corridor (like that proposed by RODA in Vessel Transit Lane Alternative) because larger mitigation lanes pose more navigational risk. The USCG determined that the 1 x 1 NM layout pattern "will result in the functional equivalent of numerous navigation corridors that can safely accommodate both transits through and fishing within the [the lease areas]." The USCG concluded that the 1 x 1 NM uniform layout reflected in Proposed Action would "maximize safe navigation within the MA/RI WEA." The USCG's conclusions in the final MARIPARS report accord with other evidence in the record. For instance, five project developers commissioned an independent report, prepared by W.F. Baird & Associates Ltd. (Baird Report), and submitted it to the USCG. The Baird Report found most traffic in the general region transits around, or along the outside edges, of the wind energy area. In addition, most of the transiting vessels are fishing vessels, and they follow a wide range of transit paths through the wind energy area as they are coming from several different ports and heading to a variety of fishing grounds. The analysis concluded that a uniform 1 x 1 NM layout would provide ample navigation transit corridors throughout the Massachusetts/Rhode Island wind energy areas. In sum, consistent with the evidence in the record, the Proposed Action should be adopted as the preferred vessel transit and navigation alternative because it better accounts for the needs of vessels and fishing without compromising the technical needs and transmission capabilities of offshore wind projects, as well as state demand for offshore wind.

Comment Number	Comment
359-3	To reach their economic potential, industrial investments such ours require reasonable and predictable regulatory decisions that preserve the economic viability of the projects we serve. This allows investors to maintain confidence that the U.S. offshore wind market is an investable market. It is understandable that legacy stakeholders might be wary of new entrants which acquired leasing rights from the federal government in areas on the outer continental shelf close to their states. However, US offshore wind developers have been responsible corporate citizens, and have exerted significant efforts to reach out to other stakeholders and take their concerns into consideration. This has been demonstrated with the Joint Developer Agreement Layout in which the offshore wind developers have gone to great lengths to meet the specific needs of the stakeholders in the Massachusetts / Rhode Island wind area thereby reducing the impact of the wind farms on vessel transit and safety to minor or none even allowing commercial fishing between turbines. This is demonstrated again with Eversource and Ørsted submitting in February 2020 an update to the South Fork's COP which commits the project to the Developer Agreement Layout with a 1 x 1 NM layout aligned with adjacent projects, forming columns and rows in a grid in order to address concerns from the fishing industry regarding the need for safe navigation as identified during extensive public outreach. South Fork layout adopting the Joint Developer Agreement Layout of a uniform 1:1 nautical mile layout is eminently reasonable and avoids the need for a special transit lane. It goes well beyond what has been adopted in other parts of the world. That layout as an extension of the Joint Developer Agreement Layout is consistent with: (i) The United States Coast Guard ("USCG")'s final report on "The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study", Docket Number USCG-2019-0131, dated May 14, 2020 ("MARIPARS") and published in the Federal Register Vol. 85, No. 102 on Wednesday, May 27th, 2020 in which the following quantitatively-derived final recommendations can be found: … if the MA/RI WEA turbine layout is developed along a standard and uniform grid pattern, formal or informal vessel routing measures would not be required as such a grid pattern will result in the functional equivalent of numerous navigation corridors that can safety accommodate both transits through and fishing within the WEA … If the WEA provided several larger corridors as some commenters proposed, the reduced turbine spacing would largely preclude fishing in the WEA, an area of almost 1400 square miles … A. That the MA/RI WEA's turbine layout be developed along a standard and uniform grid pattern with at least three lines of orientation and standard spacing to accommodate vessel transits, traditional fishing operations, and search and rescue (SAR) operations, throughout the MA/RI WEA. The adoption of a standard and uniform grid pattern through BOEM's approval process will likely eliminate the need for the USCG to pursue formal or informal routing measures within the MA/RI WEA at this time. 1. Lanes for vessel transit should be oriented in a northwest to southeast direction, 0.6 NM to 0.8 NM wide. This width will allow vessels the ability to maneuver in accordance with the COLREGS while transiting through the MA/RI WEA. 2. Lanes for commercial fishing vessels actively engaged in fishing should be oriented in an east to west direction, 1 NM wide. 3. Lanes for USCG SAR operations should be oriented in a north to south and east to west direction, 1 NM wide. This will ensure two lines of orientation for USCG helicopters to conduct SAR operations. In the event that subsequent MA/RI WEA project proposals diverge from a standard and uniform grid pattern approved in previous projects, the USCG will revisit the need for informal and formal measures to preserve safe, efficient navigation and SAR operations. …, (ii) the Bureau of Ocean Energy Management's assumptions for future OSW development of up to 22 GWs as described in the section titled "PAST, PRESENT, AND FUTURE REASONABLY FORESEEABLE ACTIVITIES AND PROJECTS" of the Draft EIS, and (iii) with the Proposed Action alternative of section 2.1.1 in the draft EIS. Nexans therefore (i) supports the Proposed Action alternative which is responsible and reasonable and asks the Bureau of Ocean Energy Management to reject the other alternatives, and (ii) would like to encourage the Department of Interior to continue to work with all the relevant agencies to insure that the permitting for South Fork in particular and for the US offshore industry is treated fairly and expeditiously in order to meet the target stated by Presidential Executive Order of January 27th, 2021 on Tackling the Climate Crisis at Home and Abroad section 207, of doubling offshore wind by 2030.

Comment Number	Comment
378-16	George Povall: Okay, hi, my name is George Povall. I'm the Executive Director of All Our Energy a local Long Island South Shore Nassau organization, promoting environmental advocacy and protections. Thank you to everyone for having this hearing today and moving this process forward. Let me just start by making it perfectly clear that we support offshore wind. And really it boils down to what, what you've been hearing from everybody else today, which is climate change. We just cannot afford to keep waiting. At the same time, we are wholeheartedly behind a robust and thorough process to make sure that what we do now has the least environmental impacts that are possible. So, having said that, we think that moving forward with the South Fork Wind Farm is a great first step, but it is just the first step. Deciding of in right, where there is the greatest need for fossil fuels to be displaced, and this is the way to do it. Those fossil fuels have been eating up our climate and now we have a place that has a giant need for electricity, and we have a clean answer to supplying that, which is also when. We are also have the mind that the landfall on Beach Lane in Wainscott really is the least impactful, most direct, and really it's right where the power is needed. We don't see any other really viable option that makes any sense. And so we just want to make very clear that we support that landing site. Also, we want to reject the transit lane alternate. We don't feel that that's necessary. It's just another setback upon the previous setback, and really, nobody has shown any reason why the current shipping situation can't handle what they currently use, why they need even more in the future, nobody has explained that. So just to keep things brief, we want to make sure that that you know, and that we thank the East End of Long Island for choosing this option, because the other option was to jam a track gas pipeline across Long Island to feed a new power plant that would have needed to be placed to generate this, in addition to all the problems with that and the miles and miles and miles of impact that that would have had to the rest of Long Island. This South Fork Wind Farm really is the least impactful on the environment, and actually it really solves a lot of issues with the current system that we use of fossil fuels. So we just want to say, we support this robust environmental process to ensure that all work and infrastructure is least impactful for our environment and we support the rapid development of offshore wind within those parameters to display 30 fossil fuels and move Long Island to renewable energy to help stop climate change and avert environmental pollution. Thank you.
378-17	Josh Slaughter: My name is Josh Slaughter, S-L-A-U-G-H-T-E-R, I'm the Long Island political coordinator for the Mason Tenders District Council. We represent several thousand working Long Islanders who are ready and willing to construct a clean energy future for Long Island. We've been working diligently to educate our members on the importance of climate change and how sound policy solutions such as South Fork Wind's proposed project will allow us to make great strides towards a healthier planet and while producing good-paying jobs for the local economy. I'm a lifelong Long Islander who has seen firsthand the impacts of climate change on my community, and as a Labor leader, I understand the need for good-paying job opportunities for our skilled workforce. I enthusiastically support the South Fork wind project, which will improve our environmental footprint, especially since South Fork Wind has worked hard to engage the local community as well as work with local Labor to ensure they have responsibly developed this offshore wind project. And this is going to be New York's very first offshore wind project, it's fitting that Long Island will host this project, considering the very recent impacts we have had experienced from climate change related to storms, as well as our need to deliver clean, renewable, and cost-effective power to the South Fork of Long Island. Long Island's Union labor force is enthusiastic to be a part of this historic moment for our region. Orsted has committed to working with local Labor by using project Labor agreements with the Nassau Suffolk Building Trades and by directly investing in local workforce training. The laborers and other Union trades provide extensive training programs and apprenticeships, at no cost to taxpayers. By coordinating with the wind energy industry, we can continue to lead and train the offshore wind workforce of the future. The project developers have spent years working with local stakeholders on construction-related and community benefits agreements, and they have carefully considered all the cable lending options, which I believe has resulted in the best onshore cable route. The Labor is recognized the concerns raised by commercial fishermen local community stakeholders, but we believe that the proposed mitigation efforts provide acceptable solutions that, in the end, allow for environmental economics and energy benefits that far outweigh any negative impacts have been raised. For these reasons, we support the one-by-one nautical mile layout compromise and we urge BOEM to reject the transit lane alternative in the final EIS. This project is too important to move folks, not move forward to expeditiously it will provide long-term sustainability, economic development, and create a new, skilled workforce here in Long Island. As we begin to rebuild our economy in a post-COVID world, this will put people back to work, build infrastructure to address climate change, and spur economic development in our communities. For these reasons, I urge you to approve the environmental impact statement so that this critical project and move forward. Thank you.
379-5	David Monti: In conclusion, I reject the transit lane alternative and support the proposed action, as it provides for possible micro-siting of turbines. With a consistent one-mile nautical spacing between turbines. The one-by-one layout is the approved U.S. Coast Guard recommendation providing an optimal safety. I am opposed to the four-mile transit lane, as all travel would be funneled into one congested area. My biggest fear as a state-licensed and federally credentialled captain is being hit by someone else. The transit lane option will increase those chances. Part of developing a wind farm responsibly is building it in the safest manner possible. The transit lane alternative is not the safest way to build a wind farm and should be rejected. Once again, thank you, and I am grateful for the National Environmental Policy Act that allows fishermen like me to comment on such a project. Thank you.

Comment Number	Comment
379-7	Roger Clayman: My name is Roger Clayman. I think you said spell it. C-L-A-Y-M-A-N. I am the executive director of the Long Island Federation of Labor. We represent 250,000 working men and women and their families on Long Island. I've submitted something in writing, so I'll try to be brief in the interest of time. We're anxious to see the South Fork project go forward. It addresses some major concerns on Long Island. First of all, climate change. We're very sensitive as an island to what the impacts will be. It, secondly, it brings the South Fork what they voted for, which is wind power. And third, is job creation. On a very large scale, this project opens the door to many others. Approving this statement, this environmental statement of their construction and operation plan, will really be just the beginning of a large number of new careers that can be created. I just want to give my personal experience in working with the developer. You know they've been very diligent about their environmental studies and their work with the community arm. And they've done this over the last couple of years, but we've really been working with them back when they were called Deepwater Wind, going back 10 years. And over that period of time, they've demonstrated incredible amount of concern for every stakeholder in the community, whether its environmental, or Labor, working people, or businesses that are impacted, so I think they've done their homework and they've done it very well. The South Fork Wind submitted its construction and operation plan to BOEM in 2018, and it's continued to collect the data in a transparent way to provide all the agencies and stakeholders with information and potential environmental impacts from the project. We have concerns on the layout of the project, that it not be changed and that, that we maintain the one mile-by-one mile layout. Otherwise, I feel, with a wider four-mile stretch, we could undermine the, the economic value from the project. The developer has also been diligent in their commitments to the host community, and I believe that they should land this project in Wainscott. We have a workforce. It's very skilled at digging trenches, connecting to substations. We've done this all over Long Island and, and it can be done safely and with consideration for the population and really makes the most sense. So, I would urge you to move forward with the permitting schedule and release the construction and operation plan as early as possible this year. Thank you.
379-8	Joe Martens: Alright, my name is Joe Martens, M-A-R-T-E-N-S, and I'm the director of the New York Offshore Wind Alliance, or NYOWA, which is a project of the Alliance for Clean Energy New York. I'm also the former commissioner of the New York State Department of Environmental Conservation, where I served Governor Cuomo from 2011 to 2015. NYOWA is a unique coalition of offshore wind developers, environmental NGOs, Labor organizations, and a variety of businesses, all dedicated to promoting the responsible development of offshore wind in federal waters off of New York's coastline. Orsted, the half-owner of the South Fork project, is an NYOWA member, as are many, many of the other members of the community that have been testifying at these hearings. Let me start by thanking BOEM and staff for completing and releasing the draft EIS in the middle of the national health emergency. This is really critical work, and moving forward, and the project is important not only for Long Island, but for New York and the nation. It's critical on many levels in the fight against climate change, in our efforts to reduce criteria pollutants, improve public health, address long-standing environmental justice issues, and to help restart the economy and provide family-wage jobs in the wake of the COVID pandemic. I plan to submit written comments on behalf of NYOWA, but I'd like to just emphasize a few high-level points in my oral testimony. First, although it's relatively modest in size compared to other projects in BOEM's queue, the South Fork project, as I've already noted, is critically important, is a critically important project and it's been 10 years in the making. It's an essential local project that would move East Hampton toward its 100% renewable energy goal. Second, it's an important and positive step towards achieving New York's nation-leading climate renewable energy standards, and specifically, its 9,000-megawatt offshore wind target by 2035. And finally, it would further President Biden's climate goals as recently outlined and Executive Order 14008. Notably, the South Fork project, if approved, would triple the current offshore wind power generation in the United States and kickstart this new American clean energy industry. The history of how this project got started is important. Electricity needs on the South Fork are growing faster than anywhere else on Long Island. And in 2015 the Long Island Power Authority issued a technology-neutral, competitive RFP to address this need. And more than 20 proposals were received and the South Fork Wind Farm was selected as the most cost-effective solution. And it is by far the most environmentally effective solution. Importantly the DEIS concluded that the majority of the anticipated impacts from the project will be minor or moderate and higher-rated impacts can be mitigated. The DEIS also calls out a number of long-term benefits, including the development of a clean domestic energy source, and clean energy, job creation, the promotion of renewable energy that is affordable, affordable, reliable safe and secure. Its contribution to meeting New York's climate and energy goals and increased habitat for certain species, as you heard about from the charter captain a few minutes ago. There is more, more than enough information and data in the DEIS for BOEM to approve the proposed project. The vessel transit lane alternative, on the other hand, should be rejected. This alternative would effectively eliminate the South Fork southern row of foundation locations and could substantially impact the project's economic viability. Orsted and Eversource, along with other developers of the New England wind energy areas, have agreed to advance all projects in these areas, including the South Fork project, with a one-by-one nautical mile layout. This layout provides ample room for safe navigation and was adapted to minimize the impact on commercial fishing. Importantly, the U.S. Coast Guard concluded, concluded that a four-nautical mile wide navigation quarter would make navigation more challenging increase the risk for vessel interaction. To the extent that the South Fork project sets a precedent, the transit lane alternative would add that adversely impact all of the projects in these areas and would reduce the overall generating capacity by some 3,300 megawatts, which in turn would dramatically reduce emission reductions, public health benefits, economic investments, and employment opportunities. Where BOEM comes out on the South Fork and other well-advanced projects like Vineyard Wind will send a clear message to the entire offshore wind industry and will likely determine whether it will invest billions in the U.S. and give birth to an entirely new clean energy industry. So, I want to thank BOEM once again for advancing this DEIS and urge to finalize it and ultimately move to a record of decision approving the proposed projects. Thanks again for all your hard work.

Comment Number	Comment
379-15	Adrienne Esposito: And the last thing I just want to mention is that we also strongly support the one-by-one layout for the turbines, which we also believe provides ample room for navigation. As someone who grew up on Long Island with one foot on the land and one foot in a boat, my dad was a charter boat captain on the weekends and deep sea fishing every minute that he could be. And, listen, we listen to the Coast Guard. Because when the Coast Guard said something was safe, it was safe. And I think we have to defer to our experts and, and really rely on their guidance.
380-3	Ross Gould: Good evening, my name is Ross Gould, that's R-O-S-S G-O-U-L-D, and I am the vice president for Supply Chain Development for the Business Network for Offshore Wind. I am here on behalf of the 335 members of the Business Network for Offshore Wind, 40 of whom are based in New York. I would like to thank BOEM and the Army Corps of Engineers for the opportunity to address the draft environmental impact statement to the South Fork Wind Farm under consideration this evening. The Network will also be submitting written comments. Thank you for all the time and effort you have made to work responsibly to analyze the environmental impacts and benefits, may I say environmental benefits, including mitigating climate change, of the South Fork Wind Farm. The Network is a 501(c)3 nonprofit organization focused on the development of the U.S. offshore wind industry and its supply chain. Since 2012, the network has brought together business and government, both domestically and internationally to educate and enable American businesses of all sizes to enter the offshore wind market. The Network uses the voice of its diverse membership, comprised of the full spectrum of offshore wind supply chain, to educate and support federal state and local policies to advance the development of the U.S. offshore wind industry. The Network is a proud partner of the Bureau of Energy Ocean Management and the Network looks forward to continuing successful partnership with BOEM, and we'd like to thank BOEM for conducting these virtual meetings about the South Fork EIS under these challenging circumstances. And we want, and we do commend you on the job well done. Speaking from personal experience, it is a Herculean behind-the-scenes effort to execute virtual events, so we recognize the effort and coordination that BOEM has clearly invested in preparing and making them run so smoothly. And the Department of Interior approval of South Fork construction and operation plan will unleash a wave of investment. More importantly, this approval will begin a domino effect that will ultimately put tens of thousands of hardworking Americans from across the economic spectrum and from literally all walks of life, the building trades, vessel captains and deckhands, accountants, dockworkers, economists, welders, divers, aircraft pilots, atmospheric and marine scientists, truck drivers, attorneys, crane operators, project managers, mechanics, and every imaginable engineering discipline, among many other occupations, back to work. South Fork will also significantly contribute to energy security and improve local air quality in New York. Offshore wind presents an enormous economic and job opportunity for the State of New York and it's either over 700 companies in New York that have listed themselves as capable and interested in participating in the offshore wind industry. With five projects scheduled for New York, these projects are set to bring 6,000, projected to create 6,800 jobs and more than 12.1 billion in combined economic activity. Now we at the Business Network would ask that you, that BOEM approve the proposal, the proposed South Fork Wind Farm, as proposed by Eversource and Orsted and reject the vessel transit lane alternative. We look forward to submitting written comments and, once again, we will cede the rest of my time, and I want to thank BOEM for the opportunity for the comments this evening, and we continue to partner with them to support the robust growth and responsible development of the U.S. offshore wind industry. So, thank you, Meg. Thank you, Jim. Thank you all who are there, appreciate it.
380-6	Caroline Hahn: And in addition to the proposed action by South Fork Wind, the EIS includes several alternatives, including a vessel alternative lane. But it is clear that the proposal put forth by South Fork Wind is the best option that will cause the least impacts to the environment. Additionally, the town leaders in East Hampton have been clear they believe that route from Beach Lane is the best option because it minimizes impacts to the whole community. The EIS analyzes short-term use compared to long-term productivity, concluded that South Fork Wind would not result in impacts that significantly narrow range of future uses of the ocean. The DEIS also states that South Fork Wind provides several long-term benefits, including the promotion of clean and safe development of domestic energy sources and the creation of clean jobs. South Fork Wind offers a significant opportunity for economic development and the creation of good-paying Union and green economy jobs. Long Island has the potential to become a center for an offshore work force at the center of a major industry that helps rebuild our economy and combat climate change. And it's estimated that the three currently awarded offshore wind projects, including the South Fork Wind Farm, will create more than 1,600 new jobs and generate $3.2 billion in private investment. Offshore wind has the potential to drive economic recovery post the COVID-19 pandemic and stimulate economies up and down the East Coast. Additionally, there is deep and diverse stakeholder support among local environmental and labor organizations from Long Island, and NYLCV is proud to be included in these groups. We urge you to adopt the DEIS and enable the South Fork Wind Project to move forward exponentially. Thank you for your time.
358-4	We appreciate the tireless leadership BOEM has provided to the US offshore wind business. We urge the agency to reject the No Action alternative and adopt the Proposed Action alternative in SFWF's final approval.
320-2	WindServe Marine supports the project as proposed by Ørsted/Eversource, which is the proposal for 1x1 nautical mile spacing in a uniform east-west grid layout. This reflects the joint proposal of all wind farm developers holding a lease in the area south of Martha's Vineyard, and it is the proposal that the Coast Guard determined would facilitate navigation safety and search-and-rescue in its MARIPARS report.

Comment Number	Comment
380-12	Ryan McGarry: HI, good evening. Thank you for affording me the opportunity to address this body. My name is Ryan McGarry, M-C-G-A-R-R-Y. And, on behalf of Suffolk AME, the region's largest independent Labor union with approximately 10,000 active and retired members, I'm proud to offer our support of offshore wind and the South Fork Wind Project in particular. Through an investment in utility and infrastructure improvements, this project will provide needed Union jobs to our region, helping to stimulate our local economy at a time we need it most. While this project will not directly impact the work of our AME members, the creation of Union-represented jobs, the positive impact the project will have on our local economy, and the fact that this green energy investment will help protect our environment on which both our hurting industries and tourism-related businesses rely, make us confident that the social or one project will surely have a positive impact on all our region's residents. Lastly, as my understanding that the Beach Lane cable route was thoroughly studied and is the best option to minimize community impact. Again, on behalf of Suffolk AME, we are proud to stand with our brothers and sisters from the Long Island Federation of Labor and climate jobs in New York to offer our full support of this regionally significant project. Again, I thank you very much for affording me the opportunity to speak to you this evening. Thank you.
301-9	SFW requests that BOEM adopt the Proposed Action Alternative, including the 1-NM x 1-NM grid layout for wind turbine generator ("WTG") spacing, without the additional requirement for transit lanes, as the preferred alternative in the FEIS. A 1-NM x 1-NM grid layout is consistent with, and far more conservative than, the design of existing offshore wind facilities in the United States and Europe. The spacing between turbines for the current projects in the United States range from 0.45 NM to 0.57 NM. While WTG spacing varies among wind farms in Europe, it has been on the order of 0.5 NM to 0.75 NM.7 Compared to the layouts of existing large-scale offshore wind installations, the additional spacing in the Proposed Action Alternative will further accommodate vessel navigation, including large commercial vessels and fishing vessels. There is also broad regional support for the Project, 8 including a diverse set of local community, environmental advocacy, and labor union organizations that have engaged with SFW to support the stakeholder outreach process. Based on these findings, SFW urges BOEM to adopt the 1-NM x 1-NM grid layout set forth in the Proposed Action Alternative, which balances and optimizes the interests of all uses of the OCS.
299-3	By contrast, the failure to issue a Record of Decision (ROD) fully approving the SFW–or, alternatively, issuing a ROD that requires a dramatic reconfiguration of the SFW at this late stage – would represent a monumental lost opportunity for robust job creation. In terms of market signals, the approval of a severely reconfigured SFW project – i.e., requiring 4 nm wide transit lane – would be tantamount to no approval at all. This will have drastic broader negative economic ramifications and would serve to further deepen the staggering COVID-19-related recession that is now being experienced by Americans across the United States. Such a decision would hamper American economic recovery and would exacerbate the country's OSW market uncertainty at a time when global OSW markets are surging.
329-10	Similarly, in evaluating the two Alternatives to the Proposed Action, the health and GHG benefits are not evaluated, but would be proportionally large—the lost benefit would be roughly proportional to the number of turbines removed. The DEIS also does not demonstrate any corresponding benefit to navigation or fishery habitat of these two alternatives. Thus, if the impacts were correctly tabulated, Proposed Action would be strongly favored due to health and CO2 benefits, rather than either Alternative.
133-4	The other alternatives presented will delay or jeopardize the efficacy of the project without creating substantial environmental or community benefits. The Vessel Land Transit Alternative would eliminate Orsted's ability to construct turbines in the proposed area, handicapping the project. While it may be possible to reduce the number of turbines by using larger turbines capable of generating more energy per turbine, it may also cause delays or hinder the viability of this project. South Fork Wind Farm is advancing in the permitting process and has already experienced delays at the federal level which pushed back its projected date of operation. We cannot continue with added delays.

Comment Number	Comment
299-1	The Business Network for Offshore Wind strongly encourages the Bureau of Ocean Energy Management (BOEM) to reject the Vessel Transit Lane Alternative and adopt the Proposed Action. The Proposed Action is defined as: “the construction and installation, operations and maintenance (O&M), and conceptual decommissioning of up to 15 wind turbine generators (WTGs) in the 6- to 12 MW range and an offshore substation (OSS) within the Lease area (including the expanded area) and associated export cables would occur within the range of design parameters outlined in the Construction and Operations Plan (COP), subject to applicable mitigation measures. Deepwater Wind South Fork (DWSF) would space WTGs in a uniform east–west and north–south grid with 1 × 1–nautical-mile (nm) spacing between WTGs and diagonal transit lanes at least 0.6 nm wide. This configuration would still allow micrositing of WTGs to avoid sensitive cultural resources and marine habitats.” By approving the full configuration of the South Fork Wind, the Department of the Interior will send a clear message to the offshore wind market and investors that the U.S. is open for business and intends to be a central player in a global energy industry that will expand to $1 trillion by 2040....South Fork Wind (SFW) is an important and precedent-setting project for the U.S. OSW industry. The comprehensive Draft Environmental Impact Statement (DEIS) outlines this in great detail. The Network and its members strongly support SFW’s proposal as submitted and its commitment to installing the project’s turbines in a uniform grid layout, with 1 nautical mile (nm) spacing between turbines in the east-to-west direction, and 1 nm between turbines in the north-to-south direction.
359-5	Adopting or endorsing proposals that require a substantial reconfiguration of the project (and therefore all projects in the area) as for example the Vessel Transit Lane Alternative requiring a 4 NM wide transit lane (which would be the equivalent of not granting any approval) will have serious negative consequences for this country and the industry. In the face of such regrettable decision, firms and investors understandably will have to consider deploying capital in more certain markets such as Europe and in fast growing markets such as Asia (by 2030, 51GW in China and 33 GW rest of APAC per 4C Offshore Global Market Overview Q2 2020).

Response to comments: Thank you for your comment.

Comment theme: Include Habitat Alternative as an Environmental Protection Measure (EPM).

Associated comments

Table I-123 provides the full list of comments received as part of this comment theme.

Table I-123. Include Habitat Alternative as an Environmental Protection Measure (EPM) comments.

Comment Number	Comment
338-3	While the Agencies’ detailed comments appended to this letter are supportive of appropriate offshore wind development in this project area, we would like to highlight the following key issues as these likely warrant further discussion and continued coordination: - NEPA Alternatives: The alternatives to the Proposed Action would benefit from additional detail to fully justify the anticipated magnitude of impact. For example, more explanation is needed to support the conclusion that the Vessel Transit Lane Alternative would not measurably decrease impacts when compared to the Proposed Alternative and in the cumulative impacts analysis, given that there would be fewer wind turbine generators installed. Likewise, it was challenging to evaluate the Fisheries Habitat Impact Minimization Alternative (“Habitat alternative”) because there was little mapping provided to identify exactly what complex finfish habitat may be avoided. The South Fork Wind Farm (SFWF) contains specialized and topographically distinct hard-bottom habitats, particularly Cox Ledge, that serve as important spawning sites and shelter areas for commercially and recreationally important species to New York (e.g., Atlantic cod, American lobster, black sea bass, longfin squid, monkfish). Further explanation is needed of why the Habitat alternative was not identified as an Environmental Protection Measure (EPM) to minimize impacts to complex finfish habitat within the SFWF (and other offshore wind facilities), instead of being discussed as a project alternative. In the absence of such information and given what an important part of the DEIS it represents, the Agencies recommend evaluation of whether minimizing impacts to complex finfish habitat can be considered as an EPM.

Comment Number	Comment
338-8	The Fisheries Habitat Impact Minimization Alternative ("Habitat alternative") should be an Environmental Protection Measure (EPM) to minimize impacts to complex finfish habitat, instead of being discussed as a project alternative. As the DEIS acknowledges, there are specialized and topographically distinct hard-bottom habitats found in the SFWF, particularly Cox Ledge, that serve as important spawning sites and shelter areas for commercially and recreationally important species to New York (e.g., Atlantic cod, American lobster, black sea bass, longfin squid, monkfish). Complex hard-bottom habitats do not recover as quickly from disturbances during construction like relocating substrate or habitat conversion, and measures that minimize long-term impacts to hard-bottomed substrates directly benefit the species that rely upon them. If protection of complex finfish habitat continues to be identified as a project alternative (not an EPM), then it is an alternative that must in some fashion be selected for every offshore wind project. Overall, it is very challenging to evaluate this alternative because there are no definitions and little mapping provided to identify exactly what is complex finfish habitat. The Agencies recommend the following updates as part of the FEIS: a. Eliminate Scenario A where wind turbine generators (WTGs) "are sited within and adjacent to complex habitat and micrositing would not reduce impacts to complex habitats." This appears to be identical to not selecting the alternative. Rather, the alternative should specify "not-to-exceed" thresholds to ensure project viability, such as identifying the maximum number WTGs that could be eliminated. b. Clarify how complex habitat areas would be prioritized for protection, in the event Scenario B is selected where there are more locations of complex habitats within the project area than can be fully avoided. At a minimum, larger contiguous areas of complex habitats should be prioritized for protection. Identify criteria that would be used to determine when micrositing alone is not sufficient to protect complex habitat and eliminating a WTG becomes necessary. c. Provide more explanation to justify how selecting the Habitat Alternative would not reduce impacts to habitats, fisheries, and commercial and for-hire fishing when compared to the Proposed Action. Cox Ledge is a very productive area for a variety of fish species. If the Proposed Action disturbs cod spawning habitat, it could lead to population level effects since their stock is already very low. Similar stock impacts could occur for species that use these habitats for sheltering. Fishing could realize indirect benefits if adopting the Habitat Alternative led to increased fishing access, as alluded to on p. 3-105.
284-2	The Nature Conservancy supports moving this Habitat Alternative through to the Final EIS. In doing so we assert that the comparison of the Habitat Alternative to the Proposed Action Alternative would be more complete if the FIES [sic] includes an analysis of the number and location of proposed foundation sites that BOEM believes have high potential to be in situations where foundation micro-siting options appear insufficient to avoid site-specific conflicts with complex fisheries habitat. It is our understanding that the developer has provided BOEM with the high-resolution geophysical information that could inform making such a preliminary assessment. However, we recommend incorporating the following qualifications prior to disqualifying an area for foundation installation based on the pre-construction presence of complex fish habitat. Depending on the characteristics of the complex fisheries habitat in question it may be possible to mitigate the potential impacts by recreating habitat of equal, or perhaps even greater value to the species/communities of concern in terms of size, configuration, and complexity of habitat structures within and adjacent to the specific foundation(s) through the use of Nature-Inclusive Designs of scour protection and/or other structures established around the specific foundation location(s) of concern. Mitigation of potential impacts to complex fish habitat through the use of Nature-Inclusive Design provides an opportunity where mitigation approaches have the potential to be employed at the exact site of impact, and where approaches have the potential to not only restore, but even enhance the habitat value of the area impacted. In the ocean environment there are few examples of this, but there is new research looking at how to maximize ecological value of offshore wind scour protection in the North Sea. The focus is on species "that need hiding places, shelter, feeding area or use the area as a nursery area and species that will profit from creating additional smaller and larger crevices", such as Atlantic cod, loligo squid, crab, lobster, and eastern oysters, all of which are of interest here in the Northeastern US. The general approach is to integrate objects like pipes, reef balls, cages and other space producing items into the standard scour protection to improve the beneficial impact that is described in the DEIS/SEIS for this structure. Another approach for enhancing ecological value of structures has been demonstrated by adjusting concrete mixes to increase species richness of encrusting organisms. The Nature Conservancy is currently working with Inspire Environmental on tailoring the Nature-Inclusive Design technical report and catalog recently produced by The Ministry of Agriculture, Nature, and Food Quality in the Netherlands to be relevant to conditions and marine communities in the US Atlantic offshore wind energy areas, and US-based materials suppliers. We expect this information to be available for review and use later in 2021. Should the Habitat Alternative be selected, we strongly encourage BOEM and its consultive agency partners at NOAA to explore the use of Nature-Inclusive Designs as a mitigation/enhancement option for potential fisheries habitat impacts after exploring micro-siting alternatives, but prior to eliminating an area for locating a foundation(s) or cable transit routes based on concerns for potential impacts to complex fish habitats.

Response to comments: The inclusion of this alternative for detailed analysis: 1) addresses some of the concerns voiced by resource agencies and members of the public during the scoping period; and 2) provides the decision-maker with a clearly articulated alternative that could minimize adverse effects to important environmental resources and existing ocean uses and compare and contrast environmental trade-offs among alternatives.

Section 3.4.2 and Appendix G of the FEIS have been updated to discuss the suggested mitigation in the form of nature inclusive designs.

The Council recommended establishing two small HMAs on Cox Ledge, closed to hydraulic clam dredges, and prohibiting ground cables on trawls fishing in the areas; however, that recommendation was disapproved (83 FR 15240).

Suggested New Alternatives

Comment theme: Reasonable range of alternatives.

Associated comments

Table I-124 provides the full list of comments received as part of this comment theme.

Table I-124. Reasonable range of alternatives comments.

Comment Number	Comment
362-1	Consideration of Additional Alternative Routes BOEM is required under NEPA to consider a reasonable range of alternatives that are practical and feasible, even if not the applicant's desired alternative. This obligation further requires consideration of potential alternatives that are similar to alternatives proposed by the applicant but that may be less impactful. As BOEM acknowledged, its statutory obligations under NEPA and its responsibilities under 43 U.S.C. § 1337(p)(4) and 30 C.F.R. § 585.621 require it to assess overall impacts, including those onshore, from the construction, operation, maintenance, and decommissioning of energy infrastructure. Importantly, the selection of the SFEC's landing site affects both offshore and onshore impacts. Here, the proposed landing site may yield the least expensive onshore route, but its environmental impacts are considerably greater than alternatives either rejected or not considered. BOEM's analysis of alternative routes for the SFEC in the DEIS was insufficient to support an adequate analysis of the Project's environmental impact. The DEIS's inadequate analysis cannot support the reasoned issuance of a ROD without additional review, because there are unanalyzed alternatives or modifications to existing alternatives that would create fewer impacts, both offshore and onshore, than either Deepwater Wind's preferred Beach Lane route or the original Hither Hills route considered in the DEIS. CPW has provided substantial information, conceptual engineering, and expert analysis on alternative landing sites and routes, including more detailed information than was provided in the Project's Construction and Operations Plan (COP). This information, resubmitted herein as Attachment B, should be expressly included and analyzed by BOEM in the EIS, even if it was not contained in the COP.
362-6	CPW generally supports development of OSW on the outer continental shelf and appreciates BOEM's careful attention to the environmental impacts of the SFWF and SFEC. But CPW also believes that further analysis will demonstrate that alternative landing sites and routing of the SFEC would have substantially less environmental impact than the proposed Beach Lane route. As such, approval of Deepwater Wind's COP as written does not satisfy NEPA's requirement to consider a reasonable range of alternatives. Additionally, the foreseeable cumulative impacts of additional OSW projects in the region warrants the inclusion in the EIS of an alternative that considers combined transmission. We would be happy to discuss our comments or our technical analysis in greater detail at your convenience.

Response to comments: BOEM is evaluating South Fork Wind's COP which is for the development of an up to 15 turbine offshore wind farm with two potential cable route landings and the potential impacts associated with their action. No decision will be made about the COP until after publication of the Final EIS. The reasons that BOEM did not consider additional landing sites or cable routes is explained in Table 2.1.5-1.

Comment theme: Modified Hither Hills Route alternative.

Associated comments

Table I-125 provides the full list of comments received as part of this comment theme.

Table I-125. Modified Hither Hills Route alternative comments.

Comment Number	Comment
362-3	Modified Hither Hills Route CPW has provided BOEM an in-depth analysis of a variation on the Hither Hills landing site that would reduce impacts well below those that would occur under the Deepwater Wind proposal. This analysis, which reflects information that CPW also presented in the New York State Article VII proceeding before the Public Service Commission, is included in Attachment B (and previously provided to BOEM by CPW). BOEM should consider this information and specifically analyze the impacts associated with this variant of the Hither Hills landing site. CPW prefers Deepwater Wind's proposed Hither Hills landing site to the Beach Lane landing site. However, BOEM correctly identified that—as configured—Deepwater Wind's proposal for the Hither Hills landing site could cause significant traffic disruptions, because Deepwater Wind proposed that the SFEC run along Montauk Highway and local roads for more than 11 miles, impeding access to local businesses and requiring at least 73 road crossings. By contrast, CPW's analysis demonstrates that these impacts are avoidable. Co-locating the buried transmission cable along the LIRR right-of-way, which already parallels existing transmission lines, would obviously result in fewer construction related impacts to the community. Indeed, offshore and onshore impacts of CPW's variant of the Hither Hills landing site would be substantially less than either of Deepwater Wind's proposed SFEC routes at Beach Lane or Hither Hills. CPW's variation on the Hither Hills route would use an alternative landing site at Hither Hills State Park, north of Highway 27, alongside the LIRR right-of-way. The SFEC would then run within the LIRR right-of-way for a distance of 9.7 miles to terminate at either the Buell Lane or East Hampton Substations. At Buell or East Hampton Substation, the voltage would be transformed with a point of interconnection established at the existing 69 kV East Hampton Substation bus. This route would involve no disruption to town roads, no construction in residential neighborhoods, and no interference with local businesses. As explained in further detail in Attachment B, CPW's proposed Hither Hills route would place the SFEC entirely within existing commercial rights-of-way. The sea-to-shore transition vault would be located underground, approximately 0.48 mile west of the Hither Hills State Park upper parking lot, on State-owned land in the unpaved area between the north side of Highway 27 and the south side of, and adjacent to, the LIRR right-of-way. This location is approximately 1,170 feet onshore from the mean high-water line. The SFEC would be installed using horizontal directional drilling (HDD) under the beach, under the western end of the Hither Hills State Park (where there are neither campsites nor other park facilities), and under Highway 27. From the transition vault, the cable would be buried within the LIRR right-of-way for approximately 10 miles, terminating at the adjacent Buell or East Hampton Substations. CPW's variation on the Hither Hills route would minimize offshore impacts, because it would reduce the amount of submarine cable by approximately 10.6 miles, relative to the Beach Lane alternative. Indeed, the DEIS recognizes that a cable landing at Hither Hills State Park not only reduces environmental impacts relative to Beach Lane but also reduces impacts to the fishing industry. See DEIS 3-84. CPW's variation on the Hither Hills route would also minimize onshore impacts. It would not involve disruption to any residential neighborhood and would eliminate community impacts associated with burying the SFEC under Town of East Hampton roads by burying 100% of the SFEC's overland route within the LIRR commercial right-of-way. And by placing the new equipment for stepping down the 138 kV voltage of the SFEC to 69kV adjacent to or within the Buell or East Hampton Substations—which currently have space available for new equipment—this proposal would eliminate the need to build a new substation adjacent to the East Hampton Substation bordering the Dune Alpin residential community. And this route would not present any undue challenges in securing necessary property rights: Deepwater Wind is already planning to secure access to the LIRR right-of-way for 2.1 miles of the SFEC's overland route from the proposed Beach Lane landing, and it is reasonable to believe LIRR might also be willing to provide access to a different portion of the same right-of-way.

Response to comments: BOEM is evaluating South Fork Wind's COP which is for the development of an up to 15 turbine offshore wind farm and the potential impacts associated with their action. BOEM defers the specifics of cable routes to the state.

Comment theme: Atlantic Avenue Route alternative.

Associated comments

Table I-126 provides the full list of comments received as part of this comment theme.

Table I-126. Atlantic Avenue Route alternative comments.

Comment Number	Comment
362-4	Atlantic Avenue Route CPW also provided BOEM with a detailed analysis of a potential route for the SFEC involving a landing site at Atlantic Avenue in Amagansett. This information, also presented in the Article VII proceeding, is included in Attachment B. This Atlantic Avenue route would present fewer community impacts than the Beach Lane route and would mitigate the safety concerns associated with constructing the landing vault within the narrow Beach Lane right-of-way. As explained further in Attachment B, CPW's proposed Atlantic Avenue alignment would start with a sea-to-shore transition vault situated within the Town-owned Atlantic Avenue right-of-way, just north of (but not within) the Town-owned Atlantic Avenue Beach parking lot. From there, the SFEC would proceed north under Atlantic Avenue for 0.7 miles to Highway 27, where it would run 0.1 miles to the north side of the existing LIRR right-of-way adjacent to the Amagansett Substation. The SFEC would then continue west for 4.2 miles within the LIRR right-of-way to the Buell or East Hampton Substation. Crossing under Atlantic Avenue Beach, Highway 27, and the LIRR tracks would be accomplished with HDD methods. The total overland cable length and construction methods would be similar to those Deepwater Wind has proposed for the Beach Lane route. BOEM did not present an adequate rationale for declining to analyze the impacts of the Atlantic Avenue landing site alternative in the DEIS. The DEIS states that BOEM considered the Atlantic Avenue landing site during its initial screening "but did not include the site in permitting documents because it was determined, based on was not possible." DEIS at 2-15. Both the Atlantic Avenue and Beach Lane routes would involve burying the SFEC under Town of East Hampton roadways and drilling the SFEC under the beach using HDD. It is reasonable to assume that the local government would consider providing the property rights required for the Atlantic Avenue alignment as it has for the longer stretch of roadway required to bury the SFEC along the Beach Lane route (2.0 miles of roadway for the Beach Lane route and 0.8 miles for the Atlantic Avenue route). CPW believes that Atlantic Avenue is a more suitable landing site than Beach Lane. Atlantic Avenue's wider right-of-way can better accommodate construction staging and provide a 20-foot wide emergency vehicle access lane without obstructing beach parking or turning capability. The Atlantic Avenue sea-to-shore transition vault would be easily contained within the paved section and compacted shoulders of Atlantic Avenue while easily accommodating vehicle and pedestrian traffic. Emergency vehicles and other traffic could turn around in the large municipal parking lot at the end of the avenue. Moreover, Deepwater Wind could adopt the same proposed construction mitigation techniques designed to contain impacts within the Beach Lane transition work area, and therefore avoid disruption of the protected environmental areas adjoining the Atlantic Avenue work area. By contrast, under the Beach Lane alternative, the HDD equipment setup for construction at the sea-to-shore transition vault would restrict vehicles and pedestrians to a dangerously narrow 10-foot wide access lane with no place to turn around large emergency response vehicles. Considering the available information regarding the Atlantic Avenue and the likelihood that a full analysis would find fewer environmental impacts than the Beach Lane route, BOEM should conduct a full analysis of this alternative cable route. Merely citing unexplained difficulties with obtaining property rights does not suffice for a reasoned dismissal of this alternative, when the property rights required from the Town are of the same kind but less extensive than those required for the Beach Lane route.

Comment Number	Comment
362-3	This letter provides an overview of CPW's most significant comments and concerns related to the DEIS. CPW's specific and technical comments are provided as an attachment to this letter (Attachment A). CPW is also formally submitting technical analysis of two alternative alignments for the SFEC— an alternative on-land route running from the Hither Hills State Park landing site and then along the LIRR right-of-way, and another running from a landing on Atlantic Avenue and then along the LIRR right-of-way—analyses that CPW previously provided to BOEM on December 8, 2020 (Attachment B). As explained further below and in Attachment A, the DEIS does not adequately consider these alternatives. The DEIS dismisses the Atlantic Avenue landing site without a sufficient factual basis and fails to consider alternate, lower-impact routes from the Hither Hills landing site to the East Hampton substation. The alternate, non-residential Hither Hills route is of particular interest because its selection would result in 11 fewer miles of ocean cable, thereby providing a concomitant reduction in offshore impacts. The revised Hither Hills routing and landing site would also be consistent with Ørsted's practice in its home country of Denmark of not landing export cables in residential areas. The DEIS also fails to consider the cumulative effects of reasonably foreseeable OSW development proceeding with project-specific radial transmission cables rather than consolidated, offshore transmission infrastructure. To address this shortcoming, BOEM should consider an additional alternative that at a minimum consolidates the transmission infrastructure required for SFWF and the neighboring Sunrise Wind project. CPW believes the depth and breadth of this information CPW has provided is more than sufficient to justify including in BOEM's environmental impact analysis the three alternatives described in this comment. Analysis of Additional Alternatives BOEM has a responsibility under NEPA to consider a reasonable range of alternatives that are practical and feasible, even if not the applicant's desired alternative. BOEM should consider additional alternative cable alignments, including alternative landing sites, before finalizing its environmental review and issuing a record of decision (ROD). Considering additional alternatives is particularly important in light of the growing controversy involving the SFEC's proposed Beach Lane landing site, as reflected in the State of New York's Article VII proceeding and local litigation involving the Town of East Hampton. Analysis of additional alternatives is also required in consideration of the significant 9,000 MW of OSW development expected along the New York State coast and the cumulative impacts associated with laying duplicative, parallel transmission infrastructure on the OCS and the siting of numerous cable landings on the New York State shoreline. Specifically, BOEM should consider the alternatives CPW has identified—(a) a Hither Hills landing with a different onshore cable alignment from the one proposed by Deepwater Wind and (b) an Atlantic Avenue landing site. CPW is formally resubmitting its technical analysis of these two other possible SFEC alignments, and that analysis shows that either of these alternatives would produce fewer onshore and offshore impacts than the Beach Lane route.

Response to comments: BOEM, through discussions with the developer, determined that the Atlantic Avenue cable landing location was not viable because the Town of East Hampton and the Trustees of East Hampton did not support this route, preventing South Fork Wind from securing the rights of way for the cable route.

Comment theme: On-shore renewable energy alternative.

Associated comments

Table I-127 provides the full list of comments received as part of this comment theme.

Table I-127. On-shore renewable energy alternative comments.

Comment Number	Comment
169-9	And here there is a clear alternative to the project, which is on-shore renewable energy.
169-13	The DEIS wholly ignores onshore solar as a replacement for the proposed action. That results in flawed conclusions that ongoing activities and future offshore activities will have a comparable adverse impact on finfish, invertebrates, and EFH. That conclusion makes little sense and is based upon the premise that if the proposed Project does not create the adverse impact, then someone else will, so the proposed Project is not really causing much of an impact. Such circular reasoning effectively negates the purpose of NEPA.
169-17	The DEIS fails to take a hard look at alternatives thus failing to comply with EPA's 404(b)(1) guidelines. The DEIS violates the Clean Water Act's ("CWA's") requirements by not taking a hard look—indeed not taking any look—at the proposed purpose of the Project being able to be accommodated by onshore renewable energy.

Comment Number	Comment
169-34	II.FAILURE TO TAKE A HARD LOOK AT ALTERNATIVES UNDER THE CLEAN WATER ACT—FAILURE TO COMPLY WITH EPA'S 404(B)(1) GUIDELINES. Section 404(a) of the CWA authorizes the Secretary of the Army, acting through the Army Corps of Engineers, to issue permits for the discharge of dredged or fill material into navigable waters “after notice and opportunity for public hearings.” 33 U.S.C. § 1344(a). In making permitting decisions, the Corps must follow a set of guidelines developed by the Environmental Protection Agency (“EPA”) in conjunction with the Secretary of the Army (the “404(b)(1) Guidelines” or “Guidelines”). See id. § 1344(b); Bersani v. EPA, 850 F.2d 36, 39 (2d Cir. 1988). These Guidelines prohibit the Corps from granting a Section 404 permit “if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences."" 40 C.F.R. § 230.10(a). The Corps' own regulations further require the Corps to conduct a public interest review for each proposed discharge, and prohibit the Corps from granting a permit that (1) would "not comply with [EPA's] 404(b)(1) [G]uidelines"" and/or (2) that would be ""contrary to the public interest." 33 C.F.R. § 320.4(a)(1). Under EPA's 404(b)(1) Guidelines, an alternative to the proposed discharge is practicable if it is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes." 40 C.F.R. § 230.10(a)(2). Alternatives need not be in locations that are presently owned by a permit applicant so long as they are otherwise practicable and could "reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity." Id.; accord Bersani, 850 F.2d at 39. “[P]racticable alternatives include, but are not limited to: (i) Activities which do not involve a discharge of dredged or fill material into the waters of the United States or ocean waters,” see 40 C.F.R. § 230.10(a)(1)(i), such as onshore renewable energy generation. The only energy supply alternative briefly mentioned is fossil-fuel plants [Footnote: “Because future offshore wind facilities would produce less GHG emissions than fossil fuel–powered generating facilities with similar capacities, the reduction in GHG emissions from the Proposed Action when combined with other future offshore wind projects (or avoidance of increased GHG emissions from equivalent fossil fuel–powered energy production) would result in long-term beneficial impacts…” DEIS, p. 3-94.], which lays the basis for the DEIS’ conclusions that the Project would result in climate and air quality benefits. Yet that logic lays bare the failure of BOEM to take a hard look at alternatives that do not have adverse aquatic consequences. There is no justification for limiting the consideration of alternatives to the strawman of a fossil-fuel plant, when the purpose is the delivery of renewable energy which can be accomplished by onshore facilities. The DEIS violates the CWA’s requirements by not taking a hard look—indeed not taking any look—at the proposed purpose of the Project being able to be accommodated by onshore renewable energy.

Response to comments: Thank you for your comment.

BOEM determined that it is reasonable to assume that if the proposed Project is not built, another project or projects would be constructed to meet mandates/demand. This allowed BOEM to assess the maximum-case scenario in terms of potential impacts and was used to frame the No Action Alternative. BOEM's obligation is to review the proposed Project as outlined in the COP as well as alternatives that meet the purpose and need. Additionally, before any decision is made on the applications before the USACE, the USACE will perform all reviews required under the statutory authorities governing its actions. These reviews will consider information in this final EIS.

Comment theme: Alternative placing excavated material on barges rather than sidecasting material.

Associated comments

Table I-128 provides the full list of comments received as part of this comment theme.

Table I-128. Alternative placing excavated material on barges rather than sidecasting material comment.

Comment Number	Comment
338-22	The DEIS lacks a discussion of the impacts from cofferdam excavation and the management of the excavated material. Section 2.1.1.3.2 states, "The cofferdam would be removed; excavated sediments placed in the immediate vicinity of the cofferdam would be allowed to disperse naturally." Alternatives such as placing excavated material on barges instead of sidecasting material should be discussed. As part of the ongoing NYS Article VII proceeding, Deepwater Wind South Fork (DWSF or "developer") has agreed to prohibit sidecasting during horizontal directional drilling (HDD) pit construction and require excavated material to be placed on a barge for potential reuse as backfill during the same construction season.

Response to comments: BOEM requires SFW to comply with all permits as part of the approval process. The FEIS is revised to say that materials will be placed on a barge for potential reuse as backfill during the same construction season.

Comment theme: Alternatives outside BOEM's authority or jurisdiction.

Associated comments

Table I-129 provides the full list of comments received as part of this comment theme.

Table I-129. Alternatives outside BOEM's authority or jurisdiction comments.

Comment Number	Comment
169-31	Under NEPA regulations, agencies must consider all reasonable alternatives, including those not specifically under their authority to implement. See 40 C.F.R. §1502.14; see also NRDC v. Morton, 458 F.2d 827 (D.C. Cir 1972) (explaining that it is the essence and thrust of NEPA that impact statements serve to gather in one place discussion of relative environmental impact of alternatives, and although alternatives required for discussion are those reasonably available, they should not be limited to measures which particular agency or official can adopt; when proposed action is integral part of coordinated plan to deal with broad problem, range of alternatives which must be evaluated is broadened). Thus, the failure to consider and take a hard look at onshore renewable generation resources because they would not require a permit within BOEM's or the cooperating agencies' jurisdiction is clear error.
172-2	Orsted/Eversource will construct Sunrise Wind, adjacent to the proposed South Fork Wind project. The sea cables could and should be combined, resulting in less sea bottom trenching. Orsted/Eversource states that is not possible because Sunrise Wind will have AC generating turbines while South Fork Wind would have DC generating turbines. As they are not built or installed yet, would it make sense to use the same power generating turbines and splice the cables at sea to run one cable to deliver the power? As a foot note, the BOEM study BOEMRE 2011-09 points out that DC Transmission cables generate higher EMFs, another good reason to use AC turbines instead of DC and combine the cables into one. South Fork Wind is stated to only supply power to Suffolk County. Thomas Falcone, CEO of LIPA has publicly stated in the news that the power can be transmitted west to the New York Grid. That means they can also transmit the power east.

Comment Number	Comment
362-6	Combined Transmission Alternative In connection with the cumulative impacts analysis described above, BOEM should incorporate a consolidated transmission infrastructure alternative into its NEPA analysis. At a minimum, this alternative should consider consolidated transmission infrastructure serving the energy transport needs of both SFWF and the Sunrise Wind project. The Sunrise Wind project is a much larger, proposed OSW generation project that is also being developed by Ørsted. Sunrise Wind is slated for an outer continental shelf lease area neighboring the SFWF lease area, and Sunrise Wind is also slated to connect to the Suffolk County, NY electrical grid, interconnecting at a major substation in Holbrook, NY. As CPW explained in its October 6, 2020 letter to BOEM, these commonalities make consolidated transmission a feasible alternative worthy of study in the EIS. Specifically, this analysis would allow BOEM to better assess the “cumulative impacts” that would result to the environment and community from continued permitting of project-specific generator tie-lines versus those that will occur with some level of planning and consolidation of transmission infrastructure. Since SFWF would feature the first ocean OSW transmission cable landing approved in New York State, it would set an important precedent for the state and the OSW industry. If the NEPA analysis for Deepwater Wind does not consider the potential environmental and other benefits of combined transmission infrastructure serving generation on known, proposed, adjoining OCS projects by the same developer, then there is the potential for cumulative impacts to grow substantially in the future on Long Island and along the Atlantic coast more broadly. Considering the significant environmental benefits of a consolidated transmission approach, BOEM should not dismiss this alternative solely because it would result in grid interconnection at a substation other than the East Hampton Substation. While CPW acknowledges that the 2015 request for proposals (RFP) from the Long Island Power Authority (LIPA) sought interconnection at the East Hampton Substation, the 2015 RFP should not dictate a limited approach to evaluating transmission options/alternatives. Energy efficiency measures, the integration of energy storage capability, and transmission reinforcements by LIPA on eastern Long Island have helped alleviate the short-term risk of electricity shortages on the South Fork that led to the LIPA RFP. Therefore, the urgency of bringing power directly to the South Fork is reduced from what it was in 2015. Moreover, LIPA is currently improving and enhancing transmission infrastructure that approaches East Hampton Substation from the west. These onshore transmission upgrades are necessary to ensure the ability to serve future peak demand on the eastern part of Long Island, given projected demand growth and the intermittent nature of offshore wind. With such infrastructure improvements, a combined transmission alternative that integrates both SFWF and Sunrise transmission lines and interconnects at the Holbrook Substation (or elsewhere in Suffolk County) is feasible and would serve the purpose and need identified in the DEIS. A primary objective of the 2015 RFP was LIPA’s desire to meet New York State energy planning goals for reducing carbon or for the development of renewable sources of supply. As proposed, SFWF will be an intermittent source of supply on a single export cable. Even with the proposed SFEC, LIPA must construct and electrically protect electric transmission infrastructure from west of East Hampton Substation to provide additional supply to support system demand if power is unavailable from SFWF at times during summer, peak load periods. Construction of this onshore transmission infrastructure is required to support LIPA system reliability even with SFWF power interconnected into the East Hampton Substation. New York carbon reduction and renewable development goals have also changed substantially since 2015, due in large part to passage of the 2019 Climate Leadership and Community Protection Act, which calls for 9,000 Mw of OSW generation to be developed for New York by 2035. Such development will have a substantial impact on the Long Island transmission system, with much of this power interconnecting at mid-island through bulk power import and export for efficient distribution within Long Island. The East Hampton Substation is not a part of that mid- and western-Long Island bulk power import or export consideration because of its location and relatively small size. However, as part of the development taking place from now through 2035, export from bulk power import stations on Long Island to the East Hampton Substation (and even to points further east) will be an essential aspect of LIPA’s future distribution planning.
362-5	BOEM should therefore consider a potential alternative in which the SFWF’s power is brought ashore via a combined transmission line that also services the Sunrise Wind project. SFWF and Sunrise Wind are geographically close, set for development on a similar timeline, share common ownership, and deliver power to the same onshore transmission owner, the Long Island Power Authority. Combining the export cable infrastructure from these two developments would significantly reduce both offshore and onshore impacts. This alternative is therefore worthy of BOEM’s detailed analysis as part of the NEPA process.

Response to comments: BOEM is evaluating South Fork Wind's COP which is for the development of an up to 15 turbine offshore wind farm and the potential impacts associated with their action. Combining of transmission projects is too speculative to be analyzed in this EIS.

Comment theme: Alternatives to mitigate for impacts to commercial fishing and fish stocks.

Associated comments

Table I-130 provides the full list of comments received as part of this comment theme.

Table I-130. Alternatives to mitigate for impacts to commercial fishing and fish stocks comment.

Comment Number	Comment
363-28	NEPA requires consideration of “Alternatives, which include the no action alternative; other reasonable courses of action; and mitigation measures (not in the proposed action)” within the scope of a DEIS. It must also indicate whether other NEPA documents are being or will be prepared that are related to but separate from the scope of the action under consideration. The DEIS contains almost a complete lack of such alternatives that constitute mitigation measures for impacts to commercial fishing and fish stocks (the notable exception being the transit lane alternative). Perplexingly, fisheries experts provided comments during previous phases of BOEM’s outreach on this project--including the Call for Information and scoping activities--suggesting mitigation measures for consideration. The vast majority of those substantive comments and mitigation recommendations do not appear in the DEIS. Some of these include: • New England Fishery Management Council: “Specifically, we ask that BOEM consider a robust range of alternatives related to turbine spacing and arrangement. Alternative cable routes also should be formally considered.” • NMFS GARFO: “[A]lternative locations within the lease area should be considered, particularly if such locations would minimize impacts to sensitive habitats and other marine resources. An evaluation that considers the most appropriate location for project siting within the lease area should be included. If alternative locations within the larger lease are not considered, it will be necessary to provide a detailed explanation and justification as to why...” • NMFS GARFO: “In addition to the proposed spacing alternatives outlined in the COP, the potential need for greater than one-mile spacing should be considered, particularly if such an alternative could minimize environmental impacts in the area.” • NMFS GARFO: “Modifications to cable installation and layout should also be evaluated as part of any turbine spacing alternative.” • NMFS GARFO: “The cable corridor alternative should be evaluated for … the extent of the route that allows for full cable burial to minimize permanent habitat impacts and potential interactions with fishing gear.” • Amagansett F.I.S.H.: “The BOEM should not move forward with any OSW project until such time that detailed site specific, project specific and species specific electromagnetic frequency studies have been accomplished as recommended by [prior BOEM] reports.” • East Hampton Fisheries Committee: “Compensate us for loss of income during construction and damage to fishing gear caused by construction and operation.” • East Hampton Fisheries Committee: “Allow a fisherman to have a seat on the committee for the purposes of being privy to all plans for expansion and having a voice to express the rights and needs of the fisheries.” • Massachusetts Lobstermen’s Association: “We strongly ask that more research be done on the impacts of the OSW turbines and the interaction with radar on the vessels.” • Long Island Commercial Fishing Association: “BOEM should analyze a percentage range of lost fishing grounds from requiring additional cement mats and other armoring options being placed on the ocean floor where the SFEC cable cannot be buried, and the subsequent economic losses for New York fishermen of varied gear types, with values that include lost terrain of up to 0-50% of the entirety of the SFEC cable route, due to the unexpected increases in cable armoring via concrete matting, concrete bags or rock by DWW throughout the SFEC corridor.” Other comments raised in prior communications regarding the SFWF project and BOEM’s approach to NEPA more generally are also absent from this DEIS. These include previous comments from RODA, other fishing interests, state and federal agencies on processes associated with the MA/RI WEA area identification and lease issuances, the Vineyard Wind DEIS and SEIS, BOEM’s 2015 Request for Feedback on the State of the Renewable Energy Industry, and others. As these are formal comments to BOEM regarding the proposed action or closely related activities, each are incorporated by reference. These scoping suggestions must be analyzed, or an explanation must be included as to why they have been rejected by BOEM.

Response to comments: SFW proposes a 1 nm X 1 nm spacing to align with all other future projects in the RI/MA lease areas in accordance with the recommendations in the USCG MARIPARS report. This alignment will allow for vessels to transit between the turbines. Greater spacing would result in a larger overall footprint for the project while producing the same amount of electricity.

BOEM is funding a study with the National Academy of Sciences to address the issue of vessel radar interference by offshore wind turbines. Impacts to vessel radar is discussed in Section 3.5.1.2.2 of the FEIS.

Comment theme: Alternative approaches to decommissioning.

Associated comments

Table I-131 provides the full list of comments received as part of this comment theme.

Table I-131. Alternative approaches to decommissioning comment.

Comment Number	Comment
364-5	Plans for assessing alternatives to, and alternative approaches for, decommissioning the project. The impact of decommissioning on the surrounding ecosystem should be the first and highest consideration.

Response to comments: Thank you for your comment. Detailed Project decommissioning impacts will be evaluated under a separate NEPA process at the end of the Project life cycle.

Effects Analysis (General)

Comment theme: Cox Ledge and landing site impacts.

Associated comments

Table I-132 provides the full list of comments received as part of this comment theme.

Table I-132. Cox Ledge and landing site impacts comment.

Comment Number	Comment
3-1	We are writing as 40-year residents of the hamlet of Wainscott in the Town of East Hampton to express our concerns about the viability of the South Fork Wind farm project. We are strongly in support of non-fossil fuels our home is partially solar powered and we drive an electric vehicle, however this project has not been adequately researched with respect to the wind turbines construction and location adjacent to Cox's Ledge and it's impact on the nearshore fish migratory patterns. Further, we don't feel that the proposed cable landing site at Beach Lane is the least environmentally impactful of the proposed alternate sites. Thank you for your consideration and recommendation for further study.

Response to comments: Thank you for your concern. BOEM recognizes that Cox Ledge is an important resource to both fish species and commercial and for-hire fishing ventures. The Applicant has conducted extensive sea floor modeling throughout the Lease Area, including Cox Ledge. This modeling represents best available science regarding EFH habitat, and is disclosed in the Final EIS in Section 3.4. Additionally, the EIS evaluates a range of project design options that include both the Beach Lane and Hither Hills landing site. Based on an evaluation of impacts disclosed in the EIS, BOEM may choose to restrict land site alternatives in the Record of Decision.

Comment theme: Terminology

Associated comments

Table I-133 provides the full list of comments received as part of this comment theme.

Table I-133. Terminology comment.

Comment Number	Comment
349-26	The DEIS should not use value-laden terms (e.g., “beneficial”) to describe changes in ecosystems or species. It should instead be objectively described as ecosystem change. For example, the DEIS states, “[S]tudies found increased biomass for benthic fish and invertebrates. This indicates that offshore wind farms could generate some beneficial impacts on local ecosystems.” Also, the IPF “increase in individuals or populations of species common to the Lease Area” is considered to be “beneficial.” While we agree that some offshore wind activities may result in a change in the ecosystem and, in some cases, an increase in the abundance of certain species or in overall diversity, we caution against the DEIS representing these changes as “beneficial.” This is especially the case because it is unclear what implications these changes may have on the wider ecosystem. We recommend that the DEIS remain objective in language used in its impact analysis (e.g., by using terminology such as “increase,” “decrease,” and “change”).

Response to comments: The EIS includes a detailed analysis of potential impacts and includes the use of the impact levels applied to the adverse and beneficial impacts as defined in 40 CFR 1508.8. The resource specific sections included information related to the magnitude, duration, geographic extent, and/or frequency of potential impacts, as appropriate, to support impact determinations. BOEM has reviewed impact determinations in response to public comments on the DEIS and has revised, as appropriate, within the FEIS.

Comment theme: Project benefits

Associated comments

Table I-134 provides the full list of comments received as part of this comment theme.

Table I-134. Project benefits comment.

Comment Number	Comment
301-5	SFW strongly agrees that offshore wind can provide the long-term benefits identified in Section 4.3 of the DEIS and believes the benefits of the South Fork Wind Farm (“SFWF”) and South Fork Export Cable (“SFEC”) collectively “the Project”) should be evaluated and considered as prominently as the evaluation of impacts. SFW suggests that BOEM expand the discussion of these positive findings and emphasize and balance those benefits in comparison to the impacts in the FEIS

Response to comments: The DEIS included a detailed analysis of potential impacts and included the use of the impact levels applied to the adverse and beneficial impacts. The resource specific sections included information related to the magnitude, duration, geographic extent, and/or frequency of potential impacts, as appropriate, to support impact determinations. BOEM has reviewed impact determinations in response to public comments on the DEIS and has revised, as appropriate, within the FEIS.

Comment theme: Direct versus cumulative effects.

Associated comments

Table I-135 provides the full list of comments received as part of this comment theme.

Table I-135. Direct versus cumulative effects comment.

Comment Number	Comment
166-4	Direct and cumulative impacts are described in a single narrative by alternative and resource in Chapter 3. This is a reasonable way to structure the analysis, but it is sometimes difficult to follow where the DEIS is describing a direct project effect vs. a cumulative effect.

Response to comments: Each resource section in the EIS contains a heading labelled Cumulative Impacts to help the reader understand when the EIS transitions from describing a direct/indirect effect to a cumulative effect for the Proposed Action and other action alternatives. For the No Action Alternative, each resource section contains a heading labelled Future Activities (without the Proposed Action) to help the reader understand when the EIS transitions from describing a direct/indirect effect to a cumulative effect.

Comment theme: Energy supply and cost analysis.

Associated comments

Table I-136 provides the full list of comments received as part of this comment theme.

Table I-136. Energy supply and cost analysis comments.

Comment Number	Comment
169-38	VI.THE IMPACTS OF THE PROJECT ARE OVERESTIMATED, INACCURATE, FLAWED AND INADEQUATELY ANALYZED. The DEIS assumes that taking no action on the Project would have, compared to approval, no net effects on various resource values or climate change. The preceding paragraphs of these comments have explained why that assumption is entirely inconsistent with economic theory, real market conditions, and past agency practices. Consequently, the DEIS presents a deeply inaccurate and misleading comparison of the approval options and No-Action Alternative. Similarly, the analysis of the No-Action Alternative regarding Air Quality is incorrect. The Project would be replaced with renewable energy projects located closer to the actual electrical load. Those projects would have the higher air quality benefits, and GHG and climate benefits compared to the South Fork project because they would be more efficient, and not create the warming created by the Project. See, Harvard Wind Study. The DEIS is riddled with over-assessments of the purported benefits of the Project. The DEIS must subtract from its calculation of the Project’s economic, energy supply and climate benefits, the lost benefits from all those onshore sources of renewable energy generation that would no longer be built. Once that is done, the Project may (and likely would) have a net negative impact on economics, climate benefits, fisheries, marine mammals, endangered species, commercial fishing, and all other resource values compared to its substitutes. The DEIS does not comply with NEPA because it fails to analyze those effects.

Comment Number	Comment
363-83	Several items and impacts that NEPA requires to be included in the DEIS are entirely missing. Some examples are provided here; others are raised elsewhere in these comments. However, even identifying whether certain analyses are present or absent was challenging due to the fact that the DEIS buries many important analyses (such as cumulative impacts) in appendices, and the docket is incomplete with regard to the project record. 1. Energy Analysis Perhaps the most noticeable information missing from the DEIS is any analysis of the electrical benefits of SFWF (or multiple projects in the cumulative activities scenario) and their relation to energy demands or the power grid. It is simply impossible to evaluate the extent of the environmental impacts, and the trade-offs with a potential public benefit, of the proposed action without a clear understanding of the power the project will realistically produce. This is clearly required by the NEPA regulations at 40 C.F.R. § 1502.16(a)(10) referenced above as an integral technical consideration of the project; without it, BOEM simply cannot make a reasoned decision amongst alternatives.
363-85	A sufficient energy analysis must also include considerations regarding transmission. Many OSW project plans are entirely contingent on extensive upgrades to onshore transmission systems; such upgrades have clear environmental, economic, and energy security impacts. BOEM should expand its analysis of the offshore cable transmission system, including the environmental costs and benefits of coordinated transmission.

Response to comments: Section 3.5.3.2.2 of the FEIS describes energy generation of future offshore wind activities under the No Action Alternative. Table 3.7-1 in Attachment 3 of Appendix E describes energy generation of future non-offshore wind activities under the No Action Alternative. Table 2.1.1-1 in Section 2.1.1 describes the potential electrical generation range of the proposed Project. A comprehensive forecast of impacts to energy supply and costs under the proposed Project and alternatives depends on numerous variables beyond the scope of the EIS.

Comment theme: Best available science and future studies.

Associated comments

Table I-137 provides the full list of comments received as part of this comment theme.

Table I-137. Best available science and future studies comments.

Comment Number	Comment
279-4	We urge both BOEM and the SFWF developers to work closely with ROSA to ensure that, as it becomes available, the best available science is brought to bear on decisions regarding the SFWF’s siting, construction, operation, and decommissioning. Where applicable, we at ASGA are available to assist both in the conducting of such research and in the dissemination of results to members of the recreational fishing community.
336-2	We have additional concerns that are too vast to go into detail about at this time. However, some larger topics that we think are critical for your consideration include a rigorous science-based compensatory mitigation plan, avoiding siting turbines on important habitat and protecting bottom habitat for fisheries, and improved analysis of environmental impacts including how planned development will alter the physical, ecological, economic, and social parameters of the environment.
171-4	There is little science to prove or disprove claims by both sides on the environmental impacts of wind farms-time to slow down and do an accurate study.
349-28	In this vein, as a general matter throughout the development and operation of offshore wind projects, BOEM should ensure the necessary research and monitoring is carried out to address the substantial uncertainties regarding offshore wind and wildlife interactions, for instance, interaction of seabirds, shorebirds, and migratory songbirds including nocturnal migrants with the turbines, potential turbine interactions of bats, many species of which are facing stressors on land that may make their populations more vulnerable to additional take. Based on this research, mitigation options may be needed to ensure species’ health and provide the certainty that will allow for further ramp up of the industry. Improved and sustained data compilation before and after construction as well as during operation would also advance understanding of species’ occurrence in the Project area and region. As the United States offshore wind industry moves forward, we recommend BOEM support the comprehensive analysis of these baseline data and ongoing data compilation and analyses and undertake a regional approach to data analysis to enhance collaboration across developers, scientists, managers, and other stakeholders.

Comment Number	Comment
349-29	Again, as a general matter, BOEM should also take immediate measures to address data uncertainty related to the influence of climate change on coastal and marine species and habitats (e.g., range shifts). While global climate change is acknowledged as a potential cumulative impact in the DEIS, this is not enough. BOEM should act expeditiously to obtain additional empirical data on current shifts in species and habitat distributions and work to improve its predictive modeling of future species distributions and factor this information into offshore wind project siting, construction, and operations to account for uncertainty related to climate-induced dynamic shifts in distribution (e.g., marine mammals, birds, forage fish, and sharks).
355-10	Thank you for taking the time to read our comments regarding South Fork's DEIS. I believe there is still more work to be done to be able to minimize the adverse effects on both the habitat and industry. None of these projects should be rushed. The times should be taken to make sure these projects are completed in the least invasive way.

Response to comments: The data used are the best available and reflect the state of the science at the time of publication of the EIS. BOEM continues to fund studies to address concerns raised in public comment and work closely with Cooperating Agencies during the NEPA process.

BOEM is committed to working with states, Tribes, and stakeholders on our shared ocean resources. All comments on the Draft EIS, including those from the fishing industry, were reviewed and incorporated in the FEIS, as deemed appropriate by BOEM. Additionally, Appendix G of the FEIS has been updated to include additional details, modifications, and/or additional mitigation and monitoring measures. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision.

Comment theme: Support for level of EIS analysis.

Associated comments

Table I-138 provides the full list of comments received as part of this comment theme.

Table I-138. Support for level of EIS analysis comments.

Comment Number	Comment
345-3	Overall, Mayflower recognizes that BOEM has made a thorough analysis in the DEIS of the potential environmental impacts associated with authorizing construction of the Project. By anticipating as reasonably foreseeable an eventual build out of the approximately 22 GW of offshore wind capacity under current state commitments for existing Atlantic leases, a build out that is far from certain and which approval of the Project in no way compels, the DEIS is consistent with, and arguably exceeds, the statutory and regulatory standards that guide the federal environmental impact review process. BOEM has analyzed the Vessel Transit Lane Alternative in substantive detail, obtained expert consultation, and subjected its review to fulsome public process. In this respect, BOEM has more than satisfied the "hard look" required under NEPA.
349-23	As organizations we are eager to see responsibly developed offshore wind power advance in the Atlantic and recognize that a carefully implemented project design envelope (PDE) approach could provide both environmental and economic benefits. Offshore wind energy technology and construction practices are evolving rapidly, and project design and planning takes years. A flexible permitting system that ensures developers can capitalize on new opportunities for environmental impact mitigation or cost reduction is beneficial for both the industry and wildlife. Project developers must not be discouraged from pursuing opportunities to take advantage of technologies and practices currently progressing through the research and development process that could help facilitate the increasingly responsible development of offshore wind energy.

Comment Number	Comment
	However, to ensure BOEM can perform a sufficient NEPA review of a project, a project's COP must provide enough specifics on each possible configuration covered by the proposed envelope to evaluate impacts on affected species and to fully evaluate the proposal. For example, it would be insufficient to simply identify the total number of turbines that might be built, because the timing of pile driving is also critical to evaluating noise-related impacts to marine mammals and other species. Additionally, to encompass the full range of reasonably foreseeable impacts, BOEM's analysis must include an alternative that combines the most disruptive components for each option included in the envelope. The design envelope alternative also cannot be conceived or analyzed so broadly that it impairs BOEM's duty to effectively "inform decision-makers and the public of the reasonable alternatives which would avoid or minimize impacts," as NEPA requires. We appreciate that the DEIS evaluates the potential impacts for each alternative using the maximum-case scenario. By definition, the maximum design scenario "focus[es] on the design parameters that represent the greatest potential impact to each resource [e.g., marine mammals, fish]." We caution, however, that care be taken to ensure that impacts resulting from eventual construction and operations fall within the maximum design scenario identified in this DEIS. If work entails impacts that extend beyond the full spectrum of this DEIS's maximum design assumptions, then a further supplemental environmental review could be necessary, which would negate the efficiency benefits of the PDE process.
360-5	Under NEPA, an agency must take a "hard look" at environmental impacts. Courts have made clear that an agency has taken such a look at the environmental impacts if the analysis contains "sufficient discussion of the relevant issues and opposing viewpoints" and the decision is "fully informed and well-considered." BOEM's analysis in the DEIS more than satisfies this requirement. BOEM analyzed both the direct and cumulative impacts of 18 different factors. Many of these factors were analyzed in consultation with the stakeholders for those resources. In the areas where BOEM did not have institutional expertise, it properly consulted with and incorporated studies from other agencies with "special expertise" and evaluated the environmental impacts in light of those studies. BOEM has therefore gone above and beyond its duty to take a "hard look" at the environmental consequences of South Fork.

Response to comments: Thank you for your comment.

Comment theme: Analysis ramifications for future projects.

Associated comments

Table I-139 provides the full list of comments received as part of this comment theme.

Table I-139. Analysis ramifications for future projects comments.

Comment Number	Comment
303-2	The DEIS has implications for all projects on the Outer Continental Shelf, which provide the basis for these comments. The Bureau's analysis in the DEIS illustrates clearly that turbine layout and vessel transit lane considerations are highly dependent on local practices, resources, conditions and users of ocean resources. It is evident these factors will vary by region and are key to determining the safest and most efficient transit approach relative to a region. The DMME encourages BOEM to make the significance of these kinds of project-specific distinctions clear and explicit in the DEIS, so that impact mitigations for the South Fork Wind development area are not perceived as the model to be followed by other states and regions.
303-3	The 1nm x 1nm layout assumptions may be appropriate for the certain wind energy areas, however, these assumptions should not be applied to WEA's absent project-specific consideration of local resources and conditions. These site-specific considerations should be the primary criteria for determining WEA turbine structure layout. We believe it is important that BOEM clearly articulate that any analysis done does not set the standard for use of 1nm x 1nm spacing.

Response to comments: Thank you for your comment.

Comment theme: Incomplete or unavailable information.

Associated comments

Table I-140 provides the full list of comments received as part of this comment theme.

Table I-140. Incomplete or unavailable information comments.

Comment Number	Comment
363-5	Improve documents created under the National Environmental Policy Act (NEPA) to incorporate better analysis and clearly identify information that is unknown;
337-3	I also think it is critical to complete improved analyses of environmental impacts and have clear identification of where research is incomplete or information is unavailable.
349-5	Additionally, under NEPA, BOEM must make every attempt to obtain and disclose data necessary to its analysis in order to provide a "full and fair discussion of significant environmental impacts." The simple assertion that no information or inadequate information exist will not suffice. Unless the costs of obtaining the information are exorbitant, NEPA requires that it be obtained. Agencies are further required to identify their methodologies, indicate when necessary information is incomplete or unavailable, acknowledge scientific disagreement and data gaps, and evaluate indeterminate adverse impacts based upon approaches or methods "generally accepted in the scientific community." Such requirements become acutely important in cases where, as here, so much about an activity's impacts depend on newly emerging science. Finally, NEPA does not permit agencies to "ignore available information that undermines their environmental impact conclusions."
349-27	BOEM should adopt a precautionary approach to account for fundamental gaps in our understanding of species and their behavioral responses and employ the best available scientific methods to monitor and, if necessary, design mitigation strategies. BOEM makes a conclusory statement that "BOEM has not identified any incomplete or unavailable information that is essential to a reasoned choice among alternatives." The DEIS is unclear as to how BOEM reached the conclusion regarding the adequacy of the information when a number of parameters key to carrying out an adequate impact assessment are lacking. We recommend BOEM take a more open approach to the appraisal of data gaps and uncertainties in the DEIS and carry that forward to the impact assessment.

Response to comments: Thank you for your comment. BOEM's EIS complies with the procedural and substantive requirements of NEPA. Appendix J noting incomplete or unavailable information is included in the Final EIS.

Comment theme: Consistency with Vineyard Wind EIS.

Associated comments

Table I-141 provides the full list of comments received as part of this comment theme.

Table I-141. Consistency with Vineyard Wind EIS comments.

Comment Number	Comment
363-17	There are an alarming number of ways in which the information provided to the public regarding the SFWF project does not provide a complete and sufficient record upon which to inform comment. Several of these are described in this section; others are raised throughout this comment submission as related to specific topics. 1. Inconsistent Federal Statements As a threshold issue, the information in the SFWF DEIS docket directly contradicts other information in the public record. These include: • On December 16th, BOEM published a notice in the Federal Register stating that the environmental review process for the Vineyard Wind project was terminated. BOEM's website now states that "Vineyard Wind had paused the Department's consideration of its proposal while it reviewed whether the use of Haliade-X turbines warranted any modifications to their COP" and it is proceeding with the development of a Final EIS. Putting aside questions as to the legality of this statement or the process BOEM claims to now be pursuing, these communications—and the current status of another large OSW project near the one proposed by SFWF—are so unclear as to prevent the public's ability to offer informed comment on this DEIS. • Statements occur in several instances throughout the DEIS that reference analysis done for the Vineyard Wind project and conclude that the impacts of SFWF would necessarily be similar or less due to its smaller size and geographic proximity. In reality, the Vineyard Wind project cannot be referenced as having a known or even predicted set of impacts as its federal review has been terminated without publication of any final documents that incorporated public comments. To repeat, no decision on the SFWF can be made on the basis of information contained in the Vineyard Wind SEIS, which was terminated before its finalization that would have incorporated public comments.
294-3	However, it does not appear that any substantial new analysis has been conducted since earlier versions considering the lack of analysis compared to the Vineyard Wind SEIS. To release a newer simplistic DEIS with less analysis of impacts to existing ocean users after previously releasing a more sophisticated DEIS/SEIS analysis is inappropriate. BOEM should complete a full and complete analysis as part of a new DEIS or SEIS.
380-25	Meghan Lapp: Thank you, my name is Meghan Lapp. I represent Seafreeze Limited and Seafreeze Shoreside, both commercial fishing companies in Narragansett, and we have three commercial fishing vessels. I understand that there are many New Yorkers who are supportive of this wind farm. But it's not in their backyard. This wind farm is actually off of Rhode Island, not New York. And our vessels will have to attempt to both go through and fish in the area, which will be impossible if it goes forward as planned. The, the South Fork Wind Farm DEIS basically, it does not contain any cumulative impact analysis. If you compare it to the Vineyard Wind SEIS, which did contain those cumulative impact analysis, as well as impacts on commercial fishing in a detailed manner. The South Fork Wind Farm DEIS falls far short of that analysis.

Response to comments: Thank you for your comment. The Final EIS for the Vineyard Wind project was published on March 12,2021 with a subsequent Record of Decision signed May 10, 2021. This EIS was reviewed to ensure consistency with the Vineyard Wind FEIS and that all references are accurate. The South Fork Wind Farm EIS Cumulative Activities Scenario is presented in Appendix E of the EIS and is based on the same BOEM 2019 study (National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf) as the Vineyard Wind EIS, and mirrors the Vineyard Wind Methodology for Assessing Cumulative Impacts.

The SFWF EIS complies with the procedural and substantive requirements of NEPA. Additionally, the Final EIS incorporates public comment provided during the Draft EIS comment period.

Comment theme: Sufficiency of Transit alternative analysis (general).

Associated comments

Table I-142 provides the full list of comments received as part of this comment theme.

Table I-142. Sufficiency of Transit alternative analysis (general) comments.

Comment Number	Comment
363-46	The transit lane alternative is analyzed inconsistently throughout the document in two manners. First, the cumulative effects analyses appear to presume (although it is not clear in every document section) that even if a 4 nm transit lane were included in the SFWF project approval, future projects would not contain any lanes. This is inconsistent with the proposal RODA submitted and with the clearly communicated consensus of the fishing industry. Second, sweeping statements regarding characterization of the alternative's impacts, and its comparison to other alternatives, are made without adequate support or any justification. These statements, and language within the DEIS, are so grievous as to fatally bias the information presented to the public.
363-44	Regrettably, and undermining the public's understanding of the importance of this alternative, the DEIS' analysis with respect to the transit lane alternative is grossly deficient in several regards. As with much of the rest of the document, it is replete with missing information, unfounded conclusions, and absent or incorrectly referenced citations.
338-7	The Vessel Transit Lane Alternative ("Transit alternative") analysis should include more information on why this alternative would not measurably decrease impacts when compared to the Proposed Alternative and in the cumulative impacts analysis. Presumably, the Transit Alternative would increase access and maneuverability within the Massachusetts/Rhode Island Wind Energy Area (MARI WEA), which could reduce impacts to commercial fishermen and lower workers within fishing communities. By requiring fewer monopile foundations and less scour protection, it seems reasonable to assume the alternative could also lead to decreased impacts to benthic habitat, Essential Fish Habitat (EFH), finfish, and invertebrates by reducing direct impacts to habitat during construction and reducing longer-term impacts from habitat conversion.
366-23	If the RODA Transit Vessel Lane Alternative (TVLA) is not put into action in the SFWF project, then it is reasonably assumed that other WEA developers will not implement additional traffic lanes, Thus this project will become precedent-setting for the remainder of the projects in RI-MA WEAs, and perhaps beyond. Major negative impact will be had by all commercial fishing businesses in New York that fish beyond the SFWF without the RODA-TVLA to access their fishing grounds. Loss of income to boats, loss of income to shoreside businesses, loss of productivity, increased expenses and decreased safety must all be analyzed thoroughly.
301-13	From an environmental standpoint, the incorporation of a vessel transit lane would have similar impacts and provide no additional benefit compared to the Proposed Action Alternative for all resources evaluated in the DEIS, as summarized in Table 2.3.1-1, Comparison of Impacts by Alternatives. There are nuances in these comparisons that BOEM should reconsider, specifically related to navigation conflicts and to interpretation of data related to exposed fishing revenue
363-52	The DEIS analysis of impacts to navigation and vessel traffic of the transit lane alternative is not even included in the main document, but included only in an appendix on pages H-96 & 97. It consists of 4 short paragraphs of analysis, with 2 more for conclusions. We urge BOEM and the public to review this section objectively and consider whether it adequately addresses this alternative and this topic of fundamental importance to the fishing fleet. Notably, BOEM concludes (without acknowledging any of the factors that provide rationale for the alternative) that the transit alternative would have similar impacts to the proposed alternative, both at a project-specific and cumulative impacts level. The language chosen by BOEM curiously slices its analysis two ways; at the project level, it is not rational to conclude that a project with ⅓ fewer turbines would have an equivalent safety impact. At the cumulative level, it cannot assume that removing ~5 out of the ~1000 turbines in the larger lease area amounts to a proverbial drop in the bucket. These faulty conclusions underscore the structural flaws and the lack of relevant analysis in the DEIS.

Response to comments: It is BOEM's position that the EIS complies with the procedural and substantive requirements of NEPA. The USCG is a cooperating agency for the FEIS and is the lead agency on navigational matters; therefore, BOEM relies on, and does not question, the USCG's expertise and analyses for purposes of informing the navigational impacts in the EIS. The FEIS has been updated, in appropriate sections, to reflect the Final MARIPARS results.

Comment theme: Sufficiency of EIS analysis (general).

Associated comments

Table I-143 provides the full list of comments received as part of this comment theme.

Table I-143. Sufficiency of EIS analysis (general) comments.

Comment Number	Comment
363-82	Substantial revisions must be made to this DEIS before the public can be expected to comment adequately. Due to an overall lack of quality analysis and multiple errors in the document, the information within the DEIS is insufficient for the public to understand what actions are being taken and what their impacts could be. We urge BOEM to fully consider all comments it receives regarding how to improve this DEIS to provide adequate NEPA and scientific analyses. Previous suggestions offered by fisheries experts such as NOAA Fisheries, the regional fishery management councils, fishermen and fishing businesses, and RODA regarding the Notice of Intent for this DEIS and the Vineyard Wind I project will also be informative for improving the document. We ask that BOEM revisit these documents and the recommendations therein.
372-3	In general, the analysis of impacts to marine resources presented in the DEIS should be strengthened with more support and context for conclusions. During our cooperating agency review, we identified areas requiring updated references or more supporting information; however, in some cases, those statements and information were removed from the document rather than updating the analysis. Many unsupported conclusory statements remain in the document; we expect that in the FEIS all conclusions regarding impacts will be well supported with a reasonable rationale and appropriate citations that reflect the best available scientific information. The FEIS must incorporate the best available information to ensure a more robust analysis and adequately support conclusions related to the anticipated level of impacts.
363-1	This DEIS comes before the public at a time of significant confusion and change in the U.S. approach to offshore wind energy (OSW) planning. The document itself is replete with errors including missing information, unmatched cross-references, conclusions unsupported by citations, analytical inconsistencies, and outdated facts. Its quality marks a significant step backward from the more detailed analysis contained in the Supplemental EIS for the Vineyard Wind project, which was released last summer but relegated to a state of great procedural uncertainty before public comments were incorporated.
294-1	The Notice of Availability states that the “DEIS analyzes reasonably foreseeable effects from the construction, operation and maintenance, and eventual decommissioning of up to 15 wind turbine generators, an offshore substation, inter-array cables in lease area OCS-A 0517, and the installation of an export cable from the lease area to Suffolk County, Long Island (collectively, the “Project”)”. We disagree. Several important aspects of impact to our business have gone unaddressed and unanalyzed by the document. Therefore, any analysis and mitigation discussions are incomplete.
144-1	With a project as significant as this Proposed Action it is necessary to have a good understanding of potential impacts and approaches to minimize those impacts early in the planning process. This Draft Environmental Impact Statement (DEIS) is an attempt to identify those impacts and how the Proposed Action will minimize them to the extent possible. There seem to be several instances where this document fails to provide sufficient detail or simply fails to assess certain potential impacts. These comments are provided as input to the decision making process relative to the DEIS but should not be taken as exhaustive in nature. These comments are based on examination of sections of the DEIS; additional issues may be discussed at a future date after further examination of this document that is approximately 600 pages in length.
322-1	THE DEIS DOES NOT ADEQUATELY DETAIL PROJECT ALTERNATIVES Section 1502.14 of the 1978 NEPA implementing regulations provides that the DEIS section on "alternatives including the proposed action" "is the heart of the environmental impact statement" and "should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public." Section 1502.14 further provides that "[i]n this [alternatives] section, agencies shall: (a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated. (b) Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits. (c) Include reasonable alternatives not within the jurisdiction of the lead agency. (d) Include the alternative of no action. (e) Identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference. (f) Include appropriate mitigation measures not already included in the proposed action or alternatives." The DEIS for the Project has incomplete information and analyses with respect to several Project alternatives, as set forth below. Wind Turbine Generators The DEIS assesses the potential impacts associated with the construction, operation, and decommissioning of up to 15 Wind Turbine Generators (WTGs), and possibly one offshore substation, on monopole foundations. Each foundation is proposed to be located within a "grid" pattern, whereby the foundations would be separated by one nautical mile (nm).

Comment Number	Comment
	The DEIS also discusses two project alternatives which may alter both the number and locations of WTGs. The Vessel Transit Lane alternative incorporates a four (4)-nm-wide transit lane through the wind farm lease area, in which no structures or other surface occupancy would be located. The Fisheries Habitat Impact Minimization alternative involves possible "micro-siting" of the WTG foundations so as to minimize the disturbances to complex fisheries habitats. A more specific identification of the reduction in WTGs due to these alternatives would facilitate a more detailed analysis of the beneficial or adverse impacts associated with each alternative.
380-26	Meghan Lapp: As well, the Vineyard Wind SEIS concluded that that there was no positive impact to climate change from that project, which proposed, I believe it's about 100 turbines, so the South Fork Wind Farm, which is smaller, is most certainly going to have no impact on climate change. So, then the question becomes, what is the cost-benefit analysis, and there is no cost-benefit analysis in the DEIS. The analysis is, is seriously lacking. It falls far short of the analysis that has already been previously released for a different project, so it doesn't make any sense that a newer DEIS has less analysis than a previous one, so. I would encourage BOEM to go back and to do a supplemental EIS for this project as well, because the DEIS is just seriously lacking.

Response to comments: Thank you for your comment. The analysis in the EIS represents the best available science and BOEM’s EIS complies with the procedural and substantive requirements of NEPA. All comments on the Draft EIS, including those from the fishing industry, were reviewed and incorporated in the FEIS, as deemed appropriate by BOEM. Table 2.1.5-1 of the EIS presents the alternatives considered but dismissed from detailed analysis and the rationale.

Neither the Vineyard Wind project nor the South Fork Wind Farm project alone would significantly impact climate change. The benefit mentioned in our analysis comes from the scenario in which the offshore wind project potentially replaces other non-renewable sources of energy. If increased power needs in the Project area were met by existing fossil fuel-dependent power generating facilities, more greenhouse gases would be emitted than if the same increased power needs were met by the Project. Thus, the scenario results in a beneficial impact to climate change. See Appendix H section 3.3.1 for additional assessment of Air Quality impacts.

Comment theme: Impact determinations (general).

Associated comments

Table I-144 provides the full list of comments received as part of this comment theme.

Table I-144. Impact determinations (general) comments.

Comment Number	Comment
372-2	In our review of the DEIS, we found several inconsistencies that should be addressed in the FEIS. As noted in our cooperating agency review comments, the full description of impacts, including directionality, time frame, and impact level, is inconsistently applied among resource sections in the document. Any mention of impacts within a resource section should clearly state directionality, time frame, and impact level. At a minimum, the paragraphs describing the conclusions reached for each alternative considered, where impacts are bolded, should clearly address each component, be supported by available information, and reflect the impact level categories defined in the DEIS.
166-3	We recognize that it is an editorial decision to specify magnitude but not direction for adverse impacts (vs. magnitude and direction for beneficial impacts); however, it would be helpful to reiterate this caveat at intervals throughout the text. In addition, BOEM should be careful when summarizing the effects of an alternative on a resource when a range of positive and negative outcomes are expected over different time frames due to a range of impact producing factors. This should be noted as a caveat wherever impacts are summarized.

Comment Number	Comment
166-2	It is essential to clearly identify the impacts of each alternative on each resource, and to compare impacts across alternatives. The table describing what constitutes negligible, minor, moderate, or major impacts across the different resources provides useful criteria for evaluating which level of impacts might be assigned under various circumstances (Table 3.1.1-1). However, based on the data presented, the impact levels estimated in Chapter 3 do not always seem to match these definitions. In addition, the overall impacts conclusions listed in Table 2.3.1-1 (Comparison of Impacts by Alternative) are the same for the proposed action and the transit and habitat alternatives. Even if the three alternatives do have the same magnitude of impacts (negligible, minor, moderate, or major), their relative impacts should be ranked for each resource. For example, as compared to the proposed action, will the habitat alternative result in less adverse impact to complex habitat, even if the impact magnitude of both alternatives is minor? Will the vessel transit alternative improve vessel navigation through the lease area? Clear comparisons among alternatives will improve the utility of the FEIS as a decision support tool, and importantly, such comparisons are required by 40 CFR 1502.14 which states that the document "…should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public." This is a significant shortcoming of the DEIS and makes it difficult to compare the alternatives.
349-25	The definitions of potential adverse and beneficial impact levels (i.e., negligible, minor, moderate, and major) includes language that provides minimal guidance on how impacts may be quantified. For example, adverse moderate and major impact levels in the DEIS include "notable and measurable" and "regional or population-level impact," respectively. In addition, the definitions of negative factors in the DEIS also include language that specifies "habitat" and "species common to the proposed Project area," which places the impact analyses in an ecosystem context instead of a species-by-species context. For example, "The extent and quality of local habitat for both special-status species and species common to the Lease area," and "The richness or abundance of local species common to the Lease Area." The terms "richness" and "abundance" are both quantifiable ecological terms that have been described in decades of ecological literature. More transparent information on how the level of an IPF is quantitatively or qualitatively assessed is still needed in the FEIS. As a general matter, the impact analysis should be undertaken in an objective, transparent, and, where possible, quantitative manner. In the absence of available data, BOEM should acknowledge that an IPF is indeterminate and that additional research is needed. Many of the criteria are also hard to measure (e.g., "Improvement in local ecosystem health"). BOEM should provide detail on how IPFs and associated criteria have been quantitatively or qualitatively measured in the FEIS.

Response to comments: Thank you for your comment. The DEIS included a detailed analysis of potential impacts and included the use of the impact levels applied to the adverse and beneficial impacts. The resource specific sections included information related to the magnitude, duration, geographic extent, and/or frequency of potential impacts, as appropriate, to support impact determinations. BOEM has reviewed impact determinations in response to public comments on the DEIS and has revised, as appropriate, within the FEIS.

Comment theme: Geographic analysis area definitions.

Associated comments

Table I-145 provides the full list of comments received as part of this comment theme.

Table I-145. Geographic analysis area definitions comment.

Comment Number	Comment
372-5	The area of analysis is unclear and inconsistent throughout the document and should be modified in the FEIS. While a geographic analysis area for each resource is defined and displayed in maps in Appendix E (which should be hyperlinked at the beginning of each resource chapter to orient the reader), there are still references to smaller areas in the analysis, such as the RI/MA Wind Energy Area (WEA) and New England/Mid Atlantic areas for wind leases, that lack a clear explanation as to why those areas are being discussed.

Response to comments: The geographic analysis areas presented in Appendix E of the DEIS are based on the locations that could be affected by the Proposed Action. Where applicable, other analysis areas are also discussed to provide additional context for current conditions and impacts associated with evaluated alternatives. BOEM has reviewed the discussions of geographic area within the FEIS and revised for clarity as appropriate.

Marine Mammals

Comment theme: HRG survey noise impacts.

Associated comments

Table I-146 provides the full list of comments received as part of this comment theme.

Table I-146. HRG survey noise impacts comments.

Comment Number	Comment
363-116	G&G survey noise impacts are also a primary concern. Without mitigation, certain types of G&G surveys could result in long-term, high-intensity impacts on marine mammals. The DEIS says that these effects “may include behavioral avoidance of the ensonified area and increased stress; temporary loss of hearing sensitivity; and permanent auditory injury depending on the type of sound source, distance from the source, and duration of exposure [to marine mammals].” However, once again, there is a poor justification for a lack of impacts. It is not a given that mitigation measures won’t result in adverse impacts to marine mammals, and BOEM should not treat them as matter of fact as stated in the DEIS. It is presumptive to almost guarantee that not a single right whale will be harmed during surveys, which is realistically not a claim that can or should be made.

Response to comments: The ESA biological assessment and MMPA IHA consider updated information about the potential use of HRG surveys during project construction. HRG surveys would not occur without appropriate mitigation measures. This updated information has been incorporated into the FEIS.

Comment theme: Cumulative impacts to the marine mammals from seismic surveys for oil and gas.

Associated comments

Table I-147 provides the full list of comments received as part of this comment theme.

Table I-147. Cumulative impacts to the marine mammals from seismic surveys for oil and gas comments.

Comment Number	Comment
349-13	The cumulative impact analysis in the DEIS largely glosses over the consideration of seismic surveys for oil and gas, failing to give these impacts adequate consideration. This is particularly relevant to the consideration of cumulative impacts to marine mammals and is discussed below in more detail.

Response to comments: At this point in time, BOEM does not anticipate any geophysical surveys in support of oil and gas exploration to occur along the Atlantic Coast (see final EIS, Appendix E).

Comment theme: 10 dB noise reduction.

Associated comments

Table I-148 provides the full list of comments received as part of this comment theme.

Table I-148. 10 dB noise reduction comment.

Comment Number	Comment
301-77	The FEIS should clarify the following: "..average of 10 dB re: 1 μPa noise attenuation across all frequencies," SFW is not committing to a 10 dB reduction across all frequencies. Rather, SFW is committing to meeting the acoustic ranges modeled with 10 dB broadband reduction. The actual attenuation may be more or less than 10 dB but will not exceed the thresholds at the modeled ranges.

Response to comments: This is clarified in the FEIS.

Comment theme: Editorial comments.

Associated comments

Table I-149 provides the full list of comments received as part of this comment theme.

Table I-149. Editorial comments.

Comment Number	Comment
301-81	The FEIS should revise the following: "….Risso's dolphins and pilot whales…." This is different from what is in the PSMMP. All dolphins are grouped together.
301-82	The FEIS should revise the following: "At all times of year that pile driving takes place, for purposes of monitoring the EZ, any large whale sighted by a PSO within 3,281 feet (1,000 m [a NARW EZ]) that cannot be identified to species must be treated as if it were a NARW. Additionally, a NARW observation at any distance from the pile must be treated as an observation within the EZ and trigger any required delays or shutdowns in pile installation." This entire section does not match with the modeled zones or with proposed zones described in the PSMMP. The NARW zones are the same size any time of the year. The FEIS should reflect information from Table 4 and Figure 3 in the PSMMP.
301-83	The FEIS should revise the following "..monitored at all times and be demarcated within the watch zone with effective distance-finding methods (e.g., reticle binoculars, range finding sticks, monitoring system software). The zones should reflect the calculated zones in the IHA and PSMMP.
301-84	The FEIS should revise the following: "At the beginning of each survey, active sparker and other sub-bottom profiling acoustic sound sources.." The zones should reflect the calculated zones in the IHA and PSMMP.
301-85	The FEIS should revise the following: "…200 kHz must…." 180 kHz was the frequency threshold listed previously.
301-86	There is a typo in Table G2 regarding NARW exclusion zones that states: the EZ must be extended from 3,281 feet (1,000 m) to 6,562 feet (21,578 m) for monopiles. This should be 2,000 m.

Response to comments: Thank you for your comment, the FEIS language is updated based on the biological opinion and IHA, and now reflects the calculated zones in the IHA and PSMMP.

Comment theme: NARW communication and listening range.

Associated comments

Table I-150 provides the full list of comments received as part of this comment theme.

Table I-150. NARW communication and listening range comment.

Comment Number	Comment
349-50	BOEM should conservatively assess the potential loss to the right whale of communication and listening range and assume that any substantial decrement will result in adverse impacts on the species' foraging, mating, or other vital behavior. A conservative approach is justified given the species' extreme vulnerability, where any additional stressor may potentially result in population-level impacts, and the difficulty in obtaining empirical data on population-level impacts on wild animals.

Response to comments: Project construction measures include timing restrictions to avoid NARW occurrence and therefore minimize exposure to related noise effects. The operation of the SFWF is unlikely to result in detectable underwater noise beyond a short distance from each foundation. The FEIS and IHA consider the potential effects on NARW "communication space" in this context and the potential for adverse behavioral impacts from noise.

Comment theme: Mitigation measure - PSOs.

Associated comments

Table I-151 provides the full list of comments received as part of this comment theme.

Table I-151. Mitigation measure – PSOs comments.

Comment Number	Comment
144-14	Geophysical survey vessel collision avoidance – Geophysical survey vessels are already operating in the area of SFWF and the proposed cable route. These vessels are already impacting the EFH of Cox Ledge with loud sounds and repeated passes through an area. There should be PSOs on every geophysical survey vessel to help avoid strikes of turtles and marine mammals and these PSOs should be using this time during ocean operation of geophysical survey vessels to begin collecting data on biological resources in the SFWF area.
144-13	PSO training – Since protected species observers (PSOs) will be tasked with determining when protected species are in the area and therefore the operation is required to be modified or stopped, a rigorous training of PSOs is necessary. This training may necessitate use of technology to enhance siting and identification of particular species.
326-1	Protected Species Observers (PSOs) are required to gather certain data fields. Some of these fields are date/time fields, and are specified in terms of HH:MM. Failure to require seconds (HH:MM:SS) will introduce significant error and ambiguity in a number of important ways, some of them with legal impact. These date/time fields should be specified as HH:MM:SS. 1. Over the course of a minute, a vessel going 10 kts can move ~300m. Rounding to the nearest minute is more than enough to cause significant error on take estimates in terms of calculating how far the animal was from a sound source at a given time. 2. Many mitigation situations - and subsequent take analysis - involve specific timing (e.g. shutdown within 30 seconds). Whether a vessel operator complied with the terms of their permit and the law cannot be determined if animal sightings (and subsequent mitigation actions) were only rounded to the minute. 3. Most PSOs already use automated electronic data gathering apps (on phone or PC) - these apps already collect to the second (YYYYMMDD HH:MM:SS). For PSOs gathering data on paper or in Excel, they should be required to have a cheap handheld GPS display correct time to the second. 4. PSO provider corporations are already required by law and permit to pay thousands of dollars every day for IR cameras and PAM equipment. They are also required to make significant - multiple thousands of dollars - singular purchases for each team, for safety suits, radios, etc.. Requiring a one-per-team purchase of approximately $100 GPS is not even a rounding error. 5. Failing that, PSOs themselves are each already required to spend hundreds of dollars for some of their own equipment, including reticle binoculars, inclinometers, etc. Requiring them to purchase a $100 GPS would not stray far from their normal budget (although it would of course be preferable to require the PSO provider corporation to supply it, as suggested in point 4)

Comment Number	Comment
	Summary: Recording PSO data by rounding to the nearest minute introduces significant errors in terms of take estimates, mitigation reporting, legal replay of data in the case of legal challenge, etc. This is not using the ""Best Available Science"" as specified in the Marine Mammal Protection Act (et. al.). All PSO temporal data should be recorded to the second (YYYYMMDD HH:MM:SS). This can be accomplished via either computer automation, or by reference to a cheap handheld GPS that provides accurate GPS time readout for all PSOs.

Response to comments: BOEM and NMFS are working together to refine the PSO fields. PSOs are required on each geophysical survey to implement mitigation measures including exclusion zones for marine mammals and turtles and vessel strike avoidance measures. While vessels may travel at speeds up to 10 knots while in transit, geophysical survey vessels with active sound sources in the water travel at speeds of 4-5 knots in order to collect the necessary data accurately. In addition, PSOs are collecting data on visual observations of protected species and reporting these observations to NMFS and BOEM in a final report at the conclusion of each survey.

NMFS sets minimum requirements for PSO eligibility. These includes education and specific PSO training and take into account previous experience as a PSO. Requirements are based on Baker et al. 2013. The applicant will be required to adhere to PSO standards as a condition of COP approval.

Comment theme: Grouping by taxa in the EIS.

Associated comments

Table I-152 provides the full list of comments received as part of this comment theme.

Table I-152. Grouping by taxa in the EIS comment.

Comment Number	Comment
372-12	The DEIS is constructed so that marine mammal and sea turtle impact determinations are inclusive of all marine mammal and sea turtle species, with only occasional instances where distinctions are made between species groups (e.g., low frequency vs. mid frequency citations). This broad grouping approach creates uncertainty and gaps in the analysis. As species within these taxa have different life histories, biology, hearing capabilities, behavioral patterns, distribution, etc., project effects may not have the same degree of impact across all species. Thus, in many instances, the conclusions (e.g., minor, moderate) would be clearer and better supported if the document described the degree of impacts to each species (e.g., green sea turtle vs. hawksbill) or groups of species (e.g., mysticetes, odontocetes, pinnipeds). For marine mammals, more data from European wind farms may help support each determination. This approach would also allow the analysis to better identify the ability of those species or groups to compensate when exposed to stressors, and better identify the benefit from mitigation and monitoring measures. This recommended approach would ensure the analysis reduces uncertainty and reflects the best available scientific information. We encourage you to consider adopting this approach in the FEIS. Also, wherever possible, we encourage you to identify effects to individuals (e.g., injury, behavioral disturbance, disrupted foraging), as well as impacts at the population level.

Response to comments: Thank you for your comment. Although the commenter is correct that life histories, biology, hearing capabilities, behavioral patterns, and distribution vary within taxa, the commenter has provided no data showing that taxa-level evaluation is insufficient to measure the effects of the Project or that species-level evaluation would lead to a meaningfully different analysis. Grouping species by taxa is an effective way to present a meaningful analysis. Per NEPA regulations 40 CFR 1502.2, an EIS should be analytic rather than encyclopedic and provides an appropriate level of detail to meet the disclosure requirements of NEPA. Species were grouped by their hearing ability, as is appropriate for the analysis of effects from sound. More detailed information may be found in the Biological Assessment and the Biological Opinion, as well as the Incidental Harassment Application and Authorization.

Comment theme: Construction timing.

Associated comments

Table I-153 provides the full list of comments received as part of this comment theme.

Table I-153. Construction timing comments.

Comment Number	Comment
365-1	Since time in memorial, the Northeastern Woodlands Indians, including the Indigenous Wampanoag Indian People have lived upon, traversed, encamped, hunted, fished, cultivated, gathered, gave thanks and interred our own, throughout our ancestral and cultural territories. The proposed location of the South Fork Wind Farm is part of this greater Wampanoag territory. Thousands of years ago, the ocean floor out to the edge of the Outer Congenital Shelf was open plain and where our ancient ancestors once lived. In the time that has followed, the waters have covered that ground, creating the ocean floor as we know it today. Our People continue to pass down our Oral History and Traditions to maintain our knowledge of place and stewardship in today's world. The Wampanoag Tribe of Gay Head (Aquinnah) (Tribe) is aware of all the challenges facing the world in terms of Climate Change; this is not the first time for any of us, but this is the first time humans have caused the problem. The Tribe is not against renewable energy and encourages new methods of combating and hopefully turning back some of the damage we have done to Mother Earth. In doing so, we must also take into account the cost of those methods by comparing, reviewing and ultimately deciding which method will be best serve our People, the fish and animals, the waters and Mother Earth. In that spirit, the Tribal Historic Preservation department of the Tribe offers the following comments on the South Fork Wind Farm and Export Cable Project located in lease area OCS-A 0517. Our first priority for is our family members, the critically endangered Northern Atlantic Right Whale (NARW). Last October, NOAA reported there are only 366 NARW left in the world and only a quarter of them are breeding females. If there is a loss of a few calves or breeding females, the species may not recover. There are four main reasons for decline of the NARW population: Vessel strikes, entanglements, ocean noise and climate change. There does not seem to be a large chance for entanglement and the reason for the project is to combat climate change. Therefore we must look at those things that can be managed: vessel strikes and ocean noise; both of these will be impacts created by the construction of the wind farm. Whales are seen around Martha's Vineyard all year round, and NARW are typically in the area during the spring, summer and early fall. We can write all the regulations and rules that we want, but the reality is we cannot control the whales, only the noise and the vessels can be controlled. As the whales are social animals and they communicate through song, becoming hearing impaired or deaf would have disastrous effects on a whale. We know from studies after 9/11, normal boating activity creates stress upon these mammals how much more would the construction of one or more wind farms create; they will most likely flee the area. In a cumulative effect or more than one wind farm, in more than one year, it will become a less than welcoming environment and they will be forced to leave the area for some time. The DEIS states there will be no construction during May through early September. however we ask that the no construction period be extended April through Mid- September.
363-119	Construction timing windows can be an effective tool for mitigation, that is, avoiding doing any work during critical times when the population of concern is present or likely to be within the area. However, the time-of-year restrictions to protect endangered marine mammals are confusing and inconsistent in the Mitigation and Monitoring sections. BOEM needs to explain how these measures were decided and/or provide justification for their selection.

Response to comments: Thank you for your comment. Project construction will only occur between May 1 and December 31. The (up to) 16 monopiles may take 20-30 days total for installation. If pile driving occurs during the month of May, enhanced mitigation measures will be in place. No construction will occur January 1 through April 30. These timing restrictions protect the NARW, a critically endangered species. The FEIS mitigation and monitoring sections have been updated and include additional timing restrictions required by NMFS in the project Biological Opinion and IHA.

Comment theme: Impacts to local fisherman and coastal communities.

Associated comments

Table I-154 provides the full list of comments received as part of this comment theme.

Table I-154. Impacts to local fisherman and coastal communities comments.

Comment Number	Comment
363-120	Subsequent negative impacts to local fishermen and coastal communities as a result of a potentially adverse impact to NARWs (e.g. vessel strike resulting in death or severe injury) are not mentioned or evaluated, and should be included in a comprehensive analysis. Both the NARW and Fin whale are known to be present within the proposed SFWF Project Area throughout the year, with the NARW presence classified as Common and the Fin whale classified as Regular in the DEIS, and numbers are particularly high from late winter through early fall. The lack of an adequate analysis of individual and cumulative impacts to these protected whale species is concerning, given that: • The injury or death of a single North Atlantic right whale could have population-level impacts. • The fishing industry, specifically Massachusetts lobstermen and gillnetters, are already highly restricted in their ability to harvest due to NARW protections. For instance, all MA state waters are closed to lobster gear from Feb. 1 - May 15th, with the exemption of waters south and southwest of the Cape. • Not only would serious injury or death of a single NARW be devastating to the whale population, it would result in highly negative impacts to fishermen through management action required under the Marine Mammal Protection Act.
172-3	The location and spacing of the turbines are in a sensitive marine habitat and fishing grounds. The fishing industry has repeatedly stated they cannot safely fish there with the layout that is being presented. It will require 7 to 10 hours of travel time to circumvent it, and then, only allow them to fish east to west, not north to south. The impact to the Right Whale and other sea mammals has not been properly investigated and any negative impact is not justified. The Right Whale is a critically endangered species and is protected (see links #2 and #3 below). Until South Fork Wind can prove that no harm will come to them, the project should NOT be allowed. Evidence throughout Great Britain and Europe has shown a significant increase in mortality rates where offshore wind turbine arrays have been built. The New York shoreline has seen an increase of whale beachings dating back to the installation and activation of the Block Island Wind Farm turbines. Link #4 below shows the travel route for the Humpback Whale, also running through the proposed South Fork Wind location.
380-33	Bonnie Brady: Also, the fact that there will be no analysis of potential impacts from disruption of North Atlantic right whale aerial monitoring programs, and no analysis for any incidental protected resource harm or mortality. I believe also regarding the cable route and the things that were spoken about, there's been zero input. We have had and tried for the project within state waters to be able to get anything as far as in a guarantee, as far as in depth, and we've gotten nothing. We've tried to work through the industry's Task Force and that hasn’t frankly worked at all. We're worried both about the potential job and economic losses and also directly, because we're displaced, and indirectly, because the biological species that could be affected by this. I have many more comments, which I will submit in writing. And I believe I’m right about the five-minute mark. I appreciate the time that you all are taking today. Thank you.

Response to comments: Thank you for your comment. The EIS fully considers potential impacts on commercial and recreational fisheries and on sensitive species like the ESA-listed North Atlantic right whale consistent with NEPA requirements. The FEIS incorporates NMFS concurrence on potential risks to these species and additional mitigation measures to avoid and minimize these risks.

Comment theme: Pile driving impacts on marine mammals.

Associated comments

Table I-155 provides the full list of comments received as part of this comment theme.

Table I-155. Pile driving impacts on marine mammals comments.

Comment Number	Comment
360-40	BOEM finds that project and cumulative impacts of construction pile driving on marine mammals (other than NARWs) would be “negligible to moderate,” with “moderate” effects being those from potential permanent threshold shift (PTS) for individual harbor porpoises, fin, humpback, and minke whales. The mitigation measures in place for NARWs include soft start, ramp-up, clearance, shutdown, and sound attenuation devices that will reduce sound and sound impacts for all species, including harbor porpoises, fin, humpback, and minke whales. Further, seasonal construction associated with NARWs will reduce impacts to humpback whales and harbor porpoises, as their peaks in the area mainly coincide with NARW peaks when pile driving will not occur. With respect to sound dampening mitigation, in Europe, studies have found that the bubble curtain configurations can reduce sound substantively. For example, one study in the German Bight found pile driving sound was attenuated between 7 and 10 dB with single bubble curtains and 12 dB for a double bubble curtain. A more recent study reported that Ørsted’s Borkum Riffgrund 1 offshore windfarm achieved sound reduction of 14 dB (SEL) and 16 dB (Lp, 0-pk) with an NMS-6900 system, with best performance around 1 kHz, where SEL was reduced by more than 30 dB. Low frequency attenuation is ideal for protection of baleen whales, and high frequency sound tends to attenuate naturally more quickly than low frequency sound. The same study reported that more advanced sound dampening systems designed for larger pile diameters are thought to be even more efficient. Recognizing there are some differences in local conditions, this still suggests a relatively significant sound reduction from sound dampening devices that would make PTS extremely unlikely for marine mammals, and it can be anticipated that other pile driving activities in the future will require such sound dampening, as it is common practice for offshore pile driving . The MMPA authorizations for a variety of large scale activities, like Atlantic seismic surveys throughout the Mid- and South Atlantic; pile-driving for liquified natural gas terminals and pipelines; and NMFS, National Ocean Service, Office of National Marine Sanctuaries, and U.S. Geological Survey geophysical activities (including seismic surveys) over extended areas and timeframes have been evaluated through Environmental Assessments and Findings of No Significant Impact throughout the U.S. EEZ as a result of permit requirements that reduce impacts to the required level of “negligible” to stocks and “small numbers” of marine mammals and meet ESA requirements. Although MMPA permits are being issued by project for foreseeable offshore wind farms in BOEM’s analysis area rather than as a programmatic action, the negligible impact and small numbers standards significantly limit the cumulative impacts that can result from multiple projects, and construction noise is addressed thoroughly through mitigation measures. It is reasonably foreseeable that all wind farm construction and operations will implement a sufficient combination of similar mitigation measures to achieve negligible impacts to marine mammals and small numbers of marine mammal harassments which should result in no more than minor impacts to these animals. Science and data confirm the availability of best practices for mitigation and limited impacts from pile driving. In addition, the available literature suggests that individual marine mammals will avoid disturbing levels of sound by swimming away from the sound source, with the duration of avoidance varying greatly, indicating that marine mammal responses to pile driving in the offshore environment will likely be context-dependent. Further, the threshold applied by NMFS for potential exposure to PTS is lower than actual PTS is likely to be, so more than that level of exposure would be required for actual PTS to occur. The South Fork Wind COP states that exposure estimates for impact pile driving (provided in their Appendix J1) show that potential for physiological-level acoustic exposures (potential PTS) are low even with no sound attenuation. With 10 dB sound attenuation, the South Fork Wind Farm COP states that all potential PTS exposures are estimated to be less than one individual for all 16 species evaluated except for one individual each of fin, minke, humpback, NARW, and harbor porpoise. The DEIS provides Table 3.4.4-5, which agrees with the COP, with the exception of estimating four potential humpback whale exposures and three potential harbor porpoise exposures. These exposure estimates do not account for all mitigation measures and behavioral avoidance of the area, which would further reduce the likelihood of PTS. Avoidance or even random movement may ultimately reduce the potential for this level of exposure given that all the estimated exposures for potential PTS for baleen whales are cumulative sound exposure estimates.
360-42	Although pile driving and seismic sounds are not identical in nature, they are both mainly low-frequency, pulsed sounds, and marine mammal aversion to them would likely have some similarity. If a factor of 0.2 were applied, only the four humpback whale and three harbor porpoise exposures would still be more than 0.5 and round up to one exposure. In Table 9 on pages 288 and 289 of the Gulf of Mexico ITR, mean annual Level A exposures after correction by a factor of 0.2 are 308 for Kogia (a high-frequency genera in that region), and NMFS was able to make a negligible impact determination for that genera, so just having Level A exposures does not automatically result in more than negligible impacts. Thus, the assumption by BOEM that take of one to four individuals of a species by PTS, if it were to occur, is a “moderate” impact is not an appropriate benchmark and overstates the effect, even at the cumulative level. Further, PTS is not equivalent to reduced fitness, and hearing loss occurs as a result of age and other factors in mammals, including marine mammals. Although mitigation would likely eliminate the potential for PTS of marine mammals during windfarm development and most other permitted offshore activities in the area of analysis, a few animals experiencing PTS does not constitute more than a minor effect.

Response to comments: Thank you for your comment. The FEIS has been updated consistent with findings and requirements of the IHA, which reflects NMFS analyses and concurrence with regard to potential effects on NARW and other cetaceans.

Comment theme: Marine mammal critical habitat.

Associated comments

Table I-156 provides the full list of comments received as part of this comment theme.

Table I-156. Marine mammal critical habitat comment.

Comment Number	Comment
163-10	The project area has also been identified as critical habitat for fin whales, sei whales, and sperm whales, all three of which are listed as endangered under the ESA and are protected under the MMPA.

Response to comments: Thank you for your comment. The FEIS includes fin, sei, and sperm whales as ESA-listed species in the analysis. No critical habitat has been established for these species.

Comment theme: Support for marine mammal analysis.

Associated comments

Table I-157 provides the full list of comments received as part of this comment theme.

Table I-157. Support for marine mammal analysis comments.

Comment Number	Comment
360-36	With respect to NARWs, we agree that the science and statutory requirements under MMPA support that there will be no more than a minor project and cumulative impact from the South Fork Wind Farm project on NARWs. BOEM may receive comments regarding various approaches to assessing population size and trends of right whales, and there are nuances to different models and assumptions and sources of error. We want to point to out to BOEM that, regardless of the specific population estimate that may be argued by different commenters based on the available literature, the question at hand is regarding the level of impact to that population, not the nuances of population estimation techniques.
360-38	BOEM's definition of minor states that "most impacts to species could be avoided with EMPs" and considers the "loss" of one or a few individuals when it does not affect the population as minor (depending on time of year and number of individuals involved). Most impacts to marine mammal species are avoided by mitigation measures required to reduce levels of impact to "negligible" and "small numbers" for every stock (not just species) of marine mammal potentially affected by the project. As noted by BOEM, increased foraging opportunities and removal of derelict gear from the area may benefit marine mammals, offsetting some potential adverse effects. BOEM states that "On balance, the presence of wind farm structures [including those from other wind farms]…would not adversely affect marine mammal populations." We agree that the science supports this assertion.

Comment Number	Comment
360-39	We agree with BOEM that the project and cumulative effects of offshore structures would be no more than negligible to minor on marine mammals. BOEM cites Tielmann and Carstensen, regarding long-term displacement of harbor porpoises from previously occupied habitats near a windfarm in the Baltic Sea, but population abundance of the two harbor porpoise populations in the Baltic Sea has been declining for over a century, mainly as a result of fisheries bycatch issues, and distribution shifts seasonally and annually across different areas of the Baltic Sea, making it difficult to determine if wind farm presence is an important variable in Teilmann and Carstensen's findings. Conversely, another study found a significant increase of 160% in the presence of harbor porpoise within an operating wind farm in the Dutch North Sea using acoustic detections, but in this case, the population of harbor porpoise in the region was known to be increasing. Another study found that algorithm ability to detect harbor porpoise clicks in acoustic recorder data is reduced when ambient sound is increased, further complicating the interpretation of studies that rely on acoustic detection to evaluate presence/absence. We suggest BOEM's interpretation of marine mammal increase or decrease in presence in studied windfarm areas be considered in the context of population shifts and variability in general to avoid overinterpretation of the data. Further, BOEM notes NMFS' statement that "based on simple assessment of spacing, it does not appear that the WTGs would be a barrier to the movement of any listed species through the area," and that interpretation would extend to non-listed species, which are typically smaller than baleen whales considered in NMFS' analysis.
360-43	"Given the factors described above and the mitigations that are described in the South Fork Wind COP and DEIS, it is highly unlikely that any marine mammals would experience PTS. Impacts to the few species called out (minke, fin, humpback whales and harbor porpoise) for both the project and cumulative effects would fit BOEM's definition of minor, as most impacts will be avoided with EPMs for the proposed action and future foreseeable actions. Because of the strict statutory requirements associated with marine mammals (and with ESA for listed marine mammals); the significant mitigation put into place for the purpose of protecting marine mammals both by BOEM and NMFS, including soft start, ramp-up, clearance, shutdowns, seasonal closures, and sound dampening devices for pile driving; the likely further reduction in sound impacts from aversion and context-dependent factors; and the continuous work of the project proponent and the offshore wind industry with stakeholder groups to ensure minimal impacts to marine mammals, most impacts to marine mammals, both by the Proposed Action and in accumulation, are avoided and we suggest that a maximum finding of minor impacts to marine mammals, both from the Proposed Action and cumulatively, is supported."

Response to comments: Thank you for your comment. The FEIS includes the best available information regarding potential impacts at an individual and population level. BOEM and NMFS work closely to ensure the best current population information is included in the FEIS.

BOEM and NMFS take a very conservative approach to estimating impacts. Additional mitigation measures required through the IHA and ESA processes may further reduce the potential for impacts to marine mammals.

Comment theme: Exposure estimates.

Associated comments

Table I-158 provides the full list of comments received as part of this comment theme.

Table I-158. Exposure estimates comment.

Comment Number	Comment
360-41	In the Gulf of Mexico Incidental Take Regulation for geophysical activities, including seismic sound sources, NMFS reduced PTS estimates (i.e., level A take estimates) by a factor of 0.2 to account for behavioral avoidance and stated the following: Ellison et al. (2016) modeled scenarios using animal movement models to evaluate predicted PTS in which no aversion was assumed relative to scenarios where reasonable assumptions were made about aversion, in line with historical response probability assumptions and that existing scientific literature suggest are appropriate. Scenarios where no aversion probability was used overestimated the potential for high levels of exposure required for PTS by about five times. Accordingly, total modeled injurious exposures calculated without accounting for behavioral aversion (for low- and high-frequency species) were multiplied by 0.2 as part of the EWG [Expert Working Group] risk analysis. NMFS consulted the EWG in selecting the specific offset factor, and discussed that selection again in context of the public comments received. The EWG—which is composed of some of the foremost scientists in the field of marine mammal behavioral response study, and includes the lead author of the Ellison et al. (2016) study—agreed that the approach and specific offset factor was a reasonable and likely conservative approach to addressing the issue of aversion…there is extensive information supporting the aversion concept in marine mammals, but limited quantitative data with which to develop precise, species-specific offset factors. Accordingly, utilizing the available data and expert input, NMFS applied its professional judgement in order to account for this meaningful phenomenon. This statement from NMFS suggests it may be appropriate to apply such a reduction factor to the estimates for pile driving sound for the South Fork Wind Farm, and we suggest that BOEM consider doing so.

Response to comments: Thank you for your comment. The FEIS reflects NMFS concurrence on exposure estimates presented in the IHA.

Comment theme: Underwater noise research.

Associated comments

Table I-159 provides the full list of comments received as part of this comment theme.

Table I-159. Underwater noise research comment.

Comment Number	Comment
364-8	Save the Sound appreciates that special attention has been paid to develop recommendations to protect the North Atlantic right whale, one of the world's most endangered species, from the risk of excessive underwater sound and collision with vessels. It appears, however, that much work is yet to be done with respect to the impact of underwater sound on this species, and we recommend ongoing research into these impacts to inform this and other projects.

Response to comments: Thank you for your comment. While the FEIS incorporates the best available information, BOEM supports additional research into the impacts of underwater noise. BOEM has a robust studies program that has supported multiple studies on the impacts of underwater noise to whales and other species. Information about ongoing studies and the results of completed studies can be found here: https://www.boem.gov/environment/environmental-studies/esp-data-and-information-systems

Comment theme: Potential Project impacts on hydrodynamics and oceanographic and atmospheric conditions.

Associated comments

Table I-160 provides the full list of comments received as part of this comment theme.

Table I-160. Potential Project impacts on hydrodynamics and oceanographic and atmospheric conditions comment.

Comment Number	Comment
372-13	We recommend a more thorough analysis of the potential impacts of the South Fork Project and the full build-out/cumulative offshore wind scenario on hydrodynamics and oceanographic and atmospheric conditions. As described in the DEIS, the characterization of the potential impacts of structures is misleading or inappropriate in a number of ways. We recognize there is uncertainty regarding the scope and scale of impacts that may result from the introduction of new structures into the offshore environment and related energy extraction from the wind turbines; however, it is critical that this issue is thoroughly addressed and that the FEIS considers the best available scientific information to support any conclusions regarding these impacts. In particular, the FEIS should contain a more robust assessment of the potential effects of both the South Fork project and the full build-out scenario on prey resources for North Atlantic right whales. We are available to meet with you to discuss this issue and provide support for enhancing this analysis in the FEIS.

Response to comments: Thank you for your recommendation. Further details have been incorporated into the FEIS.

Comment theme: Guidelines on noise thresholds.

Associated comments

Table I-161 provides the full list of comments received as part of this comment theme.

Table I-161. Guidelines on noise thresholds comment.

Comment Number	Comment
349-52	As a general matter and distinct from this particular DEIS, in determining the potential impact of noise from geophysical surveys, and construction and operations activities, BOEM should request new guidelines on thresholds for marine mammal behavioral disturbance from NMFS that are sufficiently protective and consistent with the best available science. Multiple marine species have been observed to exhibit strong, and in some cases lethal, behavioral reactions to sound levels well below the 160 dB threshold defined by NMFS for Level B take, leading to calls from the scientific community for the Agency to revise its guidelines. Acceptance of the current NMFS' acoustic threshold for Level B take will result in BOEM's significant underestimation the impacts to marine mammals and potentially the permitting, recommendation, or prescription of ineffective mitigation measures (e.g., under-protective exclusion zones).

Response to comments: Thank you for your recommendation. The FEIS considers current NMFS guidance for evaluating noise effects on marine mammals. This includes the 120 dB RMS threshold for behavioral and auditory masking effects from non-impulsive noise sources.

Comment theme: Marine mammal studies and monitoring.

Associated comments

Table I-162 provides the full list of comments received as part of this comment theme.

Table I-162. Marine mammal studies and monitoring comments.

Comment Number	Comment
349-41	As a general matter, integration of local data sources, including opportunistic sightings data, that collect fine-scale information on factors driving marine mammal distribution with those gathered through systematic broad-scale surveys better reflecting current marine mammal presence, abundance, and density, will provide a more accurate impact assessment. BOEM must take steps now, in coordination with NOAA, to develop a dataset that more accurately reflects marine mammal presence for future environmental impact statements and other work.
349-48	Given the acute vulnerability of the North Atlantic right whale, it is essential that, at a minimum, BOEM conduct a technical, quantitative analysis of the cumulative impacts of offshore wind development, against a baseline of other reasonably foreseeable actions, on the North Atlantic right whale population. This analysis should be incorporated into the agency's NEPA compliance documents. We note that the analyses proposed below is also relevant for other species of large whale found within the Geographic Analysis Area. We recommend that the analysis quantify the percentage of the North Atlantic right whale population potentially exposed to conceivable impacts from offshore wind development on an annual basis and, as a worse-case scenario, the potential impact on population viability of a permanent loss of foraging and other habitat within all lease areas expected to be developed. The analysis should also examine the additional energetic expenditure experienced if right whales were to avoid all lease areas expected to be developed during their migration. This is particularly important in light of new scientific information indicating the need for North Atlantic right whales to undertake efficient and uninterrupted foraging in order to maintain their energy budget. The energetic implications for displacement of pregnant females during their southern migration (e.g., offshore into the Gulf Stream) should also be taken into consideration.
349-47	BOEM acknowledges the potential hazards of physical structures in water column to marine mammals in the DEIS, including habitat displacement stemming from the physical alteration of the environment or indirect effects on preferred prey. We recommend BOEM take a precautionary approach and acknowledge that it is not possible to assess all of these potential impacts at the current time and commit to an explicit monitoring plan that will allow for future assessment (i.e., pre-, during-, and post-construction monitoring). The report, "A framework for studying the effects of offshore wind development on marine mammals and turtles," outlines detailed recommendations for monitoring the potential impacts of offshore wind on marine mammals, including long-term avoidance/displacement, by the top scientists and experts working in this field. It is vital that we gain an understanding of baseline environmental conditions prior to large-scale offshore wind development in the United States. To this end, BOEM must establish and fund a robust, long-term scientific plan to monitor for effects of offshore wind development on marine mammals before the first large-scale commercial projects are constructed. Without this in place, we risk losing the ability to detect and understand potential impacts and set an under-protective precedent for future offshore wind development.

Response to comments: Thank you for your recommendation. The FEIS considers the best available data and information for the proposed action and cumulative effects consistent with NEPA requirements.

In addition to BOEM studies like the Real-time Opportunity for Development Environmental Observations (RODEO), BOEM is working closely with NMFS, developers and other scientists to develop appropriate pre-, during, and post- construction monitoring efforts. The results of these efforts will inform future decision-making. BOEM will consider funding additional monitoring efforts and assessment tools as needed to support future planning efforts.

Comment theme: Sound sources.

Associated comments

Table I-163 provides the full list of comments received as part of this comment theme.

Table I-163. Sound sources comment.

Comment Number	Comment
372-14	Throughout the DEIS, several sound sources are not described accurately. The FEIS should accurately describe the nature of the sound sources in question throughout the document. We suggest updating the description of sound sources in the FEIS such that there is accurate agreement between the proposed Incidental Harassment Authorization (IHA) and the FEIS, as this is fundamental to presenting the analysis of acoustic impacts of construction activities on marine mammals.

Response to comments: Thank you for your recommendation. The FEIS has been updated to incorporate information from the IHA and Biological Opinion.

Comment theme: Marine mammal and sea turtle significance criteria.

Associated comments

Table I-164 provides the full list of comments received as part of this comment theme.

Table I-164. Marine mammal and sea turtle significance criteria comments.

Comment Number	Comment
372-11	We are concerned with the specific definitions of the significance criteria used for the analysis of impacts to marine mammals and sea turtles. The document includes unique definitions of significance criteria for marine mammals and sea turtles described in Table 3.4.4-3. As defined in the DEIS, it is difficult to identify a meaningful difference between minor and moderate impacts. This distinction is further confused by the consideration of often undefined mitigation measures that “could” reduce impacts. We urge you to consider alternate definitions of significance criteria for sea turtles and marine mammals in the FEIS that would allow for clear and meaningful distinctions between the criteria. An example of such definitions would be those used in BOEM’s 2014 Atlantic Geophysical and Geotechnical Programmatic EIS. In short, the document’s analysis identifies impacts that are real and meaningful; impacts that greatly exceed de minimis or negligible levels. The document’s conclusory findings, however, appear to minimize these clearly stated impacts in the labeling it uses. We recommend that your impact assessment conclusions be labeled in such a way that more consistently follows your impact analysis.
360-35	In the South Fork Wind Farm DEIS, BOEM determined that the cumulative impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in negligible to moderate cumulative impacts on marine mammals with moderate effects specifically for fin, minke, and humpback whales and harbor porpoises . BOEM found that cumulative impacts for sea turtles would be negligible to moderate and that cumulative impacts to NARWs would be minor. BOEM found that project level impacts to marine mammals would be negligible to moderate, with moderate effects specifically for fin, minke, and humpback whales and harbor porpoises and would be no more than minor to sea turtles and NARWs. Moderate impact findings were driven by pile driving sound for project and cumulative effects on marine mammals and increased vessel traffic for cumulative effects on sea turtles. The differences between minor and moderate impacts as defined by BOEM are slight, but BOEM should further consider the significant amount of directed mitigation and the findings requirements associated with the Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) in making impact determinations that rise above “minor” for marine mammals and sea turtles. Findings for marine mammals and sea turtles should be based on similar reasoning to the finding of minor impacts to NARWs. In order to make a “no jeopardy” finding, the Biological Opinion associated with the action must consider cumulative impacts in that finding, further reducing potential for impacts to species covered under this law.

Response to comments: Thank you for your recommendation. BOEM has refined the impact criteria for this resource group and will incorporate additional details for each alternative commensurate with NEPA requirements. BOEM acknowledges that additional mitigation measures required as a condition of ESA and MMPA compliance may further reduce potential impacts, and additional information from the Biological Opinion and IHA have been incorporated into the final FEIS.

Comment theme: Marine mammal distribution and abundance.

Associated comments

Table I-165 provides the full list of comments received as part of this comment theme.

Table I-165. Marine mammal distribution and abundance comment.

Comment Number	Comment
349-38	At least 13 species of cetaceans, including seven large and six small cetaceans, and four species of pinnipeds are known to regularly occur in and around the "area of direct effects" and are included in the impact analysis in the DEIS. Of the seven large whale species, five (North Atlantic right whale, fin whale, sei whale, blue whale, and sperm whale) are listed as endangered under the ESA, and as depleted and strategic stocks under the Marine Mammal Protection Act (MMPA). As the agency is aware, the conservation status of the North Atlantic right whale rests on a knife-edge. In October 2020, NMFS declared that since 2011, approximately 218 right whales died from fishing gear entanglements and vessel strikes— "a rate of roughly 24 whale deaths per year." NMFS also stated that the agency's preliminary estimate of the number of right whales alive in January 2019 is 366 right whales, and that it preliminarily revised its original estimate of the number of right whales alive in January 2018 from 412 down to 383 individuals. The agency noted that while it had anticipated the continuation of the population decline that began in 2011, the preliminary population estimate for the beginning of 2019 and the preliminarily revised population estimate for the beginning of 2018 are lower than expected because of updated photo-identification data and the worse-than-expected impact of the ongoing Unusual Mortality Event (UME). NMFS also stated that fewer than 94 breeding females remain. Scientists from the New England Aquarium subsequently released a new population estimate of just 356 individuals at the end of 2019. Additionally, these scientists now believe there are roughly 70 breeding females in the population and that low birth rates coupled with whale deaths "means that there could be no females left in the next 10 to 20 years." Since 2010, North Atlantic right whale distribution and habitat use has shifted in response to climate change-driven shifts in prey availability. Best available scientific information, including aerial surveys, acoustic detections, photo-identification data, stranding data, a series of Dynamic Management Areas (DMAs) declared by NMFS pursuant to ship strike rule, and prey data, indicate that North Atlantic right whales now rely heavily on the waters within, and in the vicinity of, the Project Area year-round. In January 2019, an aggregation representing a quarter of the population—100 whales—was seen south of Nantucket engaged in both foraging and social activities. During aerial surveys conducted in the RI and RI/MA WEAs in 2018 and 2019, New England Aquarium scientists identified 92 unique individuals. These observations demonstrate that the area may host roughly a third of the remaining population each year. In addition, eleven out of fifteen newly catalogued whales identified south of Cape Cod have never been sighted in waters further north in the Bay of Fundy or the Gulf of St. Lawrence, suggesting the area may now represent an end-point for the northern migration for a portion of the species. A recent NMFS Technical Memorandum authored by the agency's North Atlantic right whale "Expert Working Group" echoed these observations describes the area "South of the Islands" as "core" North Atlantic right whale foraging habitat during "Winter/Spring/Summer/Fall." Right whales should therefore be expected to be present in the Project area year-round. Inter-annual and inter-seasonal variability in aerial and acoustic detections imply that there are no clear spatial patterns of habitat use across the RI and RI/MA WEAs and right whales should be expected to be encountered equally across the region. Across the year, elevated relative densities of North Atlantic right whales occur from December through the end of April.

Response to comments: Thank you for your summary. BOEM and NMFS continue to work together to use the best available information to determine appropriate mitigation measures, such as vessel speed restrictions and limiting the season during which pile driving can occur.

Comment theme: Pile driving estimates.

Associated comments

Table I-166 provides the full list of comments received as part of this comment theme.

Table I-166. Pile driving estimates comment.

Comment Number	Comment
166-21	On page 3-53 the DEIS indicates that due to ‘difficult substrate conditions’ pile driving at some turbine locations could take longer than the expected installation time of two hours. Given the amount of hard bottom at the South Fork site, some additional exploration of this issue in the FEIS would be helpful. In addition, the two-hour estimate mentioned in the proposed action section differs from the 4-6 hours mentioned on page 3-46 (No Action/Future Activities section).

Response to comments: SFW has provided refined estimates for pile driving requirements. These estimates are considered in the impact analyses presented in the ESA and MMPA consultations and are incorporated into the FEIS.

Comment theme: Consistency with the MMPA.

Associated comments

Table I-167 provides the full list of comments received as part of this comment theme.

Table I-167. Consistency with the MMPA comments.

Comment Number	Comment
169-6	The Project does not meet the criteria for an incidental take authorization under the Marine Mammal Protection Act (“MMPA”).[...]The MMPA prohibits the proposed action.
169-41	VIII.TAKE UNDER THE MMPA IS NOT AUTHORIZED. An IHA is appropriate if the proposed action would result in harassment only (i.e., injury or disturbance) and is not planned for multiple years. A LOA is required if the actions will result in harassment only (i.e., injury or disturbance) AND is planned for multiple years. An IHA is inappropriate for multiple reasons. First, the proposed action will certainly require more than 1 year for construction. Second, the warming caused by the Project itself will constitute ongoing take for the life of the Project. Third, the occurrence of a category 3 or greater hurricane that is virtually certain to occur during the 30-year assumed operating period exceeds the WTGs survival speed. Prior reported incidences of cyclones exceeding a WTGs survival speed have resulted in a “twisted wreckage.” See, e.g., “Cyclone winds exceeded survival margins,” https://www.windpowermonthly.com/article/957297/cyclone-winds-exceeded-survival-margins. In addition to the hurricane-force wind, the turbine’s foundation would be contending with large, powerful waves at the same time. Take that occurs from such an event that is virtually certain to occur is intentional and not accidental. Furthermore, the twisted wreckage of the WTGs from such an event have the likely potential to result in an oil spill the size of Exxon Valdez’s causing serious injury or mortality to marine mammals. Fourth, the impact from both Project-caused warming and the eventual hurricane that exceeds the WTGs survival speed results in the inability to find that the take would (i) be of small numbers, (ii) have no more than a "negligible impact" on those marine mammal species or stocks, and (iii) not have an "unmitigable adverse impact" on the availability of the species or stock for subsistence uses.

Response to comments: The applicant has submitted a complete IHA application to NMFS. The agency has proposed to issue the IHA pending full consideration of public comments. Please see https://www.fisheries.noaa.gov/action/incidental-take-authorization-south-fork-wind-llc-construction-south-fork-offshore-wind.

The proposed project is designed to withstand reasonably foreseeable weather events per BOEM requirements. This includes hurricane force winds that occur in the Atlantic and may occur in the vicinity of the wind farm. Modern WTGs and the OSS contain minimal amounts of oil and lubricants, therefore the contention that structural failure would result in a catastrophic spill event of the order described is unfounded.

Comment theme: Sufficiency of marine mammal analysis.

Associated comments

Table I-168 provides the full list of comments received as part of this comment theme.

Table I-168. Sufficiency of marine mammal analysis comments.

Comment Number	Comment
145-8	In addition to noise impacts, offshore wind development may cause significant impacts to marine mammals through habitat displacement, altered migration routes, collisions with vessels, and impacts on prey species. One of the likely affected species is the North Atlantic right whale, which is critically endangered and known to use the areas under consideration. BOEM must analyze potential impacts on all marine mammal populations that utilize offshore wind lease areas and surrounding areas, as required under the Marine Mammal Protection Act and the Endangered Species Act. Mitigation measures for certain activities, such as pile driving must be undertaken to best ensure the protection of the health of the species and the ocean ecosystem.
363-114	The DEIS has failed to properly assess the impacts to the five endangered and one threatened marine mammal species known to occur in the region. In this comment, we focus on the critically endangered North Atlantic right whale as an example of a resource that is inadequately assessed. The DEIS states that "of these six marine mammals listed under the ESA, critical habitat has been designated for only North Atlantic right whale (NARW) (Eubalaena glacialis), but none is located within the analysis area". Though it may be true that designated critical habitat (i.e., lines drawn on a chart) for NARWs does not occur in the "Area of Direct Effects", it is only 100 miles east of the Project. It is inaccurate to posit that these waters are therefore unimportant to the NARW, especially since the presence of NARWs south of Martha's Vineyard and Nantucket, which is where the Proposed Project is to be located, has been documented as increasing since at least 2016. Importantly, the critically endangered NARW relies on coastal New England waters for feeding, growth, reproduction, and survival, whether or not all of these waters have been officially classified as critical habitat. Studies have documented increased use of Cape Cod Bay and late winter use of the region south of Martha's Vineyard and Nantucket Islands-- precisely where the SFWF Project is being proposed--was recently described. NARWs must locate and exploit extremely dense patches of zooplankton, specifically, high concentrations of a lipid-rich copepod (Calanaus finmarchicus), to feed efficiently, and these dense patches are likely a primary characteristic of the spring, summer, and fall right whale habitats within the Area. Given the high likelihood that NARWs will occur within and adjacent to the Project Area, it is crucial that potential impacts to whales be properly characterized in the final EIS. Scientists agree that the loss of even one more breeding female whale would be catastrophic to the population.
363-113	RODA has found that information describing Environmental Consequences for marine mammals (Section 3.4.4.2) as well as Activities and Associated Impact Producing Factors (IPFs) for Marine Mammals (Table 3.5-1) and associated conclusions are both inaccurate and highly misleading. One fundamental problem, as discussed earlier in this comment letter, is that BOEM has taken a big leap in presupposing that the No Action alternative will include 2,050 individual turbines, thereby rendering the installation and operation of 15 'additional' turbines proposed by this project to have no net increase in impacts. Beyond this fundamental problem with the misleading and un-clear nature of the Comparison of Impacts by Alternative, there are several points regarding marine mammals that need to be addressed and/or clarified.
363-117	In Table 2.3.1-1, Comparison of Impacts by Alternative, the Impacts to Marine Mammals under the No Action Alternative needs clarification. It states: "...Negligible to moderate adverse effects if no other wind farms are authorized and negligible to moderate effects if they are authorized." First, 'negligible to moderate' encompasses 3 out of 4 available categories within the range, and is therefore not informative in a practical sense. Second, how can adverse effects to marine mammals be said to be within the same range whether or not any future wind farms are authorized, especially given the known, if poorly understood, potentially long-term negative impacts to whales from vessel traffic and noise? This type of analytical inconsistency or discrepancy is prevalent throughout the DEIS.

Response to comments: The EIS, biological assessment, and MMPA consultation fully consider the potential effects of the proposed project on marine mammals. This includes potential effects on NARWs and appropriate mitigation measures as determined in consultation with NMFS. Per the significance criteria provided, impacts to individuals that do not result in population-level effects range from minor to moderate. The potential for population-level effects is determined by comparison of anticipated injury-level effects to the sustainable biological removal rate for each marine mammal species presented in the annual NOAA marine mammal stock assessments.

The FEIS addresses the known use of the project area and vicinity by marine mammals, including NARW, and considers the importance of these habitats. The FEIS has been revised to include any new scientific information about NARW use of the analysis area published since the DEIS as required under NEPA.

Based on the March 29, 2021 Biden/Harris announcement and current goals for offshore wind, BOEM determined that the cumulative impact analysis presents a reasonably foreseeable scenario.

Comment theme: Displacement and vessel collision risk.

Associated comments

Table I-169 provides the full list of comments received as part of this comment theme.

Table I-169. Displacement and vessel collision risk comments.

Comment Number	Comment
349-49	Habitat avoidance may also result in North Atlantic right whales being displaced into shipping lanes, thereby increasing their risk of vessel strike. The analysis should therefore estimate the additional potential risk that habitat displacement into shipping lanes and the increased vessel traffic resulting from wind development itself may pose in terms of serious injury and mortality along the East Coast and evaluate that risk against that of species extinction. Such an analysis will allow BOEM to determine if existing mitigation measures are adequate or if potential impacts need to be managed as projects are developed concurrently and sequentially. For example, considering vessel collision risk for the entire East Coast may illuminate that more comprehensive vessel speed mitigation measures need to be in place at the project level in order to reduce the overall cumulative risk.
349-46	In addition, data are readily available (e.g., on the Mid-Atlantic Data Portal) to undertake a quantitative analysis of additional vessel strike risk posed by vessels associated with the offshore wind industry (i.e., total number of vessels, proportion of vessels associated with reasonably foreseeable offshore wind activities, locations of the primary route between ports and Wind Energy Areas (WEAs), and marine mammal occurrence and density). We encourage BOEM to undertake this quantitative analysis to provide a more robust analysis in the FEIS and other future environmental impact statements.
349-45	Notwithstanding the preparation of a Programmatic EIS, all future cumulative impact analysis must include the following: Vessel strikes remain one of the leading causes of large whale injury and mortality and are a primary driver of the existing UMEs. Serious injury or mortality can occur from a vessel traveling above ten knots irrespective of its length. and vessels of any length travelling below this speed still pose a serious risk. the number of recorded vessel collisions on large whales each year is likely to grossly underestimate the actual number of animals struck, as animals struck but not recovered, or not thoroughly examined, cannot be accounted for. In fact, observed carcasses of North Atlantic right whales from all causes of death may have only accounted for 36% of all estimated death during 1990-2017. Vessel strikes are one of the two main factors driving the North Atlantic right whale to extinction. North Atlantic right whales are particularly prone to vessel strike given their slow speeds, their occupation of waters near shipping lanes, and the extended time they spend at or near the water's surface. Some types of anthropogenic noise have been shown to induce sub-surface positioning in North Atlantic right whales, increasing the risk of vessel strike at relatively moderate levels of exposure. Scientists have deemed it "likely" that noise from pile driving during offshore wind development could lead to displacement of large whales and that this potential impact should be treated as "high importance." BOEM should therefore act conservatively and implement mitigation measures to prevent any further vessel collisions for North Atlantic right whales or other species of large whale currently experiencing an UME (i.e., humpback whales and minke whales), as well as species such as fin whales, which, in light of the broad distributional shifts observed for multiple species, may be at potential future risk of experiencing an UME.

Comment Number	Comment
	BOEM significantly downplays the risk of vessel strike to endangered whales in the DEIS. The agency notes that up to an additional 207 construction vessels associated with offshore wind development may be operating within the geographic analysis area at the peak of projected offshore wind farm development in 2025. Without further quantitative analysis of relative risk, BOEM states that "the overall increase in vessel activity is small relative to the baseline level and year to year variability of vessel traffic in the analysis area. In addition, the risk of marine mammal collisions is negligible for most wind farm construction activities." BOEM then cites supposed mitigation as a means to minimize the potential for vessel collisions: "Timing restrictions, use of PSOs, and other mitigation measures required by BOEM and NMFS would further minimize the potential for fatal vessel interactions. These measures would effectively minimize but not completely avoid collision risk. Any incremental increase risk must be considered relative to the baseline level of risk associated with existing vessel traffic. Project O&M would involve fewer vessels that are smaller in size, and the level of vessel activity would be far lower than during construction. Smaller vessels (i.e., less than 260 feet in length) pose a lower risk of fatal collisions than larger vessels (Laist et al. 2001)." These arguments are flawed and do not represent current understanding of the vessel collision risk to large whales. First, any interaction between a vessel and whale poses a risk of serious injury or mortality. This is true irrespective of the number of other vessels operating in the same location. As demonstrated by the documented deaths of North Atlantic right whale calves in July 2020 and February 2021, and the serious injury, thus, likely death of a third calf in January 2020, an addition of even a single vessel traveling at speeds over ten knots pose an unacceptable risk. Thus, when analyzing impacts from vessel traffic, BOEM should concern itself less with "relative risk" and instead focus on the actual risk to the animal and the offshore wind project vessel. Second, even through the lens of relative risk, the North Atlantic right whale cannot currently withstand a single vessel strike if the species is to survive. Reasonably foreseeable wind development activities will primarily occur in the RI/MA and MA WEAs, meaning that vessel activity associated with construction, including vessel transits, will be similarly concentrated in that region. As previously discussed (see Section E.1 above), the RI/MA and MA wind energy areas now represent an important year-round foraging and migratory habitat for the North Atlantic right whale, a species for which vessel strike is a leading factor in its trajectory towards extinction. The recent Vessel Speed Rule Assessment report issued by NOAA notes that at least 25% of DMAs. Vessel strikes therefore pose an unacceptable risk in this region and BOEM must acknowledge that any vessel operating in that region has the potential to strike a North Atlantic right whale and, in doing so, expedite the species' decline. Third, BOEM's assumptions about smaller vessels posing lower risk of a fatal collision are not supported by best available science. Vessel strikes can result in either "blunt force trauma," where injuries can range from non-lethal superficial abrasions and contusions to severe lethal impact wounds resulting from contact with a non-rotating feature of the vessel, or "propeller-induced trauma," that results in incising wounds resulting from contact with the sharp, rotating, propeller of the vessel (also termed "sharp force trauma"). Observations compiled by Laist et al. (2001)—the primary reference cited by BOEM—suggest that the most severe injuries occur as a result of vessel strikes by large ocean-going vessels; this research has led to a number of mitigation and management actions in the United States and internationally. However, there is increasing recognition that smaller vessels can also cause lethal injury, even when traveling at relative low speeds (i.e., below ten knots). The NMFS Large Whale Ship Strike Database reveals that blood was seen in the water in at least half of the cases where a vessel known to be less than 65 feet in length struck a whale. This is likely an underestimate of the magnitude of the threat, as small vessel collisions with whales are underreported. Passengers have been knocked off their feet or thrown from the boat upon impact with a whale. Fourth, BOEM's assertion that existing federally required mitigation measures will "minimize" collision risk is flawed. Beyond mandatory vessel speed restrictions within Seasonal Management Areas (SMAs), there are currently no federal requirements to reduce the speed of vessels associated with offshore wind development to 10 knots or less. Voluntary 10-, NOAA DMAs and North Atlantic right whale "Slow Zones") offer an additional layer of protection, but a recent analysis undertaken by NMFS shows that compliance with voluntary speed reductions is woefully low. PSOs are stationed aboard a vessel may increase the likelihood that a whale is detected, but this approach cannot be relied upon particularly in periods of darkness or reduced visibility, and the whale would need to be detected with adequate time for the vessel captain to be alerted and to undertake evasive action (which may inadvertently strike another undetected whale). The use of vessel based PSOs may therefore provide some additional benefit when a vessel is already traveling at slow speeds (i.e., less than 10 knots), but will provide little to no benefit for faster vessels. Vessel speed restrictions and additional mitigation and monitoring measures must therefore be explicitly required as part of the permitting process. In the FEIS, BOEM should acknowledge the significant risk vessel strikes pose to North Atlantic right whales and other large whales and require the industry to reduce vessel speeds to 10 knots or less and take further measures to mitigate vessel collision risk.
365-2	The DEIS states no port decisions have been made as of the posting of the document. That does create some difficulties in attempting to make comment. However, in terms of construction vessel routes, the port that would provide the shortest and most direct route would be most favorable. There would be (hopefully) less chance of a whale strike. While the shortest port route may seem obvious, the shortest route may not be the most appropriate port for the turbine parts, or the ships that are required to carry the turbines. The Tribe does not have the ability, need or want, to calculate the cost of an extinct mammal, not when there is time and helpful methods to save it. We encourage BOEM to continue to expand the noconstruction season and limit the number of construction ports to avoid undue stress and noise to this already compromised whale population.

Response to comments: The applicant has provided updated information about vessel trips and ports of origin used during project construction and operation. This information is incorporated into the FEIS, as well as the ESA biological assessment and MMPA IHA application.

The FEIS considers the best available science regarding the displacement effects of offshore energy facilities and vessel strike risk resulting from the proposed action. Insufficient information is available to assess the likelihood of NARW displacement into areas of higher vessel traffic, therefore any estimate would be speculative. BOEM is funding a current effort to develop a ship strike risk modeling tool. BOEM will consider your recommendation for a future study and analysis.

BOEM is also working closely with NMFS to determine appropriate mitigation measures, including vessel speed reduction requirements, and the use of real-time PAM and PSOs. The final mitigation measures that are determined to be most effective will be developed through the ESA and MMPA processes and will be required of the developer.

Comment theme: Concurrent pile-driving.

Associated comments

Table I-170 provides the full list of comments received as part of this comment theme.

Table I-170. Concurrent pile-driving comments.

Comment Number	Comment
338-37	35. The document states that “a limited amount of concurrent pile driving at neighboring projects is anticipated under the No Action alternative. The MARI WEA has the greatest potential for concurrent pile driving for construction of adjacent projects.” DWSF and BOEM should coordinate with neighboring projects to ensure that “[c]oncurrent pile driving associated with neighboring projects or within a project” does not occur, allowing animals to seek refuge from the disturbance.
284-4	The SFWF DEIS and the SFWF Incidental Harassment Agreement (IHA) are both available for comment at the same time. While we are encouraged by several of the proposed provisions aimed at reducing harm to the critically endangered North Atlantic Right Whale (NARW), we believe that the final project approval documents should be strengthened and clarified in terms of requirements for minimizing and mitigating noise from pile driving. Pile driving noise is not only a major impact of concern for NARW, it also is an impact of concern for all marine mammals, sea turtles, and virtually all other taxa of marine life. Populations of marine mammals, sea turtles, fish and invertebrates stand to experience cumulative impacts resulting from chronic exposure to pile driving noise during construction of this project, and all the other projects in the construction pipeline. The minimization of cumulative impacts of pile driving for multiple projects at the same time or in rapid succession should be given more attention, since construction of these projects could overlap both temporally and spatially.

Response to comments: Thank you for your comment. The FEIS considers the potential for concurrent pile driving under revised construction schedules for SFWF, Vineyard Wind, and other proposed projects. Additional mitigation measures determined during consultation with NMFS and required by the IHA will be required of the applicant and have been incorporated into the FEIS. BOEM will continue to incorporate new information in future analyses as it becomes available.

Comment theme: Marine mammal entanglement risk.

Associated comments

Table I-171 provides the full list of comments received as part of this comment theme.

Table I-171. Marine mammal entanglement risk comment.

Comment Number	Comment
349-51	Finally, BOEM acknowledges that “entanglement in fishing gear has been identified as one of the leading causes of mortality in NARWs and may be a limiting factor in the species recovery (Knowlton et al. 2012).” Until more scientific information becomes available on the nature of habitat displacement caused by offshore wind development, BOEM should be precautionary and factor entanglement risk into the impact analysis in the FEIS. This issue is particularly pertinent to reasonably foreseeable wind projects in the RI/MA and MA wind energy areas, as they directly overlap with or neighbor management areas for the American lobster fishery that pose a significant entanglement risk to North Atlantic right whale and other large whales. The American lobster fishery will soon be subject to new regulations being proposed by NOAA to reduce the risk of mortality and serious injury of North Atlantic right whale caused by entanglement.

Response to comments: The FEIS considers the potential for entanglement in derelict gear and marine debris captured by the WTG foundations and other project features. The applicant would routinely inspect the SFWF foundations for derelict gear and debris and remove these materials for upland disposal on an annual basis at minimum. At this time there is insufficient information to determine whether large whales will avoid or be attracted to wind farm areas post-construction. Ongoing post-construction monitoring may provide insight into the interplay of fishing vessels and large whales in and around offshore wind developments. New information gained from post- construction monitoring will be incorporated into future analyses.

Comment theme: Best available science.

Associated comments

Table I-172 provides the full list of comments received as part of this comment theme.

Table I-172. Best available science comment.

Comment Number	Comment
349-40	Fundamental to satisfying NEPA's requirement of fair and objective review, agencies must ensure the "professional integrity, including scientific integrity," of the discussions and analyses that appear in environmental impact statements. To this end, they must make every attempt to obtain and disclose data necessary to their analysis. The simple assertion that "no information exists" will not suffice; unless the costs of obtaining the information are exorbitant, NEPA requires that it be obtained. Agencies are further required to identify their methodologies, indicate when necessary information is incomplete or unavailable, acknowledge scientific disagreement and data gaps, and evaluate indeterminate adverse impacts based upon approaches or methods "generally accepted in the scientific community." Such requirements become acutely important in cases where, as here, so much about an activity's impacts depend on newly emerging science. Finally, NEPA does not permit agencies to "ignore available information that undermines their environmental impact conclusions." Thus, BOEM's review must be thorough and must abide by the legal standards discussed above. The quantitative study of noise exposure probabilities for marine mammals from activities associated with the Project's development was first presented in Appendix P2 in the Construction and Operation Plan, the results of which are summarized in the DEIS. The "Denes et al. 2020" study (originally published in 2019 and updated in February 2020) used a modeling approach to quantify the number of marine mammals and sea turtles that would be exposed to levels above injury exposure criteria and behavioral disruption exposure criteria. The study used abundance and distribution data as well as animal movement modeling scenarios. The marine mammal density estimates (animals/km2) used in the Denes et al. (2020) analysis originated from the Duke University Marine Geospatial Ecology Laboratory habitat-density model results published in 2016 and an unpublished and updated density model that incorporated additional sightings data from the Atlantic Marine Assessment Program for Protected Species (AMAPPS) 2010–2016, which included some aerial surveys over the MA WEA and MA/RI WEA undertaken by the NOAA Northeast Fisheries Science Center between 2011 and 2016. The Denes et al. (2020) study is now outdated and does not incorporate significant new data collected from 2016 onwards which indicates new year-round habitat use of the area within, and in the vicinity of, the Project area by North Atlantic right whales. As stated in Section E.1 above, since 2010, North Atlantic right whale distribution and habitat use has shifted and best available scientific information indicates that North Atlantic right whales now heavily rely on the waters within, and in the vicinity of, the Project area year-round. While further iterations of the Duke University habitat-density model have since been published in 2017 and 2018, these models still exclude data collected from recent aerial surveys and those available through additional sightings databases (e.g., NOAA Right Whale Sighting Advisory System; Northeast Fisheries Science Center (NEFSC) Monthly DMA analysis) and passive acoustic monitoring (e.g. Robots4Whales detections; Acoustic Right Whale Occurrence). Therefore, the Duke University habitat-density models do not fully reflect the current distribution and density of marine mammals for the United States' East Coast and must not be used as the sole information source when estimating impact. We recognize that a number of the data sources we recommend above are not yet published or publicly available. In light of the rapidly diminishing North Atlantic right whale population, however, BOEM must require that all data are used to ensure that any potential shifts in North Atlantic right whale habitat usage are reflected in sound exposure modeling associated with offshore wind development. We suggest one approach to achieving this would be to convene all data holders (e.g., New England Aquarium, Northeast Fisheries Science Center, Woods Hole Oceanographic Institution) with the acoustic modeling team (i.e., JASCO in the case of South Fork) to collate an updated data set of best available scientific information in a format compatible with undertaking an updated acoustic impact analysis.

Response to comments: The FEIS has been revised to incorporate the information presented in the IHA application, which considers the best available scientific data and information about marine mammal occurrence in the project area and vicinity. BOEM's Center for Marine Acoustics works closely with NMFS and others with marine acoustic expertise, and also reviewed the acoustic modeling used to inform the FEIS.

Comment theme: Editorial comments.

Associated comments

Table I-173 provides the full list of comments received as part of this comment theme.

Table I-173. Editorial comment.

Comment Number	Comment
301-78	There is a typo in this section - "foot" should be edited to "root"

Response to comments: The FEIS is corrected.

Comment theme: Marine mammal population estimates.

Associated comments

Table I-174 provides the full list of comments received as part of this comment theme.

Table I-174. Marine mammal population estimates comments.

Comment Number	Comment
360-37	is unclear where the cited Stock Assessment population size of 428 is from, as a citation is not provided and the estimate published by Pace and his colleagues, which is cited elsewhere in the Stock Assessment reports a 2015 estimated best population size of 458 using the Pace Method (which is not the most recent estimate). Pace and his colleagues provide an annual report card for North Atlantic right whales, and the number 428 has not been an estimate based on the Pace Method since its application in those reports. Thus, comments may be received by BOEM quibbling over the estimated population size. Although the annual Pettis et al. reports indicate a continued declining trend, we are glad to see that, in 2020, there was a decrease in detected NARW mortalities from ten in 2019 to two in 2020, with no confirmed entanglement mortalities, and that there were ten right whale calf births, up three from 2019. The 2020 report notes that entanglement mitigation measures in Canada may have helped result in this reduction in entanglements, but they rightly state that one year of decline in entanglement and increase in births does not create a trend. That said, the point of citing Pettis et al.'s annual reports is to note that NARW population estimates vary. Regardless of the estimate applied, within the range of estimates that are available, determination of minor impacts was made by BOEM by considering a low population size and a declining population trend in the context of significant mitigation and monitoring to minimize impacts to NARWs, resulting in minor impacts. The minor impact level is further supported by the statutory framework that requires that NMFS make findings of "negligible impacts" and "small numbers" to issue permits for construction activities under the MMPA. Minor impacts to NARWs (and other marine mammals) is required by statute and will be achieved via conditions in permits issued by NMFS.
301-40	SFW suggests BOEM update the marine mammal population numbers with the 2020 SAR data that became available subsequent to development and publication of the DEIS, and also update acoustic terminology and units to be ISO-compliant in the FEIS.

Response to comments: The FEIS is updated to reflect the best available science regarding the current population status of NARW and other marine mammals.

Comment theme: Mitigation and monitoring measures for marine mammals.

Associated comments

Table I-175 provides the full list of comments received as part of this comment theme.

Table I-175. Mitigation and monitoring measures for marine mammals comments.

Comment Number	Comment
301-50	Vessel strike avoidance (non-geophysical survey vessels). SFW is concerned with the mitigation and monitoring measures associated with sea turtles for all transiting vessels. jellyfish and floating vegetation mats are widespread through the region on a year-round basis, and there is no clear threshold for which the number of jellyfish become an aggregations, nor a spatial coverage where vegetation would be considered a mat. The constraint to slow to 4 knots in these areas will severely limit vessel movements and, as a result, execution of construction and operation activities. SFW is also concerned by the measure to require a dedicated watch on all vessels underway for construction and operation. Vessels such as crew transfer vessels ("CTV") are moving for a large portion of their day but often at speeds less than 10 knots. Some vessels such as CTVs may also be small and lack room or berthing for additional personnel and the crew may have other safety responsibilities while underway. No other mariners are bound to similar constraints in the region. SFW would like to discuss with BOEM alternative measures for these conditions.
301-47	SFW provides the following comments on the mitigation and monitoring measures proposed for marine mammals and sea turtles in Appendix G, Table 2 of the DEIS and Table 8 of the BA submitted to NMFS. • SFW notes significant inconsistencies between the DEIS and BA conditions and also between the DEIS / BA and the SFW Protected Species Mitigation and Monitoring Plan ("PSMMP"). These include but are not limited to references to clearance and exclusion zones without clear definitions, zone size, ramp-up procedure, vessel speed conditions, seasonal measures etc. It appears the inconsistencies may be the result of language carried over from the Vineyard Wind SEIS that is not applicable to SFW. SFW requests the conditions be aligned as applicable with the measures proposed in the PSMMP.
301-79	The FEIS should clarify the following: "If the EZs are expanded beyond 4,921.3 feet (1,500 m)….." The large whale EZs are already greater than 1500m and SFW also is planning for one secondary PSO vessel. BOEM should clarify the intention is for an additional vessel (two PSO vessels plus the construction vessel) or one PSO vessel plus the construction vessel.
301-76	SFW notes multiple reporting and in some cases duplicative requirements in the DEIS and the BA prepared for NMFS. These requirements are significantly over and above those currently proposed by NMFS in the draft IHA. While SFW recognizes additional reporting measures may be required specific to sea turtles which are not considered in the IHA, SFW would like further clarification on the purpose and need for frequent reporting and seeks further streamlining and reporting efficiencies to ensure practical and achievable compliance requirements.
301-48	Pile-driving sound source verification plan. SFW is concerned with the requirement for BOEM to review the Sound Field Verification Report prior to initiation of the next pile. NMFS has not included this condition and has instead specified measures for SFW to self-implement, based on the sound source verification ("SSV") results. SFW is still required to submit SSV reports but this approach ensures in-season construction delays are minimized. SFW requests the DEIS and BA be aligned with the Incidental Harassment Authorization including the measure to request a modification to reduce the clearance and exclusion zones.
301-51	Entanglement hazards. SFW is concerned about entanglement measures. SFW would like to continue to discuss this measure during Endangered Species Act consultation.
301-52	The DEIS and NMFS BA reference four separate plans that will require approval 90-days prior to initiation of piling activities. SFW requests BOEM consider combining these plans and treat the SFW PSMMP as a single plan to approve.
349-42	The imperiled status of the North Atlantic right whale demands the implementation of strong protective measures to safeguard this species during construction and operations of the Project. BOEM must also require strong protections for other endangered and threatened marine mammal species, including those currently experiencing a UME. We note that the number of individuals projected to experience a permanent threshold shift (PTS) may result in "moderate" impacts for some species, including endangered fin whales as well as humpback whales and minke whales that are currently experiencing a UME. The estimated levels of PTS seem relatively high for such a small project, particularly for humpback whales (PTS = four individuals). BOEM must take all necessary precautions to reduce the number of Level A takes (any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild) for large whales to as close to zero as possible.

Comment Number	Comment
349-39	Protection of North Atlantic right whales during foraging, and the protection of their foraging habitat, must be one of BOEM's utmost priorities for wind energy project's located in foraging areas. Foraging areas with suitable prey density are limited relative to the overall distribution of North Atlantic right whales, and a decreasing amount of habitat is available for resting, pregnant, and lactating females. This means that unrestricted and undisturbed access to suitable areas, when they exist, is extremely important for the species to maintain its energy budget. Scientific information on North Atlantic right whale functional ecology also shows that the species employs a "high-drag" foraging strategy that enables them to selectively target high-density prey patches, but is energetically expensive. Thus, if access to prey is limited in any way, the ability of the whale to offset its energy expenditure during foraging is jeopardized. In fact, researchers have concluded: "[R]ight whales acquire their energy in a relatively short period of intense foraging; even moderate changes in their feeding behavior or their prey energy density are likely to negatively impact their yearly energy budgets and therefore reduce fitness substantially." North Atlantic right whales are already experiencing significant food-stress: juveniles, adults, and lactating females have significantly poorer body condition relative to southern right whales and the poor condition of lactating females may cause a reduction in calf growth rates. Undisturbed access to foraging habitat is necessary to adequately protect the species. Further, ongoing unusual mortality events (UMEs) exist for other whales in the Geographic Analysis Area. There have been UMEs for the Atlantic population of minke whales since January 2017 and humpback whales since January 2016. Alarmingly, 104 minke whales have stranded between Maine and South Carolina from January 2017 to February 2021. Elevated numbers of humpback whales have also been found stranded along the Atlantic Coast since January 2016 and, in a little over four years, 146 humpback whale mortalities have been recorded (data through February 9, 2021), with occurring in every state along the East Coast. The declaration of these UMEs by the agency in the past few years for three large whale species for which anthropogenic impacts are a significant cause of mortality demonstrates an increasing risk to whales from human activities along the United States East Coast. Given concerns regarding the health of the region's whale species, and the critically endangered status of the North Atlantic right whale in particular, BOEM is obligated to protect this species from additional harmful impacts of human activities. The agency is also obligated by NEPA to consider the full range of potential impacts on all marine mammal species, including minke and humpback whales, which are known to utilize the Geographic Analysis Area. Considering the elevated threat to federally protected large whale species and populations in the Atlantic, and emerging evidence of dynamic shifts in the distribution of large whale habitat, BOEM must ensure that any potential stressors posed by the proposed surveys on affected species and stocks are avoided, minimized, mitigated, and monitored to the full extent possible.
316-4	Finally, this area is the site of right whale activity for a healthy portion of the year. Fisheries are held to significant regulatory restrictions to minimize potential impact. BOEM must develop a similar system to insure the whales continued protection prior to approving this project with possible significant acoustic impacts during construction and operation. This must address the cumulative effects of these projects on right whales during all phase of the projects through decommissioning.
301-80	The FEIS should revise the following: "The EZs established in the Proposed Action must be considered minimum EZs and may not be reduced based on sound source verification results. " This statement is counter to what has been discussed with NMFS and is reflected in the IHA & PSMMP.
349-43	Based on the best scientific information available for the North Atlantic right whale (as summarized in Section E.1 above), we recommend the following mitigation measures be required. We note that while these measures are specifically designed to protect the North Atlantic right whale, a number offer benefits to other large whale species (e.g. vessel speed restrictions). When designing mitigation, BOEM must require the most protective measures possible for all endangered and at-risk species, including fin whales, humpback whales, and minke whales. North Atlantic right whale mitigation recommendations: ● Seasonal prohibition on pile driving from December 1 through April 30. ● Diel restrictions on pile driving: a. Pile driving shall not be initiated within 1.5 hours of civil sunset or in times of low visibility when the visual "Clearance Zone" (as hereinafter defined) cannot be visually monitored, as determined by the lead Protected Species Observer (PSO) on duty. b. Pile driving may continue after dark only if the activity commenced during daylight hours and must proceed for human safety or installation feasibility reasons. ● Clearance Zone distances: o An Acoustic Clearance Zone shall extend 10,000 meters (m) in all directions from the location of the driven pile; and o A Visual Clearance Zone shall extend 5,000 m in all directions from the location of the driven pile. ● Shutdown requirements: o When the application of monitoring methods defined in Section X results in either an acoustic detection within the 10,000 m Acoustic Clearance Zone or a visual detection within the 5,000 m Visual Clearance Zone of one or more North Atlantic right whales, pile driving should not be initiated.

Comment Number	Comment
	o When the application of monitoring methods defined in subsection (e) results in an acoustic detection within the 5,000 m Visual Clearance Zone, piling shall be shut down unless continued pile driving activities are necessary for reasons of human safety or installation feasibility. o In the event that a North Atlantic right whale is visually detected by PSOs at any distance from the pile, piling activities shall be shut down unless continued pile driving activities are necessary for reasons of human safety or installation feasibility. o Once halted, pile driving may resume after use of the methods set forth in subsection (e) and the lead PSO confirms no North Atlantic right whales have been detected within the Acoustic and Visual Clearance Zones. ● Real-time monitoring requirements and protocols during pre-clearance and when pile driving activity is underway: o Monitoring of the Acoustic Clearance Zone will be undertaken using near real-time passive acoustic monitoring (PAM), assuming a detection range of 10,000 m, should be undertaken from a vessel other than the pile driving vessel, or from a stationary unit, to avoid the hydrophone being masked by the pile driving vessel or development-related noise. o Monitoring of the Visual Clearance Zone will be undertaken by vessel based PSOs stationed at the pile driving site and on additional vessels, as appropriate, to enable monitoring of the entire 5,000 m Clearance Zone. On each vessel, there must be a minimum of four PSOs following a two-on, two-off rotation, each responsible for scanning no more than 180° of the horizon per pile driving location. o Acoustic and visual monitoring should begin at least 60 minutes prior to the commencement or resumption of pile driving and should be conducted throughout the duration of pile driving activity. Visual observation of the 5,000 m Visual Clearance Zone should continue until 30 minutes after pile driving. The deployment of additional observers and monitoring technologies (e.g., infrared, drones) should be undertaken, as needed, to ensure the ability to monitor the established Clearance Zones. ● Vessel speed restrictions: o All Project-associated vessels should adhere to a ten knot speed restriction at all times except in limited circumstances where the best available scientific information demonstrates that whales do not use the area. o The Project may develop, in consultation with NOAA, an “Adaptive Plan” that modifies these vessel speed restrictions. However, the monitoring methods that inform the Adaptive Plan must be proven effective using vessels traveling ten knots or less and following a scientific study design. If the resulting Adaptive Plan is scientifically proven to be equally or more effective than the Standard Plan, the Adaptive Plan could be used as an alternative to the Standard Plan. ● Other vessel-related measures: o All personnel working offshore should receive training on observing and identifying North Atlantic right whales and other large whale species; o Vessels must maintain a separation distances of 500 m. for North Atlantic right whales, maintain a vigilant watch for North Atlantic right whales and other large whale species, and slow down or maneuver their vessels as appropriate to avoid a potential interaction with a North Atlantic right whale or other large whale species; and o All vessels responsible for crew transport (i.e., service operating vessels) should carry automated thermal detection systems. ● Underwater noise reduction: BOEM should require the Project to use best commercially feasible technology and methods to minimize sound levels from pile driving. Specifically, BOEM should require a combination of noise mitigation systems to: o Obtain the greatest noise reduction and attenuation using technically and commercially feasible measures considering factors such as Project design and seabed conditions; and o Achieve no less than 10dB (SEL) in combined noise reduction and attenuation, taking as a baseline, projections from prior noise measurements of unmitigated piles from Europe and North America. o It should be expected that the Project, in meeting condition (i) above, will aim to obtain mitigation results at least comparable to that achieved in Europe through use of the same combination of systems. o Field measurements should be conducted on the first pile installed. ● Reporting: o BOEM should require the Project report all visual observations and acoustic detections of North Atlantic right whales to NMFS or the Coast Guard as soon as possible and no later than the end of the PSO shift. We note that, in some cases, such as with the use of near real-time autonomous buoy systems, the detections will be reported automatically on a preset cycle. o The Project must immediately report an entangled or dead North Atlantic right whale to NMFS, the Marine Animal Response Team (1-800-900-3622) or the United Stat. Coast Guard immediately via one of several available systems (e.g. phone, app, radio). o Methods of reporting are expected to advance and streamline in the coming years, and the Project should commit to supporting and participating in these efforts.

Comment Number	Comment
380-11	Nick Krakoff: CLF also urges BOEM to require a suite of strong mitigation measures to protect highly vulnerable endangered North Atlantic right whales and other marine mammals. Population estimates for the North Atlantic right whale were recently revised downward to only 366 remaining individuals. Due to the precariousness of the species survival, robust mitigation and monitoring measures are required for South Fork Wind Farm project for North Atlantic gray whales, including seasonal restrictions to avoid pile driving when right whales are most likely to be in the area, shipboard passive acoustic aerial monitoring, use of underwater noise attenuation technologies, and restrictions on pile driving at night or during periods of low visibility, and, as well as vessel speed restrictions for all vessels traveling to and from and within the project area, among other measures. Due to the critically endangered North Atlantic right whales, these measures are necessary to ensure the survival of the species. In order to better understand the impacts of offshore wind on the marine environment, as industry expands up and down the eastern seaboard, CLF also strongly urges BOEM, in collaboration with NOAA Fisheries and adjacent states, to develop and implement comprehensive monitoring the wind energy area before, during, and after construction and during operation. Thank you again for the opportunity to speak with you tonight, and again, CLF plans to submit more detailed written comments on the DEIS. Thank you.
338-38	36. Appendix G, Table G-1 states that “Passive acoustic monitoring (PAM) would be used to support visual monitoring efforts when visibility is limited or when nighttime operations are conducted.” The developer should consider expanding the use of Passive Acoustic Monitoring (PAM) and thermal monitoring to help detect North Atlantic Right Whales during all weather conditions. 37. The Agencies support the development of a pile driving sound source verification plan and field verification as outlined in Table G-2. These measures are critical for the health of endangered species and other marine mammals and fish. 38. The Agencies support the development and implementation of a pile driving monitoring plan and Protected Species Observer (PSO) requirements as outlined in Table G-2. It is critical that contractors are educated on and plan for endangered species safety precautions 39. The Agencies support the adoption of all the mitigation and monitoring measures detailed on pp. G-8 through G-15 for endangered species. These measures are all important to protect and collect information on endangered species. 40. The DEIS should include an evaluation of alternative pile installation techniques to minimize the potential impacts to marine mammals. Further, BOEM should consider requiring DWSF to develop a risk mitigation plan for marine mammals.
379-12	Alice Marlin: Thank you very much, I found your nice mute button. I wanted to start off by congratulating BOEM on the appointment of your new director, Amanda Lefton, and we're, we're very proud to see a local Long Island person with such a strong background and capability to undertake the, the major opportunities and challenges facing the nation as we develop offshore wind all along the coast. I’d like to endorse and compliment you on the work so far on the DEIS and comment that this project overall is overwhelmingly beneficial both to the nation and in mitigating the effects of climate change and ocean acidification. And that it has very strong local community support here in East Hampton where the cable would be landing, despite a small but highly vocal NIMBY objections that have virtually no basis in logic or a fair consideration of the impacts on the far larger number of people who would be adversely affected by the alternate routes for landing the cable. I wanted to focus in a little bit on marine effects. And I am glad that you have brought up the effect on the endangered species, the North Atlantic right whale. I, and I wanted to recommend that a detailed evaluation of the agreement between the NRDC and Vineyard Wind be extricated and, and analyzed and would like to put in a strong recommendation that the agreement between Orsted that, that Orsted’s s agreement here with NRDC and perhaps the National Wildlife Foundation and other major environmental organizations involved be at least as strong as Vineyard Wind. I understand that the noise, it could potentially have adverse effects not only on migrating North Atlantic right whales, but also finfish. But I also understand that there are significant mitigating factors which could reduce those impacts to very minor ones and reduce the chances that the right whales would run into them at all. These are very interesting approaches, such as having 24-seven visibility, as to whether any right whales are approaching the area with the absolute authority to completely shut down operations until the right whales are out of sight. They're also a number of new technologies to minimize the effects of any noise. The noises primarily affect only during construction stage, but there are some very interesting new technologies which it would be good to explore. And these new technologies, like a bubble curtain around the area, would tend to signal to finfish and other marine animals that they should not enter the area where the decibel level is of a danger. The technology is developing rapidly in that area, so perhaps the best way to address this is simply a limit on the decibel level rather than specifying a particular technology. Also wanted to remind all of us that, although any kind of activity anywhere has some negative effects, that far stronger dangers come from both climate change and ocean acidification. I’m referring particularly to a NOVA study on ocean acidification, which says it's already impacting many ocean species, especially organisms like oysters, a very significant factor here in East Hampton. Acidifications make their hard shells and skeletons, it erodes these calcium carbonate structures, and if the pH level gets too low, the shells and skeletons even begin to dissolve. So, this, any, any change like these, this proposed wind farm would go a long way toward protecting all of our shellfish. Thank you very much. I’ve run through my five minutes, but congratulations to all of you on, thank you for the great work that BOEM is doing in advancing this DEIS.

Comment Number	Comment
163-11	RIDEM supports the use of proposed environmental protection measures (EPMs) including soft start procedures, sound mitigation measures, and required protected species observers. These measures should be required of all developers to minimize potential impacts to all marine mammal species.
301-49	Pile-driving sound source verification plan. SFW is concerned with the terminology used for the sound field verification. Demonstrating 10 dB attenuation would require comparison to an unmitigated pile which NMFS does not support. Therefore, in alignment with discussions with NMFS, SFW has committed to achieving and measuring the acoustic ranges modeled for 10 dB attenuation. To verify, SSV results will be compared to predicted ranges from sound modeling associated with a 10 dB reduction.

Response to comments: Thank you for your recommendations. The project includes a range of applicant-committed EPMs to avoid and minimize adverse effects on the environment (Appendix G), supplemented by additional mitigation measures required as a condition of project permitting. BOEM works closely with NMFS to determine the most appropriate mitigation measures to implement for the SFWF and to make the mitigation measures presented in the FEIS consistent with NMFS Biological Opinion requirements. The FEIS also reflects the incidental take limits permitted by NMFS in the IHA and incorporates the mitigation measures required by the IHA.

The EIS and ESA and MMPA consultations fully consider the effects of construction and operational noise on NARW and other marine mammals. The applicant will adhere to EPMs and mitigation measures required as a condition of federal permitting. The FEIS has been updated to include the latest information and mitigation measures from the IHA and Biological Opinion.

BOEM shares your interest in long-term monitoring of wind development areas.

Comment theme: Underwater noise impacts to marine mammals.

Associated comments

Table I-176 provides the full list of comments received as part of this comment theme.

Table I-176. Underwater noise impacts to marine mammals comments.

Comment Number	Comment
363-118	Regarding marine mammals, BOEM states: “Under the No Action alternative, construction of 2,050 offshore structures would generate short-term and intermittent impulsive underwater noise with the potential to impact marine mammals. These effects would be limited to specific construction windows beginning in 2022 and continuing through 2030.” This claim, that effects would be limited to specific construction windows, is not informed by the most recent science, and is therefore inaccurate. RODA recommends that BOEM consult the paper “The Effects of Ship Noise on Marine Mammals- A Review” by Erbe et al. 2019. They provide an overview of what is known to date, and show that studies have been patchy not only in terms of their coverage of species and vessel types, but also in the types of impacts investigated. The documented effects include behavioral and acoustic responses, auditory masking, and stress. Since 2017 alone, 32 NARW have died and 14 have been seriously injured. Installation and operation of the South Fork Wind Farm will undoubtedly increase the amount of vessel traffic and ocean noise (e.g. from pile-driving during installation and vibrational noise from turbines during ongoing operation). The various mitigation measures presented by BOEM do not adequately address concerns regarding whales. For example, the Mitigation or Monitoring Measures proposed in Table G-2 that relate to marine mammals need clarification and an explanation of what supporting data was used, i.e., how they were informed. Again, saying that impacts could still be “negligible to moderate” even with mitigation should raise alarm. The actions should not be allowed to be considered mitigatory if they are still resulting in unacceptable potential population level impacts to numerous species.

Comment Number	Comment
284-5	As written, these documents do not call for a construction noise threshold standard nor do they clearly describe what the noise levels produced by impact pile driving 11m diameter piles at this location are anticipated to be, making it hard to discern the appropriateness of the proposed marine mammal exclusion zones or predict the extent of potential impacts to other marine life. Ideally BOEM would clearly articulate a pile driving noise threshold aimed at avoiding physiological impacts to marine mammals from cumulative exposure to pile driving noise as has been used in Germany. The benefit of clear articulation of a noise threshold at the early stages of planning is that it provides time and flexibility for the developers to choose how to keep construction noise below that threshold. If BOEM determines that this particular project is too far along to now specify a noise threshold, then this approach should still be considered for subsequent projects that are not as far along in the federal permitting process. Clarity on this point in the earliest stages of project planning will better position developers to consider all options for noise mitigation, including the selection of foundations that do not require impact pile driving, as has been done for Equinor's 2000+ MW Empire Wind 1 & 2 projects in the New York Bight.

Response to comments: Additional information on pile driving noise and modeling of the extent of the Level A and Level B zones as defined by NMFS, can be found in Appendices J1, J2 and J3 of the COP. Additional information and analysis is also found in the Biological Assessment, Biological Opinion and in the IHA. This section evaluates impulsive noise during periods of construction (e.g., pile driving) which will occur only during certain periods of time. Vessel traffic and ship noise are evaluated in section 3.4.4.2.3. The FEIS incorporates the best available science, including new information available since the DEIS was issued.

The FEIS is revised to include the anticipated noise levels presented in COP Appendix J1 (available at: https://www.boem.gov/renewable-energy/state-activities/south-fork). The applicant has committed to achieving an average of 10 dB noise attenuation effectiveness and will comply with additional EPMs and mitigation measures to avoid and minimize adverse effects on marine mammals consistent with the take limits specified in the IHA.

Comment theme: Project impacts to NARWs.

Associated comments

Table I-177 provides the full list of comments received as part of this comment theme.

Table I-177. Project impacts to NARWs comments.

Comment Number	Comment
363-115	BOEM has dismissed the potential importance of the SFWF to NARWs and minimized the potentially devastating effects to the population that could occur due to offshore wind construction and operation activities and associated Impact Producing Factors (IPFs). The first concern is the high amount of increased vessel traffic- up to 2,600 vessels throughout the life of the project. This would greatly increase the risk of ship strike to the endangered NARW. Threats to the NARW population include vessel strikes, habitat degradation, ocean noise, changes in distribution and availability of prey, entanglement in fishing gear, and their small population size. NOAA Fisheries has stated that slowing down vessel traffic and reducing ocean noise, as well as reducing risks of entanglements are key to regulation and management plans. Additionally, associated increases in vessel noise could contribute to the suite of ongoing stressors impacting the population. Noise has been found to interfere with right whale communication and increase their stress levels. In turn, “females that undergo energetic stress from reproduction may be more susceptible than males to dying from chronic injuries such as those from entanglement or vessel strikes.” Noise from human activities, such as that which would occur with the wind energy installation and operation of the proposed project, can disrupt normal behavior of right whales and may further reduce their ability to identify physical surroundings, find food, navigate, and find mates. However, the impacts of noise are minimized within the DEIS, especially that of increases in the amount of vessel noise. One glaring example of insufficient analysis by BOEM is that the section describing impacts of noise on the NARW relies heavily on a single 2009 study. that was done on a completely different classification of whales. This study talks about odontocetes (that is, toothed whales including bottlenose dolphins and pilot whales), and the NARW is a mysticete (a baleen whale, with completely different feeding, migration, physiology, behavior response, etc.). The DEIS only cites this study, which is largely irrelevant to the NARW. Additionally, another false justification is made for minimal impacts: BOEM states that “brief [negative/avoidance] responses of individual [whales] to passing vessels would be unlikely given the patchy distribution of marine mammals, and no stock or population level effects would be expected.” This is overtly contrary to what is known about the NARW population and use of the proposed project area. It is imperative that vessel and noise impacts from offshore wind energy development NOT be considered in isolation, that is, at the project level alone, particularly when it comes to impacts to whales, as they are highly migratory and rely on resources and habitat along the U.S. eastern seaboard, in which numerous wind energy areas have already been leased and more will likely be leased in the future. Again, here is where an impacts characterization has been flipped on its head; by saying that the No Action alternative will have the same impacts as the Proposed Project based on the assumption that thousands of turbines are inevitable and then using that to justify poor practices for the assessment of the development of the SFWF Project.
161-1	I represent ACK Residents Against Turbines and its individual members, each of whom has an interest in preventing damage to the human and natural environment along the New England and Mid-Atlantic coast, including the areas potentially affected by the proposed Deepwater South Fork wind project (the "Project"). I have reviewed the Draft Environmental Impact Statement (DEIS) for the Project, and, like the other NEPA documents prepared for the many wind power arrays proposed for this area of the Atlantic seaboard, this one is heavy on self-serving conclusions and light on analysis. The two most significant defects in the DEIS relate to project impacts on marine mammals and air pollution, including greenhouse gas (GHG) emissions. Specifically, the DEIS continues the wind industry practice of downplaying cumulative impacts on North Atlantic Right Whales (NARW), a federally listed species that is native to the project area but is suffering steep population declines due to human interference with its habitat. There is voluminous literature on the urgent need to protect the NARW before it slides irretrievably towards extinction; yet, the DEIS does not address this literature, much of which is both recent and simple to obtain. As a result, the DEIS does not provide a full or accurate assessment of existing conditions as they relate to the status of the NARW. This, in turn, renders the document's analysis of project impacts on NARW fundamentally flawed.
163-9	The North Atlantic Right Whale (NARW) is critically endangered and protected under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA) of 1972. a. A Ship Speed Rule Seasonal Management Area overlaps directly with the project Wind Development Area (WDA). This management area exists to reduce the likelihood of deaths or injuries to NARWs. b. The project does not intersect with NARW critical habitat but is situated in an area between the Northeastern U.S. Foraging Area (Unit 1) and the Southeastern U.S. Calving Area (Unit 2). Seasonal migrations between the two units may pass through the project area.

Response to comments: Thank you for your comment. The FEIS considers NARW in the project area and throughout their range, incorporates new publications released following completion of the DEIS, and contains a robust cumulative analysis of all impacting factors for the NARW. The FEIS has been revised to incorporate relevant literature to characterize potential noise impacts on NARW.

To clarify, the 2,600 figure refers to the estimated total number of vessel trips for construction and O&M, not the number of vessels. The applicant has refined their vessel trip estimates. The operation and maintenance of the SFWF project would include up to 2,500 crew transport vessel trips (2 trips per week) over the 30-year life of the project. This equates to approximately 100 vessel trips per year relative to the environmental baseline of 25,880 vessel hours and 5,521 vessel miles within the SFWF lease area per year (see DEIS Appendix H, Section 3.5.6.1). This information and associated assessment of vessel strike risk has been incorporated into the FEIS. Mitigation measures committed to by the applicant to reduce vessel strike risk can be found in Appendix G, Table G-1.

Comment theme: Geographic analysis area.

Associated comments

Table I-178 provides the full list of comments received as part of this comment theme.

Table I-178. Geographic analysis area comment.

Comment Number	Comment
372-8	Furthermore, the geographic scope of analysis, both the “geographic analysis area” and “area of direct effects” do not fully encompass the geographic area where marine mammals or sea turtles may be exposed to project effects. Specifically, all vessel traffic routes proposed for the project, including vessels transiting from the Gulf of Mexico, are not incorporated into the geographic scope of either analysis area. As a result, the DEIS does not fully evaluate potential exposure of project effects to listed species. We recommend you revise the geographic analysis areas in the FEIS and incorporate an analysis of the potential impacts from all project-related vessel traffic.

Response to comments: Updated information on vessel routes and ports has been incorporated into the FEIS. The geographic scope of analysis in the FEIS is appropriate for addressing direct and indirect effects under NEPA. The ESA has a broader scope and the ESA consultation considered all potential ports of use and vessel routes in determining the potential effects for listed species, including the Gulf of Mexico and foreign ports. Please see the biological assessment and subsequent biological opinion for additional analysis regarding vessel routes and ports outside of the geographic analysis area of the FEIS.

Comment theme: Compliance with ESA.

Associated comments

Table I-179 provides the full list of comments received as part of this comment theme.

Table I-179. Compliance with ESA comment.

Comment Number	Comment
169-42	IX.THE DEIS FAILS TO TAKE A HARD LOOK AT THE IMPACT ON ENDANGERED SPECIES. The DEIS does not account for the additional stress on endangered species caused by the increase in temperatures caused by the Project itself. See, Harvard Wind Study. The DEIS does not account for the additional stress on endangered species caused by the devastation from a category 4 or category 5 hurricane hitting the WEA (which is virtually certain) and destroying the WTGs, resulting in a catastrophic release of oil and contaminants into the marine environment. For example, "The North Atlantic right whales primarily migrate into the [Wind Energy] area and engage in short-term feeding before moving onto feeding grounds throughout the Gulf of Maine." Rapid Climate-Driven Circulation Changes Threaten Conservation of Endangered North Atlantic Right Whales, by Nicholas R. Record, et al (the "Record Paper"). See, https://www.boem.gov/press10252016/. The Record Paper indicates that the right whales' food supply is already endangered by the warming ocean. If the right whales' food supply in the Wind Energy Area is diminished, it would adversely affect the right whales' ability to continue their journey to the Gulf of Maine. As discussed above, climate scientists at Harvard University, David Keith et al., concluded that temperatures in the area of wind farms are raised around 1-degree Celsius by the projects themselves, which would mean that the ocean around the location of the various off-shore wind farms proposed for New York and Rhode Island would be warming at an even greater rate than would otherwise occur. That warming could extend to the Gulf of Maine as well, further endangering the food supply. Together with the Harvard study, the Record Paper establishes that the warming that would be caused by the Project poses a significant risk to the food supply of the right whales, which in turn threatens the survival of the right whales. The DEIS simply fails to analyze those risks. The risk of diminished or elimination of the food supply for the Right Whales is a risk that cannot be ignored under NEPA and the ESA. The DEIS also wholly ignores the devastation from a category 4 or category 5 hurricane hitting the WEA and destroying the WTGs, resulting in a catastrophic release of oil and contaminants into the marine environment and causing the take, and possibly the extinction, of endangered species, such as the Right Whales, sea turtles, and the piping plover, which nests on beaches that would be contaminated by an oil spill that could be as large as that of the Exxon Valdez. The DEIS entirely fails to consider an important aspect of the problem—the impact the Project and climate change on the food supply for the right whales. That is yet another reason that the DEIS does not conform to NEPA and the ESA. The DEIS entirely fails to consider an important aspect of the problem—the devastation from a category 4 or category 5 hurricane hitting the WEA and destroying the WTGs, resulting in a catastrophic release of oil and contaminants into the marine environment and causing the take, and possibly the extinction, of endangered species. That is yet another reason that the draft EIS does not conform to NEPA and the ESA. The proposed Project is not permitted by the ESA because it will, to a virtual certainty, result in take of multiple listed species.

Response to comments: BOEM is conducting ESA consultation for the project with NMFS and USFWS as required under federal regulation. These consultations consider the significant, reasonably foreseeable effects of the proposed action on listed species and their habitats.

Sea Turtles

Comment theme: Mitigation measures – soft starts.

Associated comments

Table I-180 provides the full list of comments received as part of this comment theme.

Table I-180. Mitigation measures – soft starts comment.

Comment Number	Comment
163-13	On page H-79, it is stated: "For impulsive noise, BOEM anticipates that projects would employ soft starts during pile driving to allow the small number of turtles in the region to leave the area before underwater noise increase to injurious levels." Does BOEM mandate the use of soft starts? The language on this is slightly unclear.

Response to comments: BOEM anticipates requiring soft starts. The FEIS will include all mitigation measures recommended in the Biological Opinion including soft starts These mitigation measures could be considered by decision makers and incorporated into the Record of Decision.

Comment theme: Incorporation of additional data sources on sea turtles.

Associated comments

Table I-181 provides the full list of comments received as part of this comment theme.

Table I-181. Incorporation of additional data sources on sea turtles comment.

Comment Number	Comment
338-39	The information on sea turtles in the DEIS focuses mainly on data from the MARI area. The DEIS should also consider data from NYS waters and the New York Bight, including data from the Atlantic Marine Conservation Society, the New York Marine Rescue Group, DEC Large Whale Aerial Surveys, and NYSERDA Digital Aerial Surveys. In 2018, there was a confirmed nesting event for a Kemp's ridley on Long Island. This should be noted in the DEIS. 43. The Agencies recommend that the DEIS clearly state the current lack of data regarding the impacts that the Proposed Action may have on sea turtles and allow for the possible need for refinement in mitigation measures if/when more information becomes available.

Response to comments: The EIS considers the effects to sea turtles within the project area of the proposed action and potential impacts from project activities. BOEM will review and incorporate the recommended information resources in the geographic area of analysis.

Comment theme: Sea turtle density estimates.

Associated comments

Table I-182 provides the full list of comments received as part of this comment theme.

Table I-182. Sea turtle density estimates comment.

Comment Number	Comment
349-53	BOEM should update its sea turtle regional density estimates and re-run exposure models to ensure a more realistic representation of sea turtle occurrence in the Project area. The most recent survey data incorporated into the DEIS sea turtle density surface models are from 2009 and do not reflect current knowledge of sea turtle occurrence in the Project area. The Northeast Large Pelagic Survey data conducted from October 2011 through June 2015 and, e.g., Atlantic Marine Assessment Program for Protected Species (AMAPPS) data – would more accurately represent the current status quo and, in turn, provide more accurate estimates of acoustic exposures. All four species of sea turtles found in the Project area (leatherback, loggerhead, Kemp’s ridley, and green) are most abundant during the summer and fall months, largely absent in the winter, and present in low numbers in the spring. This seasonal pattern, corroborated by satellite tag data, aerial surveys, citizen sightings, entanglements, and strandings, indicates that the months of highest concern for sea turtles in this area are June through November. In addition, when cheloniid species are most abundant in the Project area in the summer and fall, they are most likely to be using nearshore habitat (i.e., bays, estuaries, sounds, inlets). The relative use of nearshore and offshore areas by sea turtle species should be accounted for in models of sea turtle density—and subsequent impact analysis—as a number of development activities described in the DEIS take place in nearshore habitat (e.g., dredging and port expansion). We recommend new density surface models and accompanying abundance estimates be generated and included alongside new acoustic exposure models in the Final EIS (see, also, Section F.2.).

Response to comments: Updated sea turtle density estimates are in the FEIS. The FEIS reflects density estimates in the biological assessment for the project.

Comment theme: Sea turtle survey methodology.

Associated comments

Table I-183 provides the full list of comments received as part of this comment theme.

Table I-183. Sea turtle survey methodology comment.

Comment Number	Comment
349-54	The ability to detect sea turtles during aerial surveys is highly variable; thus, increased investment in tagging and tracking studies would complement data collected via aerial surveys and provide a more complete picture of sea turtle occurrence and habitat use in the region. Additionally, increased sea turtle tagging and tracking studies, especially for green and hawksbill turtles, are needed to better understand movement, dive patterns and surface time, and habitat use which can, among other uses, help advise monitoring and avoidance, minimization, and mitigation strategies and generate more accurate estimates of sea turtle takes. Most satellite tagging in the Northeast United States, except for leatherback sea turtles, has been initiated in the Mid-Atlantic and does not capture New England habitat use or surface behaviors. Some satellite telemetry data is available from rehabilitated and released ridley, and green turtles that suggests rehabilitated turtles are a good proxy for wild-caught turtles. Considering the costs and probably limited success rate of in-water tagging work for these three species, acoustic telemetry of rehabilitated turtles may be an effective means of gathering useful data. There is already significant investment underway for acoustic telemetry arrays in WEAs for highly migratory fish species, presenting an opportunity for cost-effective data collection on sea turtles. Thus, a combination of satellite tags (to collect data on surface availability to parameterize density models) and acoustic telemetry will improve understanding of sea turtle habitat use in the southern New England region.

Response to comments: Thank you for your recommendation. BOEM funds research through the Environmental Studies Program including studies involving the latest aerial survey technology and tagging of species. Please see the BOEM website for additional information.

Comment theme: Noise effects to sea turtles.

Associated comments

Table I-184 provides the full list of comments received as part of this comment theme.

Table I-184. Noise effects to sea turtles comment.

Comment Number	Comment
349-55	The injury and behavioral zones for sea turtles have not been calculated correctly because the general statements in the DEIS upon which they are based are not accurate. BOEM must use NMFS's most recent pile driving calculator to obtain an accurate injury and behavioral radii for sea turtles during impact and vibratory pile driving. Additionally, as noted in the DEIS, fundamental gaps remain in our knowledge of the sensory (e.g., hearing and navigation) ecology of sea turtles. It has been determined that sea turtle hearing sensitivity overlaps with the frequencies and source levels produced by many anthropogenic sources; however, more research is needed to determine the potential physiological and behavioral impacts of these noise sources on sea turtles. Currently, BOEM's standard operating conditions for activities such as pile driving are based on a 180 dB (RMS) re 1 uPa exclusion zone, which is the original generic acoustic threshold for assessing permanent threshold shift onset for cetaceans.As the offshore wind industry advances, studies are needed to determine critical ratios and temporary and permanent threshold shifts so that accurate acoustic threshold limits for anthropogenic sound sources can be added to NMFS's sound exposure guidelines for protected species like sea turtles, and additional monitoring and avoidance, minimization, and mitigation protocols can be developed to minimize impacts to sea turtles during offshore wind development and operation and other anthropogenic activities. Experiments are also needed to: (i) spatially separate acoustic pressure and intensity to determine which component(s) of sound sea turtles detect to determine if hearing sensitivity changes under pressure; and, (ii) conduct underwater audiograms of sea turtle species of all age classes, as hearing sensitivity is known to change with age. Given this, not only should monitoring of sea turtle sensory ecology be conducted, but a conservative approach should be adopted to guard against impacts to these threatened and endangered species.

Response to comments: As discussed in the NMFS Biological Opinion, NMFS relied upon the available literature to evaluate the effects of noise on sea turtles. NMFS considers the acoustic thresholds developed by the US Navy to represent the best available data as it they rely upon all available information on sea turtle hearing and thresholds were derived using similar methodology as the NMFS technical guidance for auditory injury of marine mammals (NMFS 2018, 2020). Based upon studies of sea turtle behavioral responses to air gun noise summarized in the Biological Opinion, NFMS expect that sea turtles would exhibit behavioral response when exposed to received levels of 166 dB re 1uPa and significant behavioral disruption and avoidance behavior when exposed to received levels of 175 dB re: 1uPa (rms) and higher. Although the 180 dB (RMS) threshold level was previously recommended by NMFS, it is no longer applicable and not used to determine impacts to sea turtles. SFW conducted state of the art pile driving modeling and NMFS agrees this is more accurate than use of the NMFS spreadsheet.

Comment theme: Mitigation and monitoring measures for sea turtles.

Associated comments

Table I-185 provides the full list of comments received as part of this comment theme.

Table I-185. Mitigation and monitoring measures for sea turtles comments.

Comment Number	Comment
349-56	For sea turtles as well, mitigation measures should include a speed restriction of ten knots for all vessels Associated with the Project at all times, regardless of whether vessels are transiting or on site. Risk of collision with sea turtles is greatest when vessels are traveling at speeds greater than ten knots. While vessels are directed to slow speeds to four knots if a sea turtle is sighted within 100 m of the vessel's path, this is not a foolproof solution. Sea turtle detection – even when conducted by dedicated observers – is difficult unless turtles surface close to the vessel, at which point it may be difficult to course-correct in time to prevent collision. Keeping ship speed to ten knots improves the ability to adjust speeds. The standard mitigation plan calls for vessels of all sizes to operate port to port at ten knots or less between November 1 and April 30, except for vessels while transiting in Narragansett Bay or Long Island Sound; however, this time period does not overlap with the higher occurrence of sea turtles in this region during summer and fall months. Slowing to 4 knots from June 1 to November 30 while transiting through areas of visible jellyfish aggregations or floating vegetation lines or mats will improve protection for sea turtles, but the speed should be reduced from an upper limit of ten knots. A standard ten knot vessel speed limit ensures protections for a wide array of ocean wildlife, and should be incorporated into the FEIS.
349-57	No fewer than four PSOs should be available to monitor all exclusion zones for sea turtles – for both impact pile-driving and High Resolution Geophysical and Geotechnical Survey Plan (HRG) survey activities as well as for vibratory driving. Currently, the DEIS measures require four PSOs for impact activities: two PSOs to conduct watch from the construction vessel and two PSOs to conduct watch from a secondary, dedicated PSO vessel. For vibratory, the DEIS notes only two PSOs are required to conduct watch from the construction vessel. The vantage points and number of PSOs are critical factors for effective exclusion zone monitoring for sea turtles. To effectively monitor the full exclusion zone, multiple PSOs must be stationed at several vantage points at the highest level to allow each to continuously scan a section of the exclusion zone; a limited number of PSOs – even continuously moving around the vantage point – would still not be able to scan the entire exclusion zone. A minimum of four PSOs for all exclusion zone monitoring is recommended. Monitoring reports must be made publicly available. Moreover, PSOs must be NOAA-certified, and solely focused on monitoring for protected species. While training vessel crew members to additionally watch is beneficial, we caution this cannot be a substitution for trained PSOs as the vessel crew's top priority is vessel operations.

Response to comments: Appendix G, Table G-2, in the FEIS describes potential mitigation and monitoring measures for all project-related vessels that include speed restrictions with and without the presence of visual observers, during seasonal timeframes, and in the presence of sea turtles, jellyfish aggregations, or floating sargassum lines or mats. The final mitigation measures in the FEIS are based on the consultation with NMFS.

BOEM requires the use of an effective number of PSOs to ensure monitoring the exclusion zones for all pile driving and HRG surveys using sparkers and boomers. How PSOs must be approved by NMFS to conduct mitigation and monitoring duties. SFW must submit a pile driving monitoring plan for approval by BOEM prior to construction which will include details about PSOs and their monitoring methodology. BOEM will require an adequate number of PSOs to effectively monitor the exclusion zone.

Comment theme: Support for sea turtle analysis.

Associated comments

Table I-186 provides the full list of comments received as part of this comment theme.

Table I-186. Support for sea turtle analysis comments.

Comment Number	Comment
360-44	We agree with BOEM’s findings that the impact on sea turtles would not be more than minor by the Proposed Action. Only two sea turtle species are commonly in the area of analysis (leatherback and loggerhead), and Kemp’s sea turtles are noted to occur regularly. All sea turtles occurring in the area are threatened or endangered and so will be considered under the ESA, both as regards the Proposed Action and cumulative impacts to ensure there will be no jeopardy to the distinct population segments (DPSs) occurring in the project area. Loggerhead sea turtle populations have been growing, and as BOEM notes, the population of the Northwest Atlantic DPS is over 800,000, which can result in higher risk of encounter but also minimizes the impact of individual injury to the population as a whole and suggests that vessel collision is not substantively affecting population growth trends. BOEM concludes that no population-level impacts on sea turtles are expected.
360-45	"With respect to construction, geophysical and geotechnical activities, and decommissioning vessels (and potentially some operations and maintenance vessels depending on their activities), permits associated with MMPA will result in a situation in which third party protected species observers are on board vessels. Generally, these observers are required to watch for sea turtles as a result of ESA consultation (unrelated to MMPA) and evasion or other actions are applied as appropriate to avoid sea turtles in compliance with ESA within safety constraints. This is true for some other vessel activities permitted and approved under ESA and so is relevant to cumulative impacts to sea turtles. In addition to industries like offshore wind, there are fisheries that require observers who watch for sea turtles, among other species. NMFS guidance requires attempting to maintain at least 50 yards between sea turtles and vessels. Vessel collision associated with sea turtles (as well as seals and cetaceans smaller than the large baleen and sperm whales) tends to focus on sharp force trauma, such as propeller injury. Sea turtle-vessel collision with the large vessels associated with wind farm construction and maintenance may be less likely than small vessels for these species due to sea turtle surface behavior, deep diving, maneuverability, and/or vessel aversion. The literature on sea turtle/vessel collisions is mainly limited to small craft rather than the types of ships associated with wind farm development. The study cited by BOEM by Hazel et al. involved a 6m aluminum boat powered by a 40-horsepower outboard motor to simulate transits of recreational boats in the study site, which was a coastal area in less than 5m of water in Moreton Bay, Queensland, Australia. This vessel and the site are not similar to offshore wind locations and vessels, and the activity of sea turtles in this type of bay, such as foraging by green turtles (which was the focal species of this study and are not common in the EIS study area), may be very different from the activities and surface behavior of sea turtles of other species in open waters. We do not dispute that any increase in vessel traffic has the potential to raise vessel collision risks to animals, but as with marine mammals, this risk for sea turtles is not at a level that exceeds BOEM’s definition of “minor” in the EIS. Sea turtles’ small bodies provide less surface for collision than marine mammals, and like marine mammals, they spend a proportion of their time diving, which is likely different than that of green turtles in Moreton Bay. For example, leatherback sea turtles have been recorded diving to depths greater than 1,000m. Another study tagged leatherback turtles in Nova Scotia and followed their movements throughout the North Atlantic for over a year; they recorded dive depths of greater than 400m, though most dives were 250m and less. For adult male loggerhead sea turtles tracked in the Western North Atlantic, time spent at the surface was a median of 4.1-6.0% of time dependent on northern or southern migration and location. Maximum dive depths recorded for juvenile loggerhead sea turtles in the Southwestern Atlantic was 100-300m, with 84% of dives between 10 and 100m. Loggerhead turtles in this study were presumed to be foraging on the seafloor in waters as deep as 200m. Thus, the limited availability of individuals to collide with vessels and their small surface both reduce the likelihood of substantive amounts of vessel collisions in open waters where offshore wind farms are proposed and for most activities aside from some specific areas where coastal, recreational boating may pose a risk to sea turtles nearshore.

Response to comments: Thank you for your comment. We will include the additional provided information as appropriate in the EIS.

Comment theme: Stranding language.

Associated comments

Table I-187 provides the full list of comments received as part of this comment theme.

Table I-187. Stranding language comment.

Comment Number	Comment
360-46	BOEM cites NMFS and USFWS regarding a 10% increase in the percentage of loggerhead sea turtles stranded “due to” vessel strike from the 1980s to 2004, with 20.5% of strandings associated with vessel strikes in 2004. The same report also reported a somewhat lower combined estimate of 14.9% of stranded loggerhead sea turtles in the U.S. Atlantic and Gulf of Mexico from 1997 to 2005 associated with collision injuries, though the authors note that some of these injuries could have been post-mortem. Post-mortem vessel collision should be considered when using stranding data to assess vessel collision potential, and BOEM should indicate that it cannot know the percentage stranded “due to” vessel collision. BOEM can report that injuries consistent with vessel collision were found on 20.5% of stranded loggerhead sea turtles in the U.S. Atlantic in 2004, though an unknown number of those may have been struck post-mortem. BOEM should also note that the cited report by NMFS and USFWS states that these are mainly propeller wounds (which would not come from large vessels like those engaged in offshore wind) and the bulk of these injuries were in southeast Florida. USFWS is actively working toward understanding vessel collision risk in Florida and how management can reduce this threat.

Response to comments: Thank you for your comment. The text will be revised as recommended.

Comment theme: Sea turtle distribution and vessel strike risk.

Associated comments

Table I-188 provides the full list of comments received as part of this comment theme.

Table I-188. Sea turtle distribution and vessel strike risk comments.

Comment Number	Comment
360-47	Distribution of sea turtles is also important to consider in the context of the MA/RI lease areas. Leatherback turtles are found along the U.S. East Coast from Florida to Maine, but in winter months, they are concentrated south of Long Island, New York and in summer and fall they are known to use forage habitats as far north as Canada. Kemp’s ridley sea turtle densities are highest along the northern Florida coast, with secondary concentrations between Cape Hatteras; North Carolina; and Cape Cod, Massachusetts in summer and fall. In all seasons, the highest concentrations of loggerhead turtles are in the south, along the Florida coast; in spring, summer, and fall their range extends north to Long Island, New York, with low densities found as far as Cape Cod, Massachusetts. Thus, at most times of year, sea turtle presence in the area where South Fork and many other wind projects are anticipated is low compared to other regions. Overall, the best available science on sea turtles that are regularly or commonly present in the project area suggests that they spend substantive time below the surface, are small and maneuverable compared to large whales and have less surface area for collision risk at sea. The studies associated with vessel collisions and sea turtles focus on small, coastal vessels and are not reflective of anticipated vessel collisions in open ocean with larger vessels. Observers and crew on windfarm and other vessels at sea watch for protected species, including sea turtles, and apply NMFS’ guidance as is safe is reasonable to avoid sea turtle collisions. Stranded sea turtles have shown somewhat higher injury rates related to collision in the last decade, but some of those collisions also may have occurred postmortem. USFWS is working to address the issues associated with vessel collision and sea turtles in Florida.
360-48	The incremental effect of vessel collision for sea turtles should not be particularly different than cetaceans, or if anything, should be lower as most sea turtle collision is related to small, coastal watercraft in Florida. BOEM concludes regarding vessel collision that “the proposed action would result in negligible incremental impacts to marine mammals.” BOEM states that “any incremental risk must be considered relative to the baseline level of risk associated with existing vessel traffic” when discussing cumulative vessel collision risks for multiple windfarm developments on marine mammals. The same standards should be applied to cumulative impacts of vessel collision on sea turtles. As such, the best available science and BOEM’s own benchmark of incremental effect supports the reduction of cumulative vessel collision impact for the proposed project to minor for sea turtles, as most impacts can be avoided with EPMs and losses have minor impact on populations and the incremental effect of vessel traffic is just as low, if not lower, for sea turtles than cetaceans. In addition, the ESA status of sea turtles requires that NMFS and USFWS consider cumulative impacts in their Biological Opinions when making “no jeopardy” determinations that are necessary for South Fork Wind Farm and other actions to receive federal authorizations, further reducing potential for cumulative effects on sea turtles.

Response to comments: Thank you for your comment. Vessel strikes to sea turtles occur globally. Although the density of sea turtles off Rhode Island and Massachusetts is lower than areas further south of the project area, there is still a chance of vessel strikes of sea turtles. BOEM agrees that the risk of vessel strike is likely higher due to higher densities of turtles and high recreational vessel traffic, but there is still a risk in the project area. The risk to sea turtles is included in the consultation with NOAA and appropriate mitigation measures will be required of SFW.

Bats

Comment theme: Mitigation and monitoring measures for bats.

Associated comments

Table I-189 provides the full list of comments received as part of this comment theme.

Table I-189. Mitigation and monitoring measures for bats comments.

Comment Number	Comment
349-99	Recognizing that much remains unknown regarding the impacts of offshore wind to bats species in the United States, BOEM’s evaluation of the Project in the FEIS must be based on an explicitly defined monitoring and adaptive management plan. This must include a commitment to sufficient standardized monitoring before and during construction, during operation, and during decommissioning and using improved technology as it is developed to adequately evaluate true impacts of the Project. Most importantly, the adaptive management plan must explicitly outline a strategy to employ adequate mitigation measures, based on the impacts observed through monitoring efforts. In this manner, the FEIS can account for the reasonably foreseeable impacts of the Project and commit to addressing those impacts. Further, BOEM should incorporate best monitoring and management practices into a regional adaptive management plan to adequately measure and mitigate cumulative impacts to bats from offshore wind developments expected across the Atlantic OCS for the reasonably foreseeable future.
349-111	The FEIS and the ROD for the Project should specifically include the adoption of monitoring technologies when they are verified and commercially available as part of the Project monitoring framework and protocol as well as monitoring frameworks for future projects permitted by BOEM, and support and encourage their development and funding for their development and testing beginning at the Project. The shared cost of development and implementation of these technologies across all lessees and with BOEM, if standardized, would avoid an undue economic burden on individual projects. Many of the above listed recommendations are aimed at filling in knowledge gaps about bats' use of the offshore environment. These survey efforts will likely provide critical information about bats' use of these WEAs which will be necessary for effective mitigation. However, bat activity in the WEAs prior to turbine construction may not accurately predict bat fatalities during turbine operation. At land-based wind facilities, pre-construction bat activity surveys are poorly correlated with post-construction fatalities. Because of this, the commitment to post-construction monitoring is critical to yielding better understanding about how bats interact with offshore wind turbines. An important component to this will be programmatically supporting the tagging of individual bats, such as through Motus, requiring receiving towers in the WDAs, and requiring installation of acoustic detectors, preferably at nacelle height.
349-112	Data of bat activity and calls within the rotor-swept zone of offshore WTGs would allow better understanding of which bat species are at risk and during what environmental conditions, which can inform mitigation measures. Because bat activity offshore seems to be predominantly restricted to warm, slow wind speed nights and is highly seasonal, if bat minimization measures are needed and targeted curtailment is shown to be effective in the offshore environment, periods of operational curtailment could be restricted to these highest risk times to decrease loss in energy generation.
349-113	In addition to operational curtailment, it is possible that deterrent technologies to prevent bats from approaching wind turbines could be useful in minimizing bat fatalities offshore. Deterrent technologies are being developed for land-based turbines, including turbine coatings (to counteract any attraction to smooth surfaces which might be perceived as water), ultraviolet lighting (which many bat species can see), and ultrasonic noise emitters (to possibly 'jam' bats' radars and make wind facilities unappealing to bats). One of the ultrasonic deterrent technologies, NRG Systems, has been commercially deployed at land-based wind facilities. None of these technologies have been assessed yet in the offshore environment nor on turbines with such large swept areas, which may present a challenge for effective deterrent use offshore.

Comment Number	Comment
163-3	The DEIS asserts that the SFWF will have "negligible to minor adverse impacts" to bats and that the cumulative impacts to bats will be minor. However, this statement was not accompanied by evidence to support the claim, despite evidence that suggests adverse impacts to bats could be substantial. a. Little is known about the migration and movements of migratory tree-roosting bat species in North America, though observations of migrating bats over the Atlantic Ocean have been reported since at least the 1890's (Hatch et al. 2013). Multiple bat species have demonstrated the ability, if not the tendency, to fly considerable distances offshore during migration (Stantec Consulting 2016). Migratory bat species are disproportionately affected by wind turbines, in part because they appear to be attracted to these structures (U.S. Department of Interior 2014). Why bats are attracted to wind turbines is not yet fully understood. Evidence suggests that bats navigate across large landscapes using vision, and that their eyes are probably most important for orientation during long-distance migration (Griffin et al. 1970). It has been suggested that hoary bats move toward visible landscape features during migration (Cryan et al. 2007). b. Large numbers of bats are being killed at utility-scale wind energy facilities, and these facilities raise important concerns about cumulative impacts of proposed wind energy development on bat populations (Arnett et al. 2013). Estimated cumulative bat fatalities in the United States and Canada from 2001-2011 ranged from 840,000 to 1,691,000 bats (Arnett et al. 2013). Other estimates suggest that the number of bats killed at wind turbine facilities in the United States during 2012 alone was approximately 684,000 and 888,000 respectively (Hayes 2013; Smallwood 2013). Given that bats have low reproductive rates, significant cumulative impacts of wind energy development on bat populations are possible (Kunz 2007). c. Utility-scale wind turbines have the potential to detrimentally affect bat populations, but few well-developed and integrated methods exist for observing bat occurrence and behavior at turbines at multiple spatial and temporal scales (U.S Department of the Interior 2014). This is particularly true in the offshore environment. Potential risk of turbine-related impacts could be readily managed through turbine feathering programs proven effective at terrestrial sites with such actions necessaty during a narrow set of conditions and a brief seasonal period (Stantec Consulting 2016). Opportunities exist to gain insight and guidance for future development through using modem technology and should be required for any proposed utility-scale facilities, both in the offshore and on-shore environments. d. Prior to construction, the developer should be required to compile information on the potential bat resources within the project area. The goal of the studies is to determine the potential adverse impacts of the proposed project on bat resources by characterizing the use of the project area by bats under a variety of environmental conditions throughout the year, and estimating the mortality rate of bats due to collisions and other effects associated with the project. Data collected prior to construction can be compared to data collected in a similar manner after construction, to determine what impacts, if any, the project has on migrating bats. It is recommended that the following studies be conducted and should be done so in accordance with the guidelines established by the New York Department of Environmental Conservation's Guidelines for Conducting Bird and Bat Studies at Commercial Wind Energy Projects dated 2015. i. Pre- and post-construction radar studies, for a minimum of one-year pre-construction, and two years post construction. ii. Bat acoustic monitoring, for a minimum of one-year pre-construction, and two years post-construction. e. Research has shown that higher cut-in speeds, at least up to 5.0 meters per second, are less likely to kill bats than turbines that operate at lower speeds (Arnett et al. 2011). The benefits of curtailment are particularly noticeable for larger bodied species such as hoary, silver-haired, and eastern red bats (Baerwold et al. 2009). We recommend that for the period of August 1 through October 31, the developer increase turbine cut-in speeds to a minimum of 5.0 meters per second, during overnight hours, when nighttime temperatures exceed 9.5°C or implement feathering of turbine blades (pitched parallel to the wind) during low wind conditions when nighttime temperatures exceed 9.5°C during this period when wind speeds are less than 5.0 meters per second.
349-100	As referenced in a report prepared for the Department of Energy (DOE) in 2016, bats were present at all surveyed locations in the mid-Atlantic, Gulf of Maine, and Great Lakes, with bats detected up to 130 kilometers (70.2 nautical miles) from the mainland, though bat activity generally declined with increased distance from shore.307 There is increasing evidence that bats do regularly occupy the offshore environment and more tracking and acoustic monitoring studies are regularly being conducted. BOEM should leverage this data including data submitted to the Motus Wildlife Tracking System, an international network of researchers using coordinated automated radio-telemetry arrays to study small flying organisms' movements, including bats. Motus contains data on bat movements, including along the Atlantic coast, which could inform which species need to be considered in their analyses.

Comment Number	Comment
349-104	The DEIS relies on the seasonal use of the offshore environment by migratory tree bats, their ability to avoid collisions, and that bats would not be active while the WTGs would be operating for their rationale that impacts to these bats would be negligible. The extrapolation that exposure to WTGs being limited to spring and fall migration period means that fatalities would not be significant ignores the best available science on bats and wind energy interactions from both land-based wind energy in North America and from offshore wind energy in Europe. The majority of migratory tree bats fatalities from land-based wind energy occur during the spring and fall migration period. Despite this predominantly seasonal exposure, recent demographic modeling for hoary bats (Lasiurus cinereus), the bat species most frequently killed by land-based wind turbines in North America, shows that the 2014 land-based wind energy build out is sufficient to cause a 90% decline in hoary bat populations over the next 50 years—population-level declines that could occur during the lifetime of South Fork Wind Farm —and these declines are associated with a 22% risk of extinction if widespread mitigation measures are not adopted. Although this research focused on hoary bats, the study authors caution that other migratory tree bats, such as eastern red (Lasiurus borealis) and silver-haired bats (Lasionycteris noctivagans), which also experience high levels of fatalities at land-based wind facilities, might also experience population-level declines. With limited research available on bats offshore, BOEM cannot dismiss the evidence from land-based wind that seasonal interactions with turbines can cause significant impacts on migratory tree bats. Although migratory tree bats are less prevalent over the OCS than land and their presence seem to decrease with distance from shore, there is not enough research to support the claims in the DEIS that use of offshore habitat is thought to be limited and “offshore bat occurrences are infrequent and primarily seasonal (during migration), and activity declines as the distance from shore increases” and that the “collision-related mortality or injury could result in negligible to minor adverse impacts to bats at the Project, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the airspace of the SFWF.” In offshore bat surveys of the Great Lakes, Gulf of Maine, and mid-Atlantic, migratory tree bats were widespread, with eastern red bats detected at 97% of all surveyed sites (and 100% of sites in the mid- Atlantic), including the most remote fixed site (41.6 km from mainland) and potentially on shipboard surveys over 100 km offshore. Eastern red bats alone accounted for 40% of all detected bat activity offshore. Hoary bats and silver-haired bats had less total activity offshore but were still widespread, found at 95% and 89% of all sites, respectively. Data in Motus also indicate eastern red bats and hoary bats have made cross-water flights near Cape Cod.279 Furthermore, seasonal exposure of Nathusius's pipistrelle (Pipistrellus nathusii) to expected build out of turbines in the North Sea during their late summer/autumn migration was considered sufficient exposure as to affect Nathusius's pipistrelle populations, triggering operational curtailment measures between August 15 and October 1. This further belies claims that seasonal exposure of bats precludes significant impacts.
349-107	The DEIS does not adequately reflect the risk to bats offshore. Cave bats are found more often and further offshore than described, seasonal exposure to WTGs does not preclude serious impacts, bats may be attracted to offshore wind facilities, and WTG cut-in speeds are undetermined. Thus, the DEIS's assessment that, “Overall, collision-related mortality or injury could result in negligible to minor adverse impacts to bats at the SFWF, with long-distance migratory bats most at risk because they are most likely to seasonally occur in the airspace of the SFWF” cannot be supported. Determining risk and adaptively managing to minimize impacts relies on monitoring, but traditional fatality monitoring is not feasible offshore. Given the challenges of conducting fatalities assessments at offshore sites, many dead or injured bats would most likely go unrecorded, either falling into the water or becoming prey to marine scavengers or predators. BOEM's assessment of the impacts to bats should, therefore, be conservative, and employ the best available scientific methods, such as autodetection, acoustic monitoring at nacelle height, targeted tagging of bats, and thermal imaging technology. BOEM should also support research into monitoring methods for bats that are better suited to the offshore environment.

Comment Number	Comment
349-110	"For the reasons discussed earlier, the cumulative impacts assessment likely seriously underestimates risk to bats. While these comments provide some additional resources on bat movement offshore and bat interactions with wind turbines for BOEM to include in their analysis, there remains insufficient research on bats and offshore wind to accurately assess cumulative risk and impact from the described 22 G.W. buildout scenario. Because of this knowledge gap, it is imperative that BOEM require offshore wind facilities to commit to pre, during, and post-construction monitoring and to integrate novel technology for monitoring as it becomes available. Monitoring data must be made readily and promptly available to the public. Although we now know that population-level impacts to bats are possible from land- based wind, these impacts to bats from onshore wind energy were not anticipated and were only discovered because of required monitoring for avian impacts.347 While post-construction monitoring should occur at the project-level, BOEM and their partner agencies should support more programmatic surveys of bat use of the OCS and WEAs. Should further monitoring and research efforts reveal that impacts to bats are non-negligible, BOEM and other agencies should support the development and deployment of minimization strategies and deterrent technologies. The following is a list of recommendations for BOEM and its partner agencies to support successful understanding of offshore wind's impact on bats, modified and expanded upon from Peterson et al. (2016).348 BOEM and its partner agencies should: • Support supplemental field surveys for bats on the OCS, using similar methodology as described in Peterson et al. (2016).349 • BOEM should require acoustic detectors to be placed at nacelle height on a subset of turbines constructed along the Atlantic OCS and require that the data be made publicly available. • Support research to determine whether it is possible to improve acoustic monitoring to enable better species identifications, such being able to differentiate calls between the ESA-listed northern long-eared bat and other Myotis species. • Support continued advances in radio telemetry equipment, nanotag transmitters, and GPS tags so that more bats can be tracked offshore (e.g., support the development of smaller GPS tags with longer battery lives). • Support deploying Motus towers350 and/or other nanotag receiving towers in the coastal and offshore environment, including on structures in the WDA. • Support efforts to tag additional individual bats with nanotag transmitters and GPS tags. • Support the development of bat monitoring technology for offshore WTGs, such as strike detection technology and thermal video. • Support research on and testing of bat deterrent devices for offshore WTGs, such as ultraviolet lighting or ultrasonic noise emitters. • Require offshore wind projects to support testing and deployment of best available monitoring and deterrent technologies, once developed. • Require offshore wind projects to promptly report and make publicly available all monitoring and testing data."

Response to comments: Appendix G of the FEIS includes the mitigation and monitoring measures that would be implemented to avoid, minimize, and mitigate adverse impacts on bats. A framework for an avian and bat post-construction monitoring program would be developed and implemented in coordination with applicable federal and state resource agencies (see Appendix G for details). Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision.

Comment theme: Indiana bat.

Associated comments

Table I-190 provides the full list of comments received as part of this comment theme.

Table I-190. Indiana bat comment.

Comment Number	Comment
349-101	The DEIS fails to address potential impacts to the federally endangered Indiana bat (Myotis sodalis); however, data submitted to Motus indicates that, in 2015, a tagged Indiana bat was detected on Cape Cod and Nantucket. Given the proximity of this detection to the Project Area and the cross-water movements made by the tagged bat (between Cape Cod and Nantucket), BOEM should consult with United States Fish and Wildlife Service (USFWS) about potential impacts to Indiana bats and these impacts should be analyzed in the Final EIS.

Response to comments: There is a record of Indiana bat in Motus that was detected on Nantucket (https://motus.org/data/track?tagDeploymentId=2403). It is important to note that the site warns people that "Individual tracks have not been inspected for accuracy." Although it is possible for a bat to hop from the mainland to an island, this particular record is highly suspect due to the extraordinary traveling speeds: it was first detected in Louisville, KY traveled at 86 km/hour to Cape Cod and then traveled 400 km/hr to Nantucket. Based on this analysis, it is unlikely that this bat resides in the analysis area. Accordingly, BOEM does not need to consult with FWS about this species.

Comment theme: Proposed USFWS BA revisions.

Associated comments

Table I-191 provides the full list of comments received as part of this comment theme.

Table I-191. Proposed USFWS BA revisions comments.

Comment Number	Comment
301-95	The BA prepared for the USFWS incorrectly assumes that the Project includes operational adjustments. The DEIS (pg. H-36) references average wind speeds and expected operations, the COP (pg. 4-99) characterizes average wind speeds, and Appendix Q of the COP (Avian and Bat Risk Assessment, pgs. 20- 21, 34) characterizes bat activity in relation to wind speed. The BA prepared for USFWS should be revised to be consistent with the information presented in the DEIS, COP, and Risk Assessment.
301-94	Note that EMF is not an Impact Producing Factor for bats analyzed in the COP/Risk Assessment because the SFEC - Onshore cable will be buried. The BA prepared for the USFWS concludes that there will be insignificant impacts associated with EMF from the onshore cable on bats. For consistency, SFW recommends the text in the BA prepared for the USFWS be modified to clarify that bats have a very low likelihood of exposure to EMF onshore for this reason, or that the BA prepared for the USFWS state that exposure is unlikely for bats and therefore is not analyzed further in the document.

Response to comments: The commentor is incorrect, the BA was not suggesting operational adjustments for cut in speeds but instead states that the cut in speeds varies among turbine models. The fact that the BA did not include the shielding effect of soil on EMF does not change the conclusion because the EMF field from the cable is not anticipated to impact bats that do not spend time on the ground. The USFWS concurred with the effect determination for northern long eared bats. No change to the EIS is warranted.

Comment theme: Impacts to offshore/migrating bats.

Associated comments

Table I-192 provides the full list of comments received as part of this comment theme.

Table I-192. Impacts to offshore/migrating bats.

Comment Number	Comment
349-103	The COP and DEIS describe the risk of turbine strikes for bats as low, with the impacts from South Fork Wind Farm being negligible to minor because cave-hibernating bats, such as Myotis species, are generally not observed offshore. This characterization is likely downplaying the risk to cave bats, as they seem to be more commonly found offshore and at further distances from the mainland than described in the COP and DEIS. Bat acoustic survey efforts in the mid-Atlantic identified Myotis calls at 63% of sites surveyed and Myotis species were present at 89% of sites surveyed across the Gulf of Maine, mid-Atlantic, and Great Lakes. Motus data also indicate that Indiana bats, little brown bats (M. lucifugus), and eastern small-footed bats (M. leibii) have made cross-water flights near Cape Cod. The avian and bat assessment prepared for this project acknowledges the "documented widespread and seasonally predictable presence of multiple bat species at remote sites (>32 km [20 mi] from shore), which indicates bats can fly considerable distances offshore during migration." Recent survey efforts on Martha's Vineyard also detected little brown bats making offshore movements, with one bat traveling from Martha's Vineyard to Cape Cod. The presence of the federally threatened northern long-eared bats (M. septentrionalis) on both Martha's Vineyard and Nantucket indicates that this species can cross open water and the species has been tracked making long distance flights over water in the Gulf of Maine. The avian and bat assessment prepared for this project indicates that northern long-eared bats may cross the SFWF during mitigation.
349-105	The DEIS acknowledges that bats may be “attracted to the WTGs as potential roosting opportunities or use the structures for navigational purposes while migrating.” Bats, especially migratory, tree-roosting species like the eastern red, hoary, and silver-haired bats, are believed to be attracted to land-based wind turbines and have been recorded altering flight paths to approach turbines. Although no scientific consensus exists on why bats are attracted to onshore wind facilities, theories include that bats may perceive turbines as trees to roost in and bats may seek insect prey that congregate near turbines. This attraction behavior puts bats at increased risk for collision with turbine blades and whether such behavior could occur at offshore wind turbines merits careful consideration. Although more research is needed to characterize how bats are using areas in the WDA and the OCS, it would be reasonable to assume that bats—particularly migratory, tree-roosting species that seem to be attracted to land-based wind turbines—may experience a similar attraction to turbines offshore and that these turbines might be particularly attractive due to representing sparse resources, which could put bats at increased risk for collision. If offshore wind turbines are attractive to bats, their potential impact to bats may be dramatically underestimated in the DEIS.
349-98	Little data exist on bats and offshore wind energy, although research has shown that bat fatalities are common at land-based wind facilities over the last decade. How bats use the offshore environment is not well understood. Therefore, BOEM should be conservative in its analysis, as a lack of available information on impacts to bats from offshore wind does not indicate impacts are unlikely. The DEIS and COP fall short of properly addressing the potential impacts to bats from the Project. The DEIS itself is entirely deficient of any environmental impact evaluation, relying solely on the COP, without any regard for primary scientific sources in evaluating risk to bats populations. The FEIS must address population level, cumulative impacts to bat populations from the Project, other offshore wind developments expected in the Atlantic OCS, and terrestrial development in the reasonably foreseeable future. In doing so, BOEM must consider impacts to a broader range of bat species which may be impacted by the Project including the federally endangered Indiana bat (Myotis sodalis).

Response to comments: Section 3.4.1 of the FEIS has been updated to include additional information on migrating bats. The FEIS uses the best available information, and thus complies with the procedural requirements of NEPA to predict potential impacts on bats from the Proposed Action. See response to comment 349-101 regarding the Indiana bat.

Comment theme: Tree-clearing impacts.

Associated comments

Table I-193 provides the full list of comments received as part of this comment theme.

Table I-193. Tree-clearing impacts comments.

Comment Number	Comment
338-43	A discrepancy exists related to tree-clearing activities for the onshore portion of the facility. Appendix H, p. H-36 reads "…tree removal, vegetation clearing, and other major noise-producing activities near potential bat habitat would take place during winter months when northern long-eared bats are not present…". However, Appendix G, Table G-2 p. G-6 indicates that tree clearing time-of-year restriction will "Require that trees greater than 3 inches (7.6 centimeters) diameter at breast height not be cleared from June 1 to July 31." NYS does not agree that restricting tree clearing activities only in June and July is sufficient to avoid adverse impacts to bats. Further, as part of the Article VII proceeding, DWSF has agreed to the following condition: "Northern Long-Eared Bat. Certificate Holder shall perform tree clearing activities between December 1 and February 28 to avoid potential impacts to Northern Long-Eared Bat ("NLEB"); provided, however, that if any proposed clearing activities are performed outside of the December 1 through February 28 window, roosting tree surveys shall be conducted in accordance with an NLEB Monitoring and Impact Minimization Plan, in coordination with NYSDEC. A Roosting Tree Survey Plan will be developed for the SFEC-Interconnection Facility and SFEC-Onshore in the Project Area, in consultation with NYSDEC, and will be included as part of the EM&CP. As part of the survey, biological monitors shall identify and evaluate any potential roosting trees for the NLEB. Emergence counts will be taken no more than 24 hours before tree removal to confirm that there are no NLEB roosting. This would occur through a combination of acoustic and visual surveys. If Certificate Holder or NYSDEC identify roosting trees within 150 feet of the Project Area, the Certificate Holder will coordinate with NYSDEC regarding any potential minimization and mitigation measures required to comply with 6 NYCRR § 182 and applicable federal laws and regulations promulgated by the USFWS."

Response to comments: Section 3.4.1 of the FEIS has been updated to include the condition agreed upon between SFW and NYSDEC.

Comment theme: Best available science.

Associated comments

Table I-194 provides the full list of comments received as part of this comment theme.

Table I-194. Best available science comment.

Comment Number	Comment
349-102	Assumptions that the COP and DEIS make about bat use of the offshore environment, exposure risk, and avoidance are not based on the best available science and lead to a likely underestimation of risk for bats.

Response to comments: Thank you for your comment. The FEIS uses the best available information, and thus complies with the procedural requirements of NEPA to predict potential impacts on bats from the Proposed Action.

Comment theme: Cave bat impacts.

Associated comments

Table I-195 provides the full list of comments received as part of this comment theme.

Table I-195. Cave bat impacts comment.

Comment Number	Comment
349-108	Because there is so little research on bats offshore, impacts to bats are often only given cursory consideration. However, bat species on the east coast are facing stressors on land that may make their populations more vulnerable to additional take offshore. The northern long-eared bat and the Indiana bat are listed as threatened and endangered under the ESA due, in part, to high rates of mortality from white-nose syndrome, a highly pathogenic fungus. A judge recently ruled that the USFWS's decision to list the northern long-eared bat as threatened (rather than endangered) was arbitrary and capricious and failed to consider the best available scientific evidence; that listing decision has been remanded to the agency so the status of the northern long-eared bat could change in the near future. Similarly, numerous other east coast bat species, such as the little brown bat, eastern small-footed bat, big brown bat (Eptesicus fuscus), and tricolored bat (Perimyotis subflavus) are all affected by white-nose syndrome. Due to white-nose syndrome mortality, the USFWS recently issued a positive 90-day finding for the petition to list the tricolored bat and USFWS staff have communicated their intent to assess the little brown bat for potential ESA-listing. The three migratory bat species on the east coast, the silver-haired, eastern red, and hoary bat, are the bat species most highly impacted by land-based wind energy development, representing almost 80% of all bats killed at wind facilities in North America. Recent and ongoing research has implicated wind energy as causing potential population-level declines for hoary bats and eastern red bats, and the two species are expected to be recommended for listing in Canada in the near future. East coast bat species, such as little brown bats, tricolored bats, big brown bats, northern long-eared bats, Seminole bats (Lasiurus seminolus), and Indiana bats have also been documented killed by wind turbines. Because of these existing stresses on bat species, accurately accounting for how offshore wind could affect their populations is critical. The cumulative impacts analysis in the DEIS has many of the issues discussed above, including the need to update the analysis to include the best available science, that cave bats are likely more common offshore than the COP and DEIS represent, that seasonal use of the offshore environment by migratory bats does not imply low exposure and low impact, the failure to account for bat attraction to turbines, and that larger turbines may kill more bats than smaller turbines. Accordingly, BOEM should update their cumulative impacts analysis for bats to reflect the issues discussed above in Section III.H.3.

Response to comments: The DEIS included information on cave bats in Section 3.4.1 and BOEM determined that the proposed Project-related impacts had the potential to result in impacts on cave bat populations already affected by White Nose Syndrome. Furthermore, while WTGs on the OCS may not impact cave bats, onshore activities could have impacts on cave bats and this was analyzed in the DEIS. Therefore, the FEIS does not warrant any changes. More information on cave bats can be found in the biological assessment submitted to USFWS for listed species.

Comment theme: Bat geographic analysis area.

Associated comments

Table I-196 provides the full list of comments received as part of this comment theme.

Table I-196. Bat geographic analysis area comment.

Comment Number	Comment
349-109	The Geographic Analysis Area for cumulative impacts to bats is defined as 100 mi offshore and five mi inland. The migratory movements of bats, especially migratory tree bats, are poorly understood, many species of bats—both long-distance migrants like migratory tree bats but also cave bats—are capable of flights in excess of 100 km, indicating that bats found offshore in wind development areas could also be found significant distances inland. Research from Canada found that 20% of little brown bat movements exceeded 500 km, which is further supported by data from tracked little brown bats, which shows individuals using both coastal areas and making long-distance flights to locations significantly further inland than five mi. Hoary bats, which are capable of long-distance flights over water,4 have been recorded traveling over 1,000 km and are thought capable of migrations in excess of 2,000 km. Furthermore, in addition to little brown bats, data in Motus tracks movements of individual silver-haired bats, eastern red bats, hoary bats, eastern small-footed bats, and Indiana bats from coastal areas on the east coast to areas in excess of 100 mi inland. These movements seem to refute BOEM's assertion that bats that could be exposed to offshore wind energy projects would not be found far inland (and therefore exposed to land-based wind energy facilities) and instead support that the original geographic scope of 100 mi inland was more appropriate. BOEM should conduct a thorough review of the literature on bat migration and radio- and GPS-tagged bats and select a boundary that better reflects the potential habitat use of exposed bats. This revised boundary will likely require an updated analysis to reflect that bats exposed to offshore wind projects could not only be exposed to multiple offshore wind facilities but also be exposed to land-based wind energy projects.

Response to comments: The information provided by the commentor confirms that there is a lot known about the migratory movements of bats. The five-mile inland boundary captures the bats near or in coastal habitats and for those that migrate they may travel south along the coast or as pointed out by the commentor travel west inland. See response to comment 349-101 regarding the Indiana bat.

Comment theme: Turbine cut-in speeds.

Associated comments

Table I-197 provides the full list of comments received as part of this comment theme.

Table I-197. Turbine cut-in speeds comment.

Comment Number	Comment
349-106	As the applicant has not yet selected their final design, the actual cut-in speeds of the WTGs are only assumptions. The DEIS relies on an unsupported WTG cut-in speed of five meters per second to assume “bat activity can be expected to be low during WTG operation and limited to warmer periods in the summer or during fall migration, and thus, the risk of injury and/or mortality to bats would also be minor.” This determination cannot be made in absence of actual WTG design specification to confirm cut-in speeds. If BOEM wishes to rely on a minimum cut-in speed as an avoidance measure, then it must be supported by a mitigation measure requiring curtailment of the WTGs at speeds below five meters per second.

Response to comments: The text in the FEIS is updated and does not rely on a minimum cut-in speed as an avoidance measure to protect bats.

Birds

Comment theme: Avian survey methodology.

Associated comments

Table I-198 provides the full list of comments received as part of this comment theme.

Table I-198. Avian survey methodology comment.

Comment Number	Comment
349-63	Personned aerial surveys, if done correctly, can not only inform offshore wind siting that minimizes avian impacts, but are also useful for measuring the realized level of impacts when comparing survey results before and after construction. While the Ocean Special Area Management Plan (OSAMP) surveys were well designed to provide a detailed spatial assessment of avian distribution off the coast of Rhode Island, none of the personned aerial surveys used to assess the Project were capable of distinguishing similar avian species to the degree necessary. The aerial surveys off the Massachusetts coastline similarly aggregated many medium-sized tern sightings into a shared "tern species" category, which cannot be parsed out to provide detail on the number of endangered Roseate Terns, NY state threatened Common Terns, or Arctic Terns. While the COP references an interim report from the OSAMP, which does list the number of terns attributed to species, most of these sightings are based on surveys from shore and are not relevant to the Project area. The publication produced from these surveys admits that the number of sightings attributed to species from aerial and vessel surveys was too low to inform a reliable density estimate within the OSAMP. The Marine-Life Data and Analysis Team (MDAT) predictive models, while excellent for estimating broad-scale, relative patterns of avian abundance along the Atlantic, are not of suitable resolution for reliably estimating distribution at a local scale. The MDAT models are wholly inappropriate for use in impact assessments and should only be used for broad scale planning purposes (such as determining Call Areas). Furthermore, even as it relates to broad scale evaluations, BOEM's own report provides that the MDAT models are not suitable for predicting distribution and abundance for a rare and narrowly distributed species like the Roseate Tern. As a result, when these and other data deficiencies are factored into the biological assessment, the density of Roseate Terns within the SFWF is likely to be underestimated. The core of the Roseate Tern's breeding range, which overlaps with the Project area, is small and therefore a conservative approach for this species and others that may be impacted by these surveys is required by the Final EIS. Adults and sub-adults may occur in the project area in the spring and summer to forage, while individuals of all ages likely cross the project area in the late summer and fall to reach their staging grounds on Cape Cod. Roseate Tern use of this area, and other wind development projects in the Atlantic OCS, should be a priority in pre- and post-construction monitoring so that true impacts to the population from collision and displacement can be properly measured and compensated.
349-64	We are pleased to see that the COP for the Project relies on a combination of personned aerial surveys, vessel surveys, and digital aerial surveys over the project footprint. However, it relies mostly on raw data from these surveys to assess the project area. The Final FEIS must address the biases of each of these methods and present published results from the associated studies that account for imperfect detection. Distance sampling is the most obvious method to address imperfect detection in transect surveys and we recommend that BOEM and developers incorporate this accepted method into their survey protocols. As discussed above, personned aerial surveys are unable to reliably distinguish between similar-looking species. Digital area surveys may be able to attribute observations to species more frequently, but so far there are no peer-reviewed publications which document the reliability of this method. Vessel surveys, while occasionally better for attributing observations to species, are biased against species which sit on the water (sea ducks, waterbirds, alcids) and are more likely to flee from approaching vessels. Because of these biases, it is wholly inappropriate to assess the SFWF using the raw data alone. The Final EIS for SFWF must not rely on the presentation of raw data, and instead rely on models produced from these standardized collection methods. Additionally, while the OSAMP vessel surveys were well designed to account for detection biases, the surveys covered a limited time period. Annual and seasonal variations in avian movement may not have been well enough captured during the limited survey period, and therefore BOEM should require survey efforts to continue over the SFWF and surrounding lease areas planned for the foreseeable future, to capture this variation.
349-69	The FEIS must produce a fuller picture of migratory pathways for songbirds and shorebirds. This could be realized with the addition of satellite tracking information from Movebank and NASA's Icarus project for larger bodied shorebirds, additional research and tagging of priority bird species using radio and satellite telemetry technology as appropriate, and an expansion of the radio telemetry receiver network in the offshore environment. While we recognize that implementing and completing new tracking studies prior to the publication of the FEIS, BOEM should outline their plans to fill these knowledge gaps to inform future offshore wind operation and siting processes. In addition, there should be a commitment to, and process outlined for, addressing unforeseen impacts through compensatory mitigation (see section on Compensatory Mitigation for Birds). The FEIS should use the data currently available to calculate the risk to these migratory birds, especially in regard to modern turbine height, and provide for tracking these migratory birds during the life of the project and over all the cumulative projects in the Atlantic OCS.

Response to comments: A discussion of impacts on threatened or endangered bird species is included in the biological assessment submitted to USFWS, which can be found at the following link: https://www.boem.gov/renewable-energy/state-activities/south-fork. In the USFWS concurrence letter dated March 4, 2021, no roseate terns were detected in the Lease Area during aerial surveys or during boat-based surveys (Paton et al 2010). USFWS indicated that roseate terns are likely to occur in the action area, albeit in small numbers. Breeding and non-breeding terns, including 2-year-old birds and adults, may occur in the action area in spring, late summer, and early fall resting on the water, foraging, or traveling across the WDA to adjacent foraging habitat in Nantucket Shoals. Roseate terns may also pass through the WDA during their spring and/or fall migration. The highest probability for exposure to wind energy facilities may occur during post-breeding dispersal and migration (mid-July through late September) (Loring et al. 2019). Roseate terns may pass through the WDA during migration or when initiating their migration from staging areas on Cape Cod, Martha’s Vineyard, or Nantucket. Northeastern birds (including Cape Cod birds) disperse throughout the breeding area in July and August and then concentrate into a major staging area on Cape Cod in late August and September. The fall population would be a portion of the entire adult population (breeding and non-breeding) with the addition of young-of-the-year birds during migration if post-breeding staging occurs in Massachusetts (Nisbet et al. 2013). We do not expect the entire population would fly through the WDA while traveling to foraging habitat or during migration. Moreover, based on coarse estimates of roseate tern flight heights reported by Loring et al. (2019) and flight ascending rates for migration based on information from other tern species, the number of roseate terns passing through the rotor swept zone may be small. The BOEM Massachusetts Clean Energy Center report by Veit et al. (2016) quantified low tern densities in this area.

The final EIS uses the best available information, and thus complies with the procedural requirements of NEPA to predict potential impacts on birds from the Proposed Action. A framework for an avian and bat post-construction monitoring program would be developed and implemented in coordination with applicable federal and state resource agencies (see Appendix G for details). Additional mitigation and monitoring measures may arise from consultations and coordination with federal and state resource agencies. These additional mitigation measures could be considered by decision-makers and incorporated into the record of decision.

Comment theme: Impacts to ESA-listed birds.

Associated comments

Table I-199 provides the full list of comments received as part of this comment theme.

Table I-199. Impacts to ESA-listed birds comments.

Comment Number	Comment
317-10	Impacts to ESA-Listed Species Must Be Given Further Consideration We appreciate the studies and analysis that went into assessment of likely impacts to ESA-listed species, but have outstanding concerns due to remaining uncertainty. In particular, we are concerned about movement of Roseate Terns between breeding areas and post-breeding staging areas. Loring et al. (2019) provides strong data for nearshore areas, but less so within the wind lease areas themselves where it was not possible to install a Motus receiver. Roseate Terns, as well as Red Knots and Piping Plovers, are at risk of colliding with turbines, but in what numbers remains to be seen. The recommendations provided for collision monitoring provided in previous sections is critically important to document impacts to ESA-listed species, particularly the inclusion of digital video technology. We also recommend that a sample size of Roseate Terns be included in Motus tagging to obtain sufficient data on post-breeding movement of this species.
349-78	Any level of construction which will impact ESA-listed species during the active nesting season is unacceptable. If there are Piping Plover or tern chicks within 100 m of onshore construction activities, these activities require that the developer higher a spotter to prevent the chicks from encountering harm during activities. Additionally, no construction activities may happen on the beach or intertidal zone within 100 m of piping plover chicks or nests, as this would starve breeding plovers of necessary foraging habitat.

Comment Number	Comment
349-80	In addition to better accounting for potential avian impacts in the Final EIS, as we have reiterated repeatedly herein, BOEM should require Deepwater Wind to undertake long-term Project monitoring before, during, and after construction for endangered species like Roseate Terns, Red Knots, and Piping Plover, for other species with a suspected high collision risk (such as shearwaters and petrels), for species of conservation obligation and, at a minimum, for the ten species of migratory birds that cross the Atlantic through the Project area. Monitoring for adverse effects requires multiple modes of evaluation in a coordinated framework pre- and post-construction. Radar, vessel and aerial surveys, acoustic monitoring, and telemetry are all complimentary tools that provide data necessary for evaluating impacts, though none of these tools provides the full picture when used alone.
349-97	Compensatory mitigation requirements under Section 7 of the ESA were essentially ignored by the previous administration. We urge the current administration to observe compensatory mitigation requirements for species currently listed and under listing consideration for the ESA which may be impacted by offshore wind development: Piping Plover, Red Knot, Roseate Tern, and Black-capped Petrel. Seabirds are long lived, have delayed maturity and low fecundity; these unique life-history traits require a substantial and long-term commitment to reach the offset needed. Given that compensatory mitigation is time-consuming from concept to success, we urge the developers and agencies to commit to this, and initiate action as soon as possible.
378-4	Joel Merriman: Third point, we appreciate the studies and analysis that went into assessment of likely impacts to ESA listed species, but find that we do not share the confidence that this is discountable. In particular, we are concerned about movement of roseate turns between breeding areas and post-breeding staging areas. Studies of this species' movements to inform risk assessment have strong data for near-shore areas, but not as much within the wind lease areas themselves. In our view, this leaves too much unknown to assume that the species will not be substantively affected. This species, as well as red knots and piping plovers, are also at risk of colliding with turbines during migration.
389-1	Please refer to the Service's correspondence on the Biological Assessment (BA) dated March 4, 2021, for our concurrence on BOEM's determination that the proposed project may affect, but is not likely to adversely affect listed species under the jurisdiction of the Service including roseate tern (Sterna dougallii; endangered), piping plover (Charadrius melodus; threatened), rufa red knot (Calidris canutus rufa; threatened), seabeach amaranth (Amaranthus pumilus; threatened), sandplain gerardia (Agalinis acuta; endangered) and northern long-eared bat (Myotis septentrionalis; threatened).

Response to comments: A discussion of impacts on threatened or endangered bird species is discussed in the Biological Assessment submitted to USFWS, which can be found at the following link: https://www.boem.gov/renewable-energy/state-activities/south-fork. The USFWS concurred with the effect determination in the BA. Please also refer to Appendix G of the FEIS for the monitoring and mitigation onshore and offshore activities that has been proposed for the agency-preferred alternative.

Comment theme: Collision risk analysis.

Associated comments

Table I-200 provides the full list of comments received as part of this comment theme.

Table I-200. Collision risk analysis comments.

Comment Number	Comment
349-67	The FEIS should include a collision risk analysis on ESA-listed endangered and threatened species, NY-listed threatened, endangered, and species of concern, and International Union for Conservation of Nature (IUCN) listed endangered, threatened, and near threatened, at the very least, which are known to occur within a 20-km radius of the project area. These species include, but are not limited to Roseate Tern, Piping Plover, Red Knot, Common Tern, Least Tern, and Upland Sandpiper, including the risk to birds as they migrate through the projects. The Biological Assessment should be a starting place for this analysis, not the end point, and should include the most recently available scientific information. Furthermore, the Final EIS cannot rely on the COP to make its assessment of impacts from collision. Based on MDAT models, the Project will not likely have consistent impacts to avian populations during operation, especially when compared to call areas in the New York Bight and off the coast of North Carolina. However, these MDAT distribution models have limited reliability across species, and better methods for predicting impacts have not yet been applied in the offshore environment in the United States. Additionally, while collision events during migration are likely to occur less frequently, these events have the potential to have large, population-level consequences during a short time. All the current lease areas and call areas occur within migratory pathways for trans-Atlantic migratory songbirds and shorebirds. BOEM's FEIS needs to evaluate this cumulative risk, as the likelihood of large migratory collision events will increase as the total offshore wind footprint increases.
349-72	We have previously provided comments on the SEIS and DEIS for the VW I project regarding BOEM's use of CRMs. This criticism of BOEM's application of CRMs does not excuse BOEM to avoid these models in its evaluation of the Project. While limited, CRMs are one of the only tools available to hypothesize potential impacts to birds from collision in the offshore environment. We reiterate our concerns with BOEM's previous application of CRMs in the following paragraphs in hopes that BOEM will provide an adequate collision risk analysis in the FEIS for the Project. The Final SEIS should include a CRM-driven analysis for all species of conservation obligation which may occur within the SFWF and for which a current CRM would be appropriate, even if the species has not been documented within the footprint of the Project. This should include a recent stochastic derivation of the Band model, such as the McGregor (2018) version of the Band model.
349-71	The COP and DEIS do not adequately assess collision risk to seabirds. The COP appears to rely solely on a publication by Johnson et al. (2014) to suggest that seabirds do not fly high enough to collide with modern turbines. Table 2-13 provides a qualitative assessment of risk by species, but does not provide ranges of flight height, vital in determining potential collision risk. The COP also fails to provide the air gaps for any of the potential turbine models under consideration. The Final EIS must, at the very least, provide results from BOEM's own analysis of the vulnerability of 177 species of birds that could come into contact with the WTGs in the cumulative OCS WDAs in the foreseeable future and incorporate this analysis into the cumulative impacts conclusions within the Final EIS. In doing so, the FEIS must be transparent in presenting the high level of uncertainty in the results, including high and low estimates for population-level cumulative impacts. Much of the high uncertainty in these models is a result of highly variable concentrations of seabirds throughout the year. The COP for VW I, references a study by Nisbet et al. (2013), acknowledging, Petrels and shearwaters that breed in the southern hemisphere visit the northern hemisphere during the austral winter (boreal summer) in vast numbers. These species use the US Atlantic Outer Continental Shelf ("OCS") region so heavily that, in terms of sheer numbers, they easily swamp the locally breeding species and year-round residents at this time of year. Additionally, "many species continue to congregate outside the breeding season in areas of high productivity, such as upwellings. Huge flocks of Sooty and Greater Shearwaters have been seen in these areas." "For most development sites, the statistical variation in the data derived from surveys is likely to mask any within-site variations in bird density." The FEIS should consider this variability of large concentrations of birds even in short periods of time in its analysis of seasonal abundance when calculating risk to birds.
349-74	Additionally, CRMs should consider differences in daytime and nighttime flight patterns. As Band himself stipulates: For some species typical flight heights are dependent on the season, and in such a case it will be best to use seasonally dependent typical flight heights in assessing collision risk for each month, rather than average flight heights across the year...Flight activity estimates should allow both for daytime and night-time activity. Daytime activity should be based on field surveys. Night-time flight activity should be based if possible on nighttime survey; if not on expert assessment of likely levels of nocturnal activity...collision model[s] should take both day and night flights into account. Where there is no night-time survey data available, or other records of nocturnal activity, for the species in question, (or for other sites if not at this site), it should be assumed that the Garthe and Hüppop/ King et al. 1-5 rankings apply. These rankings should then be translated to levels of activity at night which are respectively 0%, 25%, 50%, 75% and 100% of daytime activity. These percentages are a simple way of quantifying the rankings for use in collision modelling, and they may to some extent be precautionary.

Comment Number	Comment
349-90	The FEIS should include a risk assessment, considering the largest turbine size being considered by SFWF that addresses 1) impacts from collision and barrier effects to migrating birds, and 2) potential increased habitat loss that may need to occur in order to reach offshore wind energy goals.
349-68	Collision risks to nocturnal migrants have not been properly accounted for in either the COP or DEIS. The COP inappropriately uses the Robinson Willmot (2013) study and OSAMP study to assess risk for nocturnal migrants, despite acknowledging that these studies were not designed to assess risks for nocturnal migrants. Likewise, radar studies conducted on Block Island, while helpful in characterizing migration timing, do not reach the SFWF and are based on a limited number of years. The Final EIS must consider migration timing, variations in flight height, and the distance from shore at which nocturnal migrants reach maximum migration height. It is additionally important to note that acoustic monitoring within the Project is not, on its own, an appropriate technology to characterize the community of nocturnal migrants within the Project footprint. We recognize that BOEM is considering acoustic monitoring as a standardized monitoring method. However, evidence suggests that Empidonax flycatchers and vireos, two of the most abundant nocturnal migrant groups, do not emit nocturnal flight calls, and therefore, would not be accounted for using acoustic monitoring. Additionally, acoustic monitoring does not adequately assess flux – a necessary value for assessing collision risk and estimating population-level impacts. La Sorte and Fink (2017) document the flights of species of migratory birds that migrate over the Atlantic Ocean: American Golden-Plover, Bicknell's Thrush, Blackpoll Warbler, Bobolink, Buff-breasted Sandpiper, Connecticut Warbler, Pectoral Sandpiper, Semipalmated Sandpiper, Solitary Sandpiper, and White-rumped Sandpiper. Two species classified by FWS as Birds of Conservation Concern—Upland Sandpiper and Whimbrel, also cross the Atlantic Ocean during migration. We do not currently know what the specifications will be of the turbines that Deepwater Wind plans to use in the Project. While there is evidence to suggest that nocturnally migrating songbirds typically fly above the rotor swept zone for current wind turbines in operation, we also know that nocturnal migrants fly lower, potentially within the rotor swept zone, during inclement weather and cross winds. Nocturnal oceanic migration for the ESA-listed Piping Plover is not a rare event. The COP incorrectly suggests that Piping Plover migrations in the offshore is a rare event, with statements like, "Piping plover have been observed in Bermuda, so they are capable of migrating offshore, or they may get blown off course during inclement weather." The majority of Piping Plover winter on islands in the Caribbean, so they necessarily leave the mainland coastline during migration. Furthermore, remote tracking studies that rely on the Motus passive VHF radio tracking system confirm that Piping Plovers migrate nocturnally over open water, "directly across the mid-Atlantic Bight, from breeding areas in southern New England to stopover sites spanning from New York to North Carolina...at altitudes of 288 m (range of model uncertainty: 36-1,031m)," putting this ESA-listed species at high risk of collision with turbines, should their path cross through the farm. The current configuration of VHF receiving towers does not allow for detailed characterization of flight paths for this species or any protected avian species using this tracking technology, and therefore, BOEM should take a conservative approach in the Final EIS when evaluating potential impacts (cumulative or otherwise) to Piping Plover and other species which may fly through the SFWF and other wind farms expected in the foreseeable future. It is imperative that BOEM invests in supporting this work and in constructing and maintaining a full network of VHF receiving towers throughout the offshore environment.

Response to comments: A discussion of impacts on threatened or endangered bird species is discussed in the Biological Assessment submitted to USFWS, which can be found at the following link: https://www.boem.gov/renewable-energy/state-activities/south-fork. The BA includes a collision risk analysis for ESA-listed species. BOEM determined that the Project "may affect, but is not likely to adversely affect" any of the ESA-listed species that may occur in the Project Area. BOEM plans to engage in project-specific ESA consultations for all future offshore wind developments. BOEM is currently working with USFWS to develop programmatic consultation for future offshore wind development; this consultation will be informed by a currently ongoing BOEM study, which can be found at the following link: https://www.boem.gov/environment/environmental-studies/transparent-modeling-collision-risk-three-federally-listed-bird.

The FEIS has been updated to reference the cumulative Avian Stochastic Collision Risk Model results in the Vineyard Wind FEIS Appendix A. This analysis incorporated variability into model inputs and as a result provides collision predictions with estimated variability around the variables identified by the commenter. The FEIS has also been updated to include all model inputs, including a measure of nocturnal activity. The collision risk modeling presented in the FEIS relied upon flight height data from Johnson et al. (2014) that was derived from thousands of observations, likely under varying weather and wind speed conditions, and thereby capturing many of the conditions identified by the commenter. The estimates of potential collision mortality provided in the FEIS are not relied upon to reach an impact level determination, but were provided to explore the potential for collision mortality associated with the anticipated development on the Atlantic OCS generally, and the proposed SFWF Project, specifically.

The FEIS uses the best available information, and thus complies with the procedural requirements of NEPA to predict potential impacts on birds from the Proposed Action. A framework for an avian and bat post-construction monitoring program would be developed and implemented in coordination with applicable federal and state resource agencies (see Appendix G for details). Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision.

Comment theme: Mitigation and monitoring measures for birds.

Associated comments

Table I-201 provides the full list of comments received as part of this comment theme.

Table I-201. Mitigation and monitoring measures for birds comments.

Comment Number	Comment
10-1	It seems like a broad range of things were considered in this document, and I think the alternatives were well thought out. However, a few months ago, I read an article posted on the Smithsonian Magazine, which discussed wind turbines with one black blade. The study found "that the turbines with one black blade killed 71.9 percent fewer birds than standard turbines on the same wind farm in the Norwegian archipelago of Smla." Painting just one blade black caused the birds to change their flightpath, I realize this is just one study but it's provocative. If the agency could implement this change here, and if that change were to be found to be viable, inexpensive, and an efficient way of reducing endangered bird strikes, imagine how great of an outcome that would be. This project could help set precedent for future projects, which could result in saving an entire bird species. Even if the alternative is not utilized, I still believe it should be considered Endangered Species Act (Taken from the EIS) Section 7(a)(2) of the ESA of 1973, as amended (16 USC 1531 et seq.), requires that each federal agency ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of those species . . .. BOEM has accepted designation as the lead federal agency for the purposes of fulfilling interagency consultation under Section 7 of the ESA for listed species under the jurisdiction of NMFS and USFWS. BOEM will consult on the proposed activities considered in this EIS with both NMFS and USFWS for listed species under their respective jurisdictions. 3.4.3.1.3SPECIAL-STATUS SPECIES (Taken from the EIS) The USFWS IPaC official species list for the Project, dated September 17, 2020, contains the following three bird species: piping plover (federally threatened and state endangered), rufa red knot (Calidris canutus rufa) (federally threatened), and roseate tern (Sterna dougallii) (federally and state endangered) (VHB 2018). BOEM has prepared a BA to address Project effects to federally listed species under the jurisdiction of the USFWS, pursuant to Section 7 of the ESA (BOEM 2020b). The BA also provides detailed accounts for each of these species. New York Natural Heritage Program (NYNHP) records include 21 New York State-listed and protected species for the analysis area (VHB 2018:Appendix F). State-listed bird species documented or potentially present in the SFWF and portions of the offshore and onshore SFEC include the state-threated northern harrier (Circus hudsonius), bald eagle (Haliaeetus leucocephalus), least tern (Sternula antillarum), and common tern (Sterna hirundo) (Stantec 2018:Table 5). Bald eagles are federally protected by the Bald and Golden Eagle Protection Act, 16 USC 668 et seq. No bald eagle nests have been recorded near onshore Project components, and suitable bald eagle habitat on Long Island is limited (Stantec 2018) Special-Status Species (Taken from the EIS) Federally and state-listed bird species maybe at risk of collision during construction, although risk of collision is considered low because these species are expected to infrequently occur over the SFWF (Stantec 2018). Although the loss of one or a few individuals to at-risk bird populations would represent an adverse impact, conservation measures identified during the ongoing ESA Section 7 consultation with the USFWS would minimize adverse impacts to federally listed bird species. Therefore, Project adverse effects would be minor Conclusion Therefore, based on the EIS data mentioned supra, it would seem there are protected birds in the area of project that could be harmed. Painting one blade black, or at least considering it would be a reasonable solution to protect the birds.. I have provided the link below to the aforementioned article. https://www.smithsonianmag.com/smart-news/black-wind-turbine-blades-help-birds-avoid-deadly-collisions180975668/
14-1	The EIS states there will be little impact on birds, but later acknowledges there are some species more susceptible to collision with the wind turbines. The EIS briefly mentions in appendix G the possibility of mitigating this during construction by installing bid deterrents, such as painting a turbine blade black. This should be a necessary addition during construction, not a possibility. Something as simple and cost effective as painting a blade could save many birds. BOEM should consider how this simple addition can protect our avian population.

Comment Number	Comment
349-82	We support the requirement that industry mortality reports should be made promptly available to the public and this requirement should be incorporated into the Final EIS and ROD.
145-10	Offshore wind development may cause negative impacts to bird and bat populations from collisions with turbines and habitat displacement. Rotor speed, rotor size, the amount of turbines, turbine location, turbine lighting and the cumulative impact of other turbine projects, are all factors that BOEM must examine and mandate mitigation measures to reduce negative impacts as much as possible. These factors can greatly affect the level of negative interaction between turbines and birds and bats. Offshore wind development may also displace bird and bat populations from foraging grounds or cause avoidance of wind farms altogether. Impacts of avoidance should be examined through an ecosystem based management lens to determine the overall footprint of this disturbance, with careful monitoring and evaluation mechanisms clearly communicated in a transparent and public manner in place to address any adjustments that might help mitigate negative outcomes.
317-3	Robust Bird Collision Monitoring Must Be Conducted Bird collisions at offshore wind facilities have been minimally studied to date, despite the many years of industry development in European waters. Skov et al. (2018) is frequently cited, but this study consisted of cameras on two turbines in the interior of a single facility. It found that, of 15 birds that were documented flying perpendicularly to the rotor blades within the rotor-swept zone, 6 (40%) collided with turbine blades. It is possible that, as predicted, collisions at facilities in the U.S. may be uncommon, and not have a substantial impact on bird populations, but we can’t know that without robust data collection at operational facilities. In particular, a lack of collision monitoring makes it impossible to know whether these facilities are having an impact on Endangered Species Act (ESA)-listed species and other species of concern (see below). Bird collision monitoring is standard practice for onshore wind facilities. There is no reason that offshore wind development should be held to a different standard, fully recognizing the very different realities of conducting such monitoring in the two settings. To the contrary, a cautionary approach should be taken for this industry, which is new to U.S. waters and ecosystems. Table G-2 of the DEIS states that “Potential Additional Mitigation and Monitoring Measures” include acoustic monitoring, installation of Motus receivers on wind turbines, deployment of up to 150 Motus tags per year for up to 3 years, and avian behavior point count surveys at individual turbines. We strongly support this, with caveats (see “Recommendations” below), and recommend that this be carried forward to the COP and Final EIS as definitively included. Recommendations We recommend that South Fork Wind, and all other offshore wind facilities being planned in the U.S.: • Utilize the best available technology to monitor bird collisions once facilities are constructed, • Make bird collision data publicly available, providing transparency and an opportunity for informed discussion about minimizing impacts as this industry grows, and • Commit to upgrading to improved collision monitoring technology when it becomes available as part of an adaptive management strategy
317-5	We also recommend that digital video be added to the technologies currently being considered. This would provide key information that would otherwise not be obtained; in particular, identification of individual birds to species that are exposed to the turbines or struck in collisions. This would also conversely provide important information on avoidance rates.
317-6	Finally, we urge BOEM and the developers to use operational facilities as study sites for testing new technologies, and particular collision sensor technology. This will move important research forward and gather data specific to collisions in U.S. waters.
338-41	45. The DEIS should discuss mitigation methods proposed to limit the interaction between offshore wind turbines and migrating birds. For example, recent empirical evidence supports that Piping plovers cross the Atlantic outer continental shelf rather than follow the coastline when migrating (Loring et al., 2020).
349-70	Additionally, the FEIS should explicitly outline BOEM’s plan to implement collision detection and minimization measures during the operation of SFWF. Under the ESA and MBTA, developers are responsible for any take of migratory birds and ESA-listed species. However, without appropriate monitoring for collision detection, large collision events could have serious population-level impacts to migratory songbirds and shorebirds without any recourse. This is not an acceptable outcome, and BOEM must be clear in the FEIS in its plans to address this concern.

Comment Number	Comment
349-81	Post-construction fatality monitoring onshore is a key component of Tier 4 of the FWS Land-Based Wind Turbine Guidelines. Many wind projects onshore conduct post-construction monitoring, especially on public lands managed by the Department of Interior's Bureau of Land Management. The methodology of determining mortality rates at onshore wind projects consists of protocol level surveys around turbines to search for carcasses. The data are adjusted for searcher efficiency and carcass persistence among other extrapolations. This practice is entirely impractical at sea for obvious reasons, however, that is not reason enough to relieve the offshore wind industry from post-construction fatality monitoring--an obligation that the onshore wind industry has committed to and is required to fulfill. There is ongoing, rapid development of imaging and bird strike technologies used in the European Union and the United Kingdom, and such technologies are also being developed in the United States. Grant funding from the Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE), state energy agencies, and others supports technical and economic advancement of offshore and onshore wind. The DOE Wind Energy Technologies Office invests in energy science research and development activities that enable the innovations needed to advance U wind systems, reduce the cost of electricity, and accelerate the deployment of wind power. The DOE has recently funded development of collision detection technology from the Albertani Lab at Oregon State University. The Albertani group is continuing to test and modify its design to detect small object collisions with wind turbines at the National Renewable Energy Lab. BOEM and developers must support the development and integration of this or similar technologies. Similar technologies are being tested at Block Island Wind Project and other offshore locations in the EU and UK and are making rapid gains in being effective, officially verified, commercially available, and affordable at scale in the near future, possibly at the same time as the Project would be ready for construction and operation. The incorporation of these new monitoring technologies, and hopefully a standardized technology, should be a required element in the post-construction monitoring plan for the Project, even if it must be phased in when available if not immediately upon operation. BOEM should standardize the methodology for using these new technologies across all projects in the Atlantic OCS in order to incorporate mortality data, and possibly displacement data, into ongoing cumulative effects analyses, adaptive management strategies, to validate collision risk models, and to measure impacts on ESA-listed species and species of conservation obligation by augmenting tracking data with data from on-site detection technology. The DEIS proposes the following protocol to monitor collision impacts to birds in the Project: Require an annual report of any dead or injured birds discovered on Project vessels or structures. The report would contain the following information: species, photographs to confirm species, location, date, and other relevant information. Carcasses with federal or research bands must be reported to the U.S. Geological Survey Bird Band Laboratory, BOEM, and USFWS. This is contrary to the standard protocol for post-construction monitoring at onshore wind projects, where a radius from the turbine is prescribed as the search area and includes where birds may be expelled or thrown from the actual turbine structure and blades. The offshore structures anticipated to be installed by Deepwater Wind have very little available structure on which a dead or injured bird could land. Defining the structure as a search area, if it means the turbine base or nacelle (since no injured or dead birds could be found on the blades) is woefully inadequate. Only updated technology will detect bird strikes or mortalities in the appropriate range established by onshore post-construction mortality studies. The FEIS and the Record of Decision (ROD) for the Project should specifically include the adoption of these monitoring technologies when they are verified and commercially available as part of the Project monitoring framework and protocol as well as monitoring frameworks for future projects permitted by BOEM, and support and encourage their development and funding for their development and testing beginning at the Project. The shared cost of development and implementation of these technologies across all lessees and with BOEM, if standardized, would avoid an undue economic burden on individual projects.
349-89	Suggestions that increased spacing (1 nm) between turbines, as is proposed for the Project, would reduce risks to birds from both collision and displacement is unfounded, as offshore wind farms in Europe do not provide this level of spacing, and therefore, there is no operational comparison to be made. Instead, increased spacing means fewer turbines and less energy production within the footprint of the project, so more projects (and more space) will be necessary to meet state and national energy goals. Furthermore, greater space between turbines may increase collision risk if species vulnerable to collision end up using the wind farm more frequently. Unfortunately, these are all unknowns until these configurations are developed and operational. BOEM will need to fund studies to answer these questions either through tax revenue or through the preferred method of financial support from offshore wind project developers.

Comment Number	Comment
349-92	The DEIS suggests the following minimization measures: Install bird deterrent devices (including painting a turbine blade black [May et al. 2020]) to minimize bird attraction to operating turbines and on the offshore substations (OSSs), where appropriate and where DWSF determines such devices can be employed safely...The SFWF wind turbine generators (WTGs) would be widely spaced apart allowing bird species to avoid individual WTGs and minimize risk of potential collision. While painting turbines black is an admirable action, the proposed action is hardly a commitment. Additionally, the referenced study by May et al. (2020) suggests that the efficacy of this deterrent requires further study. Should BOEM require it, this could provide an excellent opportunity to institute adaptive management—studying the efficacy of black turbine blades in reducing collisions in order to inform best management at future wind farms. As we have addressed previously, widely spacing turbines is not a minimization strategy in itself, as there is little evidence to suggest that turbine spacing reduces risks to birds. However, this too could provide an opportunity to learn from this management practice and adapt management for future wind developments from this knowledge.
349-93	Instituting adaptive management, using the two strategies above as examples, will require robust collision monitoring. As we have noted in this document and in other letters to BOEM, collecting bird carcasses is a completely inadequate method for estimating collisions in the offshore environment. Instead, collision monitoring will need to use technology from which we can rapidly learn the variables contributing to collision risk and adjust management accordingly--including informed curtailment strategies as necessary.
378-3	Joel Merriman: Second point, requirements to monitor impacts to birds post-construction are inadequate. The biological assessment indicates that telemetry receiving stations and acoustic monitoring devices will be established at the facility. We strongly support this and recommend that this be carried forward to the COP and, final EIS. However, this falls short on one very important issue, which is how to detect bird strikes and how to identify which species are struck. A 2018 study in Europe used digital video cameras to accomplish this at an offshore facility, and this technology has continued to improve since. We strongly recommend that video cameras be used to monitor bird collisions at the South Fork wind project.
301-45	SFW also provides the following comments on the mitigation and monitoring measures proposed in Appendix G, Table 2 of the DEIS and Section 6 of the Biological Assessment (“BA”) submitted to the United States Fish and Wildlife Service (“USFWS”). • Bird deterrent devices. SFW has not proposed blade painting, due to potential concerns with navigation, visual impacts and technical blade integrity. In addition, while use of “passive” visual markings to increase turbine visibility and reduce avian collision risk holds promise,18 it requires demonstration of effectiveness before it is appropriate for commercial application.
378-5	Joel Merriman: Fourth point, we know that there will be impacts to birds and compensatory mitigation must be provided to offset these impacts. Project planning is proceeding at a faster pace than the science and technology needed to effectively measure impacts to birds, and we must err on the side of protecting this important resource. This requires proactive compensatory mitigation for species likely to be affected, whether this occurs within the regulatory context or is proactively provided by the developer.
378-6	Joel Merriman: Given these concerns and others, we urge the following revisions to the DEIS and COP. First we recommend studies of collision risks to nocturnal migrant land birds. Second, we recommend robust monitoring of bird presence and collisions with turbines post-construction, including use of digital video technology, to allow bird identification. This is particularly important for roseate turns and other ESA listed species. Third, we recommend that impacts to birds be compensated by initiating conservation work that will replace lost birds. Compensatory mitigation takes time from concept to success, so it is critical that we start this process now. Until these measures are implemented, we believe that operational curtailment should be considered during periods of high collision risk, such as fall migratory flights for nocturnal migrants and ESA listed bird species. Again, thank you for the opportunity to provide these comments.
349-95	Compensatory mitigation is another tool that should be used to offset adverse impacts of the Project. Given the current technology, there are no viable options for effectively minimizing the impacts of the Project to the extent needed to protect birds from harmful and long-term impacts. Furthermore, migratory birds pose significant conservation challenges, as many originate from other regions and actions to increase their populations require significant investment of time and resources to restore equivalent habitat. The breadth of species potentially affected, and the migratory nature of these species will require such environmental compensatory mitigation.

Comment Number	Comment
349-86	The DEIS fails to provide any reasonable scientific evidence to support its cumulative impact assessment for birds resulting from wind farm construction and operation in the Atlantic OCS. In reference to onshore activities, the cumulative impacts assessment neglects to provide for any cumulative impacts resulting from projects outside of the Project, instead only assessing impacts resulting from the current SFWF under consideration, "through the removal of 2.4 acres of deciduous forest for the interconnection facility and a small area (0.1 acre) of upland wildlife habitat at the selected O&M facility". The DEIS further asserts that the resulting impacts would be "localized and temporary, including avoidance and displacement, although no individual fitness or population-level effects would be expected." The assumption that removal of deciduous forest only creates short-term impacts and that displacement and habitat loss do not impact survival and fecundity is simply false. Regarding noise in the offshore, we simply do not know enough about the effects of noise from pile driving to diving marine birds to be able to assert that these activities do not result in changes to population vital rates. BOEM and the developer should support studies moving forward which quantify these impacts on marine birds, with a special focus on alcids.
349-79	Cox Ledge is considered to be a hot destination for birders in New England who wish to see pelagic bird species, like shearwater, petrel, and kittiwake. While the Project overlaps with the shoal known as Cox Ledge, we acknowledge that the Project has been well-sited to avoid the most significant impacts to marine birds, based on the avian distribution models resulting from OSAMP surveys. These models are based on exemplary survey methods and suggest that the areas leased by Deepwater Wind south of Rhode Island are preferred over other areas sampled within the OSAMP as it relates to predicted avian impacts. However, while this evidence suggests that the Deepwater Wind Lease Areas are predicted to be of lower impacts to birds, relative to others within the OSAMP survey boundaries, this does not suggest impacts will be non-existent. The analysis by Winiarski et al. Models population performance under various wind development area scenarios. There is evidence from these results to suggest that storm-petrels may be more impacted by these developments than other marine avian species and should, therefore, receive additional attention. Furthermore, these projected estimates are limited to impacts from distribution loss. The analysis does not attempt to estimate changes to population growth and, while it does address additional impacts from displacement, these impacts are likely underestimated. The authors state: Weighting of marine birds in the SCP based on their displacement sensitivity and conservation priority from Furness et al. (2013) increased the conservation priority ranking of nearshore waters. However, further development of displacement sensitivity weightings (Furness et al., 2013) are needed because they are currently based on relatively few OWED monitoring studies in Europe that were all conducted in relatively shallow waters. Increased monitoring of European OWEDs and future monitoring of OWEDs in US waters will lead to more accurate estimates of displacement sensitivity for species or species' groups of marine birds. We know that kittiwakes--a species which occurs within the OSAMP area--can be displaced up to 20 km from operating wind farms. We also know that, while birds may congregate more frequently in areas outside of the Project, they may continue to pass through the Project, putting them at greater risk of collision. We simply do not know the full extent of habitat loss that marine birds will experience as a result of the Project on Cox Ledge, nor do we know the rate at which birds that continue to forage in the area will be lost to collision. We do, however, know that birders have been consistently successful in sighting seabirds on trips to Cox Ledge, both on dedicated birding pelagic trips as well as on fishing trips. Whether or not these sightings are site-specific, Cox Ledge is a popular destination for birders, and gaining the support of this community will require BOEM to be transparent in its predictions of the potential impacts to birds from the Project. It will also require a clearly defined path forward for monitoring the impacts from the operational Project. This includes installing collision detection technology and continuing the OSAMP surveys now through construction and for several years following the start of operation.
349-61	Many of the species which may migrate through the Project area are not only protected under the Migratory Bird Treaty Act but are also protected by New York's endangered species regulations. Upland Sandpiper, for example, are state listed, and yet, potential impacts to the species are not addressed within the COP or DEIS. Additionally, BOEM should seriously consider species prioritized for conservation by avian expert partners, including the Atlantic Flyway Shorebird Initiative, Partners in Flight, Atlantic Coast Joint Venture, and the North American Waterbird Plan. Along with ESA-listing and IUCN Redlist status, the species included on these initiative priority lists are of high national and international conservation concern. Their priority status by these entities highlights their vulnerability and is further indicative of the need for enhanced mitigation and conservation measures to ensure their survival.
338-42	46. In Section 3.4.3.2.3, p. H-47 it states that construction activities are scheduled to occur "outside of the tern and plover breeding periods (i.e., April 1 through August 31)" However, to avoid the potential for a direct take of these species, construction activities should also not be scheduled during the fall migration period. As part of the ongoing Article VII proceeding, DWSF has agreed to no construction or maintenance activities occurring within 500 feet of the southern edge of the beach/pavement boundary between April 1 and November 1. By extending the no work window to November 1, it alleviates concerns that noise and other temporary construction and maintenance activities may deter or otherwise impact nesting or migrating shorebirds, including least tern and piping plover. Appendix G, Table G-2 proposes that the developer be required to report "any dead or injured birds discovered on Project vessels or structures." The DEIS should discuss what methods the developer considered to monitor collisions and recover bird and bat carcasses.

Comment Number	Comment
317-11	Compensatory Mitigation Must Be Provided for Impacts to Birds It appears likely that a significant number of birds protected by federal laws will be killed in collisions with turbines at South Fork Wind, and at a much larger scale under the currently anticipated industry build-out scenario. Compensatory mitigation should be provided for this loss, and particularly for species of conservation concern (e.g., ESA-listed) and those impacted in greater numbers. In our view, mitigation more effectively compensates for impacts when conducted on a project-, species- and population-specific basis. However, if a project-by-project approach proves difficult to implement, a compensatory mitigation fund could be developed and administered by trustees of federal agencies. Following the model of other forms of development, this would most appropriately be funded by the developers whose actions are resulting in the impacts, with funding amounts based on likely or actual impacts (see below). Quantifying compensatory mitigation for birds should initially be based in a conservative estimate of the number of birds that will be killed in collisions with turbines, including ESA-listed species and nocturnal migrants. Evaluating mitigation necessary to effectively compensate for these losses should use resource equivalency analysis, which accounts for the fact that birds at different life stages do not functionally equate in conservation importance (e.g., one additional hatchling does not functionally replace a breeding adult bird). Quantities and supporting analyses should be re-evaluated as collision monitoring data become available, and additional mitigation provided as necessary. Given that compensatory mitigation is time-consuming from concept to success, we urge the developers and agencies to initiate action as soon as possible. Effective compensatory mitigation should be considered for breeding, winter and non-breeding roost sites. For example, establishment of protected areas, predator control, and habitat restoration are needed for key species such as Roseate Terns, Red Knots, and Piping Plovers.
317-7	Impacts to Migratory Land Birds Must Be Studied and Addressed The DEIS neglects to substantively evaluate the impacts of offshore wind energy development on land birds within the Atlantic Flyway. Large numbers of those birds make nocturnal migratory flights in fall from the northeastern U.S. to wintering grounds in the Caribbean and South America. For example, DeLuca et al. (2015) found that the Blackpoll Warbler, a songbird weighing less than half an ounce, makes a nonstop fall migratory flight from New England / Southeast Canada as far as northern South America. La Sorte and Fink (2017) found that another nine species follow a similar fall migration pattern, including species of conservation concern such as Bicknell’s Thrush. Dokter et al. (2018) used weather radar data to estimate nocturnal migration patterns in the U.S. They found that an estimated 219 million birds followed a translatlantic migration pattern in the fall, and 63 million in spring. As was found by FWS’s Avian Radar Project4 in the Great Lakes, nocturnal migrant birds may fly within the rotor-swept zone of offshore wind turbines off the Atlantic coast, creating risk of collisions. What’s more, these birds migrate in flocks, meaning that a large number of birds could be killed in a single event. As you know, these birds are protected under the Migratory Bird Treaty Act. The DEIS defers to the Avian and Bat Risk Assessment (ABRA) on the topic of nocturnal migrants. The ABRA acknowledges that nocturnal migrants are among the bird groups most vulnerable to collisions with wind turbines, and that large-scale collision events are possible. Its conclusion that impacts are likely to be minor, however, is virtually unsupported, which is not surprising given that there is very little data available on the topic. Real data and risk assessment are needed on this topic, and soon. Table G-2 of the DEIS indicates that “Potential Additional Mitigation and Monitoring Measures” include acoustic monitoring, which we strongly support. We recommend that this be carried forward to the COP and Final EIS as included. Recommendations 1. A broad-scale study of nocturnal migration patterns using radar should be conducted to understand the relative scale and geographic hotspots of nocturnal transatlantic migration. 2. Acoustic monitoring should be augmented with radar to determine which species are traversing their sites, in what numbers, and at what altitude. This is particularly important for projects like South Fork Wind, which have not conducted such studies to inform project planning. It is important that the studies must evaluate whether certain weather or other conditions influence collision risk.
317-2	Offshore wind energy development can make significant contributions in the fight against climate change, particularly for nearby energy-intensive population centers. In anticipation of the expansion of this new industry, we have serious outstanding concerns about what we see as insufficient protective measures, monitoring, and compensatory mitigation for impacts to birds. We appreciate the studies, modeling, and assessments that have been completed for this project regarding likely impacts on birds. We urge decision makers to err on the side of caution and validate predictions with real data. It is critically important to measure and compensate the actual impacts to inform adaptive management and future project planning. Our primary concerns are as follows: • Robust bird collision monitoring must be conducted. • Impacts to migratory land birds must be studied and addressed. • Monitoring must be conducted to evaluate potential displacement effects. • Impacts to ESA-listed species must be given further consideration. • Compensatory mitigation must be provided for impacts to birds. We ask that the developer and agencies commit to addressing these concerns in final project plans.
284-3	The proposed cable landing at Beach Lane in Wainscott has simultaneously received support and opposition from the local residents. After lengthy negotiations, the Beach Lane cable landing alternative was ultimately approved by the town government and the town trustees. There have been vigorous efforts to address legitimate local concerns related to onshore construction activities and all evidence suggests that East Hampton officials will hold the developers to the agreements that have been made. One point of concern is that the seasonal construction window for work on the beach extends through April 30th. In some years nesting shorebirds arrive on Long Island beaches prior to that date. It is our recommendation and expectation that the project team will, as part of its final COP approval, be required to follow guidelines provided by USFWS and NYS DEC to minimize disturbance to nesting shorebirds, including federally threatened/NYS endangered piping plover during the final month of this construction window.

Comment Number	Comment
301-88	Monitoring requirements in the Biological Assessment should focus on ESA-listed species. Therefore, SFW requests the following edits to Biological Assessment Section 6.1.2 for clarity and to align with the DEIS Appendix G (p. G-6): 1) "Within the first year of operations, the Lessee to install digital VHF telemetry automated receiving stations"
349-94	The framework for adaptive management should include operational adjustments that are reasonable and cost effective and include advances in detection and avoidance technology. For example, the adaptive management framework should include “smart curtailment” to contain reasonable loss of energy production, seasonal adjustments based on mortality data as needed to compare with defined thresholds, and other operations that are proven to be effective in case of a rare event of mortality of a significant species or number of birds. These are practices used in adaptive management at some onshore wind facilities and in EU offshore wind facilities. Their incorporation into the Final EIS will permit BOEM to require their adoption as new technologies become available. An adaptive management framework requires a level of coordination and commitment that goes well beyond the Project and its operators. BOEM and USFWS must commit to providing a structure that ensures this across the offshore wind landscape.
349-91	The FEIS should provide more certainty that Lessees will use adaptive management for birds and collect “sufficiently robust” data to inform mitigation strategies to avoid and minimize impacts to birds. According to FWS Wind Turbine Guidelines (2012), DOI has adopted the National Research Council’s 2004 definition of adaptive management, which states: Adaptive management promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a ‘trial and error’ process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders. Further, the Supplement to the DEIS for the Vineyard Wind I project acknowledged that: Adaptive management could be used for many resources, particularly regulated fisheries and wildlife resources (including birds, benthic resources, finfish, invertebrates, essential fish habitat, marine mammals, and sea turtles), which would be closely monitored for potential impacts. If data collected are sufficiently robust, BOEM or other resource agencies could use the information obtained to support potential regulation changes, or new mitigation measures for future projects. The DEIS for the Project states: BOEM worked with USFWS to develop standard operating conditions for commercial leases and as terms and conditions of plan approval and are intended to ensure that the potential for adverse impacts on birds is minimized. The standard operating conditions have been analyzed in recent EAs and consultations for lease issuance and site assessment activities, and BOEM’s recent approval of the Virginia Offshore Wind Technology Advancement Project (BOEM 2016a). Some of the standard operating conditions originated from best management practices in the ROD for the 2007 Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf (MMS 2007:Section 2.7). BOEM and USFWS work with the lessees to develop post-construction plans aimed at monitoring the effectiveness of measures considered necessary to minimize impacts to migratory birds with the flexibility to consider the need for modifications or additions to the measures. Since the DEIS is a project level analysis of the Project, and there will be no other opportunity for the public to comment on the monitoring program methodology, the adaptive management strategies, or the mitigation (avoidance, minimization and compensatory mitigation) of “potential adverse impacts,” the specific methodologies of the frameworks for monitoring, adaptive management and mitigation should all be explicitly outlined in the Final EIS.
349-85	As is specified in the attached Avian Considerations document, we further suggest that avian boat surveys and tracking studies be accompanied by aerial surveys when possible and radar studies. Digital aerial surveys may be conducted from a higher flight altitude, and when calibrated with boat-based surveys, may provide a method for continuing aerial surveys post construction, when low-flying personned flights would no longer be possible. Radar surveys can provide a broad overview for comparison of flight paths, especially for nocturnal migrants which could not be captured during daytime survey efforts.
349-84	More specifically, we recommend that efforts to track avian movement include both satellite and passive radio telemetry, as appropriate, and these efforts should not be limited to Roseate Terns, Common Terns, and nocturnal passerine migrants. Technically speaking, while the passive radio telemetry receivers for these efforts are considered part of the Motus network, the tags themselves are VHF and UHF radio transmitters. BOEM and developers should follow recommendations by USFWS Northeast Migratory Bird Office when deploying receivers and tags, using the specifications best able to capture migratory routes in the offshore environment.

Comment Number	Comment
349-83	Within the DEIS, BOEM proposes that Deepwater Wind develop a monitoring framework in coordination with the federal and state jurisdictions, to include, at a minimum: • Acoustic monitoring for birds and bats • Installation of Motus receivers on wind turbine generators (WTGs) in the wind development area (WDA) and support with upgrades or maintenance of two onshore Motus receivers • Deployment of up to 150 Motus tags per year for up to 3 years to track roseate terns, common terns, and/or nocturnal passerine migrants • Pre- and post-construction boat surveys • Avian behavior point count surveys at individual WTGs • Annual monitoring We support these admirable expectations and hope that the Final EIS will provide further specifications for how this monitoring should be carried out to collect the best available data and will require this framework be adopted by Deepwater Wind for the Project. Monitoring pre- and post- construction should be designed in such a way as to be able to discern any changes to avian spatial distribution that might be a result of construction and operation of the Project. A monitoring plan should incorporate the suggestions previously provided to BOEM on October 23, 2020 via the Avian Considerations recommendations.
349-66	Unlike the assessment for the VW I project area, the Project benefits from being within the boundaries of Rhode Island's OSAMP. The OSAMP was well sampled prior to siting the Block Island Wind Farm. Compared to the aerial transects by Veit et al. (2016), aerial survey protocols instituted in the OSAMP incorporated transects that were closer together (3km vs 9km apart) and therefore covered a greater proportion of the survey area. In so doing, the avian models produced from the resulting data were able to reliably predict spatial use at much higher resolution. This level of spatial resolution is necessary to be able to detect any changes in use that may result from the SFWF--the displacement or habitat loss impacts from the SFWF. BOEM should require the developer to contribute to continuing this level of effort moving forward, both before and after construction, so that BOEM can accurately evaluate any potential changes in avian distribution that may result from the construction and operation of SFWF.
349-59	Recognizing that much remains unknown regarding the impacts of offshore wind to avian species in the United States, BOEM's evaluation of the Project in the FEIS must be based on an explicitly defined monitoring and adaptive management plan. This must include a commitment to sufficient standardized monitoring before and after construction, and using improved technology as it is developed to adequately evaluate true impacts of the Project. Most importantly, the adaptive management plan must explicitly outline a strategy to employ adequate mitigation measures, based on the impacts observed through monitoring efforts. In this manner, the FEIS can account for the reasonably foreseeable impacts of the Project and commit to addressing those impacts. Further, BOEM should incorporate best monitoring and management practices into a regional adaptive management plan to adequately measure and mitigate cumulative impacts to birds from offshore wind developments expected across the Atlantic OCS for the reasonably foreseeable future.
338-40	Birds and Bats 44. In addition to bird deterrent devices, continued monitoring of birds and bats at the offshore facility is necessary. Motus receivers should be installed, and collaborative research efforts should utilize automated radio telemetry to document the presence and movement patterns, particularly for focal species (e.g., ESA listed species) within the project area.
317-8	Monitoring Must Be Conducted to Evaluate Potential Displacement Effects By some measures, displacement effects have emerged as the most concerning impact of offshore wind development in Europe. Displacement effects will be longer-term and become more important as more facilities are constructed. A plan should be developed to evaluate these impacts over the next 10-20 years. This requires a broad-scale approach more appropriate for a federal and/or multi-state effort, and should include aerial surveys. Table G-2 of the DEIS indicates that "Potential Additional Mitigation and Monitoring Measures" include pre- and post-construction boat surveys. We strongly support this, and recommend that this be carried forward to the COP and Final EIS as definitively included.
317-4	Further, the "Potential Additional Mitigation and Monitoring Measures" for birds and bats in Table G-2 of the DEIS should be definitively added to the suite of post-construction activities for the project, understanding that upgrades in technology may be substituted. We recommend that greater detail be added to the numbers of birds of different taxa that will be tagged, and that the number of tags deployed be increased to ensure an appropriate sample size for focal taxa.

Comment Number	Comment
301-89	Please clarify the intent of the measure in Biological Assessment Section 6.11 to "Develop and implement an approved construction monitoring plan using Protected Species Observers", whether it applies to onshore or offshore activities, and if it is synonymous with the requirement to report dead/injured birds and bats (second major bullet in Section 6.1.2). For offshore construction activities, SFW is committed to implementing a worker incidental reporting program for dead/injured birds and bats, including reporting of any ESA-listed species (also addressed in the second bullet in Section 6.1.2). This protocol will be developed in coordination with BOEM. However, PSOs are specific to marine mammal/sea turtle monitoring, and while PSOs may play a role in implementing an incidental reporting program for birds and bats, SFW onsite representatives, construction crew members, and/or others may support this effort. Therefore, SFW requests removal of specific reference to PSOs in Section 6.1.1.
301-87	DEIS Appendix G p. G-6 and Biological Assessment Section 6.1.2 both identify post-construction monitoring measures; however, these measures are not consistent, and some are duplicative. SFW requests that the monitoring requirements in the BA and DEIS be aligned with respect to ESA-listed species to ensure there are not competing or conflicting requirements.
301-46	Avian and bat post-construction monitoring program. The potential post-construction monitoring scope for birds and bats described in DEIS Appendix G (pg. G-6) is not commensurate with the effects analysis in DEIS Appendix H, which concludes that impacts to birds and bats associated with the Proposed Action and alternatives are expected to be "negligible to minor." The proposed monitoring program appears to be copied from the Vineyard Wind SEIS, rather than tailored to match the risk profile of the Project, which is located away from areas of concentrated avian use (as depicted in Figure C-4 and C-5 of the DEIS). SFW requests that language be added to DEIS pg. G-6 in the FEIS, to allow SFW to work collaboratively with BOEM, USFWS, and other key stakeholders to develop an appropriate, scientifically based avian/bat post-construction monitoring plan for the Project.
389-8	For northern long-eared bat we recommend following the applicable Conservation Measures found at: https://www.fws.gov/midwest/endangered/section7/fhwa/pdf/AppC_AMMsRevisedFeb2018.pdf These measures address lighting and tree removal activities in suitable habitat and near maternity roosts and hibernacula.
389-7	We support the implementation of an April 1 to September 1 time of year restrictions for dredging and beach nourishment related to the Lake Montauk Operation and Maintenance Facility to avoid impacts to the piping plover and other nesting shorebirds. Red knot surveys should also be conducted from April 1 to November 30. If red knots are detected a 300m buffer between project activities and red knots should be maintained throughout the course of the project. We recommend the above time of year restriction in the event that onshore activities require work on the beach front in the East Hampton locations to protect nesting shorebirds. Seabeach amaranth surveys and avoidance measures should be also be applied from May 1 to November 1 for work on East Hampton beaches.
389-6	Potential impacts of WTG to avian species include displacement, collisions, attraction, and habitat effects. Impacts to bats are assumed to be primarily from collisions during migration. The New York State Energy Research and Development Agency (NYSERDA) has developed a working group of Federal, State and local agencies to develop hypotheses and research strategies to address issues related to these impacts (see NYSERDA 2020). In light of the uncertainties surrounding the probability and degree of these impacts, we cannot make a definitive assessment. Therefore, at this time, the Service believes that these potential impacts to avian and bat species may be avoided and minimized by following all the applicable mitigation recommendations relevant to bat and birds in Table G-1 and G-2 of the DEIS. Many of the additional measures outlined in G-2 work towards more comprehensive and transparent pre- and post-construction monitoring of bird and bat impacts, such as the development of a framework for avian and bat post-construction monitoring and annual reports of dead or injured birds. Such information is not only important in assessing the impact of the project on bird and bat species, but may also help fill information gaps and help inform other future wind energy projects. The mitigation measures outlined in the DEIS should be implemented to effectively compensate for any unavoidable bird mortality and habitat loss. Associated risks to vulnerable environmental resources such as birds and bats will only increase as the number of offshore wind developments increases over time (Stenhouse et al. 2020), therefore, we support the mitigation measures referenced in the DEIS, above. We look forward to working with BOEM and the applicant on the Avian and Bat Monitoring program and exploring the use of adaptive management in avoiding and minimizing impacts to non-listed species as coordination continues on this project.

Comment Number	Comment
389-5	DWSF has committed to enacting the environmental protection measured outlined in Table G-1 of the DEIS. For the protection of bats, lighting during operations would be limited to the minimum required by regulation and for safety, and the SFEC onshore would be located underground in previously disturbed areas. The minimization of lighting during operations would also benefit the protection of bird species. Other measures for the protection of birds include the installation of the SFEC sea-to-shore transition via horizontal directional drilling (HDD) to avoid habitat impacts, and the preparation of an avian management plan for listed species for the SFEC onshore. There are additional potential mitigation and monitoring measures outlined in Table G-2 of the DEIS that may be implemented by DWSF. These include tree clearing time-of-year restrictions to minimize potential impacts to bats. DWSF proposes developing a framework for an avian and bat post-construction monitoring program, which would include acoustic monitoring, pre- and post-construction boat surveys, avian behavior surveys at WTGs, the use of Motus2 tags and receivers for the tracking of birds such as terns and passerines, and annual monitoring reports. To further minimize impacts to birds, bird deterrent devices, such as those suggested in Table G-2, (e.g., painting one turbine blade black), may reduce the number of WTG collisions, and the use of Federal Aviation Administration-approved Aircraft Detection Lighting System would reduce nighttime visual impacts. Additional monitoring measures include annual reports of dead or injured birds found on project vessels or structures to be reported to the U.S. Geological Survey (USGS) Bird Band Laboratory, BOEM, and the Service.
389-3	Numerous studies have used point count surveys or tracking of bird movement to identify which bird species are more likely to occur in or around the lease area of the SFWF and during which time of year. About nine percent of common terns detected by VHF arrays were exposed to the lease area during breeding and post-breeding dispersal from 2014-2017, which was higher than the percentage of roseate terns or piping plovers detected by the array (Loring et al. 2019). The flight paths of tagged shorebirds such as semipalmated sandpipers, sanderlings, white-rumped sandpiper (Calidris fuscicollis), and pectoral sandpiper (C. melanotos) passed through the lease area during fall and/or spring migration (Loring et al. 2020). Other pelagic seabirds that were identified in the vicinity of the lease area during point count surveys at different times of year include great shearwater (Ardenna gravis), northern gannet, common eider (Somateria mollissima), great black-backed gull (Larus marinus), herring gull (L. argentatus), sooty shearwater (A. grisea), black-legged kittiwake, razorbill (Alca torda), Wilson’s storm-petrel (Oceanites oceanicus), Leach’s storm-petrel (O. leucorhoa), and Cory’s shearwater (Viet et al. 2015). Populations of these species that have been observed in the lease area could be more vulnerable to effects from the project, such as collisions or avoidance responses. Loons, gannets, and scoters are highly sensitive to displacement due to wind energy projects (Stenhouse et al. 2020). Northern gannets exhibited significant exposure to offshore wind areas in the Atlantic Outer Continental Shelf, including the lease area of the study project, during both migration and winter, while surf scoters (Melanitta perspicillata) and red-throated loons (Gavia stellata) were only exposed during migration (Spiegel et al. 2017, Stenhouse et al. 2020). A study of exposure to northern gannets to different siting scenarios along the Atlantic Coast found that the species will be cumulatively exposed regardless of siting scenario so efforts to minimize adverse effects at the wind farm site may be more effective at reducing risk (Goodale and Milman 2020). Many studies on avian avoidance responses were conducted on European offshore wind developments with turbines significantly smaller (e.g. 2.3 MW) than the turbines proposed for this project. The increase in spacing due to increased turbine size may either continue causing avoidance responses or may provide movement corridors through the project area (Stenhouse et al. 2020). More research is also needed on species-specific avoidance responses to improve collision risk modeling (Fox et al. 2006).

Response to comments: Thank you the comments and suggestions. The SFWF EIS has been updated to reference the Vineyard Wind 1 FEIS, Appendix A that includes a comprehensive analysis on migratory land birds. A framework for an avian and bat post-construction monitoring program would be developed and implemented in coordination with applicable federal and state resource agencies (see Appendix G for details). The monitoring program will be finalized before operations. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision.

Comment theme: Collision risk model studies.

Associated comments

Table I-202 provides the full list of comments received as part of this comment theme.

Table I-202. Collision risk model studies comments.

Comment Number	Comment
349-76	Moreover, collision risk models provide a starting point, not an end point, from which to predict cumulative, population-level impacts across wind farms in the Atlantic OCS. Collision risk models are not found to be reliable in predicting mortality: Siting and permitting decisions for many European offshore wind facilities are informed by collision risk models, which have been created to predict the number of avian collisions for offshore wind energy facilities. However, these models are highly sensitive to uncertainties in input data. The few empirical studies at land-based wind facilities that have compared model-estimated collision risk to actual mortality rates found only a weak relationship between the two, and due to logistical difficulties, the accuracy of these models has not been evaluated in the offshore environment. BOEM should pursue studies to not only verify CRM utility in the offshore environment, but should also move toward viable collision detection requirements for the Project and future offshore wind developments.
349-75	There are new derivations of the Band model under development, namely the 3-D CRM for seabirds by the Shatz Energy Research Center and stochastic CRM specific to ESA-listed species in southern New England from the University of Rhode Island. These models should be applied, once available, in BOEM's assessments of avian impacts for future offshore wind developments, as they will be better able to incorporate variation in input parameters.

Response to comments: BOEM is currently working with USFWS to update collision risk models (See https://www.boem.gov/environment/environmental-studies/transparent-modeling-collision-risk-three-federally-listed-bird). Once these new derivations of the Band model as well as others (like the model described by the commentor) become available, the DOI will evaluate them and assess their utility for future assessments. Thank you for your thoughtful comment.

Comment theme: Avian analysis area.

Associated comments

Table I-203 provides the full list of comments received as part of this comment theme.

Table I-203. Avian analysis area comment.

Comment Number	Comment
349-77	The COP and DEIS inappropriately limit the impact assessment to the project footprint. Birds are not only disturbed from foraging, staging, roosting, and nesting habitat in the immediate vicinity. Evidence from construction and operation at offshore wind farms suggest that marine birds may be disturbed up to at least 20km from an operating wind farm. Though flight-initiation distances are highly variable, nesting and foraging shorebirds can be disturbed from coastal anthropogenic activities more than 200 meters away. Additionally, vessel traffic can largely disrupt wintering marine birds. The COP provides: Along the route of the SFEC--Onshore, in East Hampton, New York, are potential temporary construction-related risks to breeding shorebirds and some seabirds (e.g., terns), including potential impacts to the federally threatened and New York endangered piping plover and the New York state threatened least tern. IPFs including seafloor/land disturbance, and sediment suspicion and deposition could briefly impact foraging habitat and nesting or staging shorebirds or seabirds. Prey fish could become startled and temporarily flee the area. In the intertidal zone, invertebrates, small crustaceans, mollusks, and other benthic shorebird prey sources could become temporarily covered by sediment released during the installation process. Nesting and staging birds are particularly at risk of impacts to their habitats due to high energetic demands during these sensitive periods… Cable transition from sea-to-shore will be completed using HDD from a new transition vault located within a public road, under the beach, to an exit point offshore… It is possible that workspaces would be required on the beach to support the assemblage of equipment (e.g., the cofferdam and conduit pipe) and for personnel vehicles...

Comment Number	Comment
	However, the COP suggests that these impacts will be negligible to minimal, because of the limited time and space which will be impacted. This assessment is not commensurate with the potential level of impacts which could be experienced during and following the activity. The impacts do not end immediately after construction activity. These are modifications to the habitat which will not return to a healthy state until long after construction activities. Given the avian distribution maps provided in the COP, it is likely that marine bird communities will be heavily disturbed during construction activities. At the very least, avian monitors should accompany construction vessels to document any disturbance that is immediately obvious. Construction activities from the cable laying and transition are not limited to the footprint of the cable. The noise and disruption caused by the construction will likely disturb marine birds during the entirety of this construction, and the COP fails to address the timeline expected. Especially closer to shore, this could displace sea ducks, waterbirds, and alcids from important foraging habitat. While it may not be possible to avoid this impact, especially if construction is avoiding nesting and staging periods for Piping Plover and terns, respectively, the Final EIS needs to be transparent in addressing these impacts and provide a path to mitigate these impacts.

Response to comments: Section 3.4.3 has been updated to reflect the duration of potential impacts including displacement outside of the immediate project offshore footprint. A framework for an avian and bat post-construction monitoring program will be developed and implemented in coordination with applicable federal and state resource agencies (see Appendix G for details). Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies (Table G-2). These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision.

Comment theme: Potential impacts to sea ducks.

Associated comments

Table I-204 provides the full list of comments received as part of this comment theme.

Table I-204. Potential impacts to sea ducks comment.

Comment Number	Comment
338-44	48. Appendix G, Table G-1, p. G-3 states “The location of the SFWF, more than 18 miles (30 kilometers [km], 16 nm) offshore, would avoid the coastal areas, which are known to attract birds, particularly shorebirds and seaducks.” NYS notes that many marked (e.g., tagged or banded) sea ducks have been observed up to 70 miles offshore with aggregations of birds up to 20 miles offshore. Given the location of this wind farm between Montauk, Block Island, and Cape Cod it is very likely that there exists a real threat to scoters and eiders. The location of this wind farm would be located between two Sea Duck Joint Venture key sites at Nantucket, MA and the south shore of Long Island, NY that represent continentally important sea duck areas.

Response to comments: Section 3.4.3 of the FEIS has been updated to include additional information on potential impacts to sea ducks.

Comment theme: Collision risk model inputs.

Associated comments

Table I-205 provides the full list of comments received as part of this comment theme.

Table I-205. Collision risk model inputs comment.

Comment Number	Comment
349-73	BOEM must be transparent in its CRM application. These models are extremely sensitive to the input parameters. A study by Cook et al. (2014) found that estimations of avoidance and collision risk from Band models were highly sensitive to the flux rate (total number of birds passing through the wind farm), corpse detection rate, rotor speed, and bird speed. Factors such as weather (i.e. wind speed and visibility) and habitat use would also affect the accuracy of these estimates, as such factors would greatly influence avian flight patterns and behavior.272 Therefore, the Final EIS must provide the inputs used in its analysis for public comment and transparency. Providing CRM results without transparency to the inputs and analytical process would never be acceptable from a scientific perspective and, therefore, should not be acceptable from BOEM. Providing inputs would show whether BOEM followed the guidance provided by Band in assessing collision risk. These details regarding inputs should include, but not be limited to, avoidance behavior, flight height, flight activity, flux rate, corpse detection rate, rotor speed, bird speed, and collision risk.

Response to comments: Section 3.4.3 of the FEIS has been updated to reference the analysis Vineyard Wind 1 FEIS (Appendix A). The Biological Assessment for the SFW has the input and output spreadsheets from the Band model for the ESA species. Of note, corpse detection rate is not one of the inputs for the Band model; in addition, the flux rate is not model input but rather is calculated by the model.

Comment theme: Population viability analysis.

Associated comments

Table I-206 provides the full list of comments received as part of this comment theme.

Table I-206. Population viability analysis comments.

Comment Number	Comment
349-87	The DEIS suggests that the Project will account for less than 1% of the 2,066 turbines estimated in the OCS in the foreseeable future, using this assumption to avoid providing a complete cumulative impacts assessment resulting from offshore wind turbines. Loss et al. (2013) estimates that the average annual mortality rate for birds from turbines onshore is 3.58 birds/MW (95% C.I.=3.05-4.68). The DEIS predicted 2,066 turbines, which are currently expected to have a 12-14MW generation capacity, would produce between 24,792MW (with 12MW turbines) and 28,924MW (with 14MW turbines) cumulatively. Using the average mortality estimate from Loss et al. (2013), this build-out would kill between 88,755 and 103,548 birds annually. Over the thirty-year life of the cumulative impact scenario, an estimated 2,662,650 birds would be killed under the 12 MW scenario and an estimated 3,106,440 birds would be killed under the 14MW scenario. The Project alone, with only 15 turbines, under this same formula, could kill between 19,332 and 22,554 birds over the life of the project. This is not negligible take, especially when considered in the context of additional leases owned (and projects proposed) by Deepwater Wind. These calculations only address direct mortality from collisions and do not include the rates of mortality driven by barrier effects and habitat loss. Barrier effects and displacement can have significant energetic costs for birds and can additionally result in increased foraging rates. Both can have consequences for individual survival and can decrease rates of egg laying and fledging. The FEIS must provide a quantitative assessment of the cumulative effects from wind farm build out in the OCS, including population viability analyses which consider changes in vital rates that result from both direct and indirect impacts. BOEM should also consider revising the cumulative impact level on birds from Moderate and the direct and indirect impacts from Negligible to Major.
349-88	There is no substantial evidence to suggest that larger turbines, spaced farther apart, reduces risks to birds, and it should be a goal of BOEM to understand the effects of displacement and mortality relative to turbine size and spacing. The size of turbines has grown substantially over the past decade, and this trend is expected to continue. In its Vineyard Wind I project, Vineyard Wind plans to use GE's 12MW Haliade-X turbine, which has a 220-meter rotor swept zone and is estimated to reach a maximum height of 260 meters above sea level. University of Virginia is currently developing 200-meter-long blades to power a 50MW turbine, with a potential rotor swept zone of approximately 400 meters.

Comment Number	Comment
	Given that the tower height would need to be more than 200 meters in height to accommodate rotor blades of this size, turbines could soon reach heights greater than 400 meters above sea level. Studies, like those from Krijgsveld et al. (2009), Smallwood and Karas (2009), and Johnston et al. (2014), which suggest that fewer, larger turbines reduce avian collision risk, are based off turbines less than 5MW. As turbines increase in size, they are more likely to encroach on airspace occupied by nocturnal migrants while not necessarily avoiding airspace occupied by relatively lower flying foraging marine bird species. Conversely, studies by Loss et al. (2013), Choi et al. (2020), and Huso et al. (2020), find that bird deaths not only increase with turbine size, but also suggest that the number of bird deaths from collision with wind turbines is proportional to the number of MW produced in a wind farm. Additionally, limiting risk evaluations to the rotor swept zone neglects the risk of collision from the tower itself.

Response to comments: Section 3.4.3 of the FEIS includes an updated discussion of Loss et al. (2013) and the applicability of mortality estimates derived from terrestrial WTGs to offshore WTGs. The analysis in the FEIS, based on the Loss et al. (2013) was provided to illustrate what the potential mortality associated with the full offshore wind build out could be but discusses why it is unlikely to be that high. Further, the mortality range provided in the FEIS used values of the number of mortalities per turbine, and not per MW, because there is not a linear relationship between turbine nameplate capacity (MWs) and turbine size, particularly when comparing onshore small, older, faster turning onshore WTGs with new, highly efficient offshore WTGs expected to be used on the Atlantic OCS.

Several factors as to why potential collision mortality is expected to be much lower are presented in the FEIS. As pointed out by the commenter, and discussed in Section 3.4.3, BOEM expects some level of reef affect to attract fish to the WTGS foundations, which would increase collision risk to those individuals utilizing the foundations for foraging. However, based on the biology of these species, most would be flying and foraging well below the Rotor Swept Zone and collision with operating WTG blades would not be expected.

Comment theme: Impacts to a broad range of species, including species protected under the MBTA.

Associated comments

Table I-207 provides the full list of comments received as part of this comment theme.

Table I-207. Impacts to a broad range of species, including species protected under the MBTA comments.

Comment Number	Comment
349-60	BOEM must ensure that the Final EIS retains consideration of the full range of potential impacts on all bird species known to forage or rest in or near the Project area, or migrate through the area, including those species protected under the Migratory Bird Treaty Act (MBTA) and the ESA as well as species of birds covered under obligations for conservation of birds under the Fish and Wildlife Conservation Act as amended in 1988, Executive Order (EO) 13186 “Responsibilities of Federal Agencies to Protect Migratory Birds” (January 17, 2001), North American Waterbird Conservation Plan, the Memorandum of Understanding (MOU) between and United States Fish & Wildlife Service (USFWS) regarding implementation of EO 13186 (June 4, 2009) and BOEM, Department of Interior (DOI), USFWS, and NOAA membership in the International Union for Conservation of Nature (hereinafter collectively referred to as the “conservation obligations.”) As we have commented to BOEM before, we are aware that the DOI and the USFWS are now relying on a new interpretation of the MBTA that limits the scope of the Act to the purposeful take of birds. Our organizations strongly oppose this interpretation as contrary to the plain language and intent of the law, and we urge BOEM to continue to implement its MBTA responsibilities as all previous administrations have done in the past, with explicit recognition that incidental take is prohibited. This would also be consistent with the memorandum of understanding that BOEM signed with USFWS in 2009 to protect migratory bird populations. If DOI’s new interpretation changes BOEM’s analysis and associated requirements for impacts to migratory birds in any way, a detailed description and explanation of such changes must be included in the Final EIS. We note that signatories of these comments (Natural Resources Defense Council, Defenders of Wildlife, and National Audubon Society), together with many other organizations and states, successfully challenged DOI’s unlawful reinterpretation of the MBTA in court and expect BOEM and USFWS to respect the court’s ruling.

Comment Number	Comment
	The MBTA states that, "[u]nless and except as permitted by regulations . . . it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill . . . any migratory bird." For decades, the Department of Interior (DOI) has interpreted the MBTA to encompass "incidental takes" of migratory birds, including from wind turbines. It was not until the 2017 Jorjani Opinion M-37050 that the DOI limited the MBTA's legal scope to only include actions that purposely take migratory birds. However, on August 11, 2020, the United States District Court for the Southern District of New York found that "the Jorjani Opinion's interpretation runs counter to the purpose of the MBTA to protect migratory bird populations." The court found that the statute's unambiguous text makes clear that killing a migratory bird "by any means or in any manner," regardless of how, is covered by the statute. As such, the district court struck down the Jorjani Opinion as unlawful, restoring the MBTA's protections for migratory birds from incidental takes. The unlawful reinterpretation does not relieve BOEM or FWS from their obligations for conservation of birds under the aforementioned federal laws, EO and MOU, as well as MBTA. At a minimum, the Final EIS should include analysis of the following priority species for fulfilling BOEM's conservation obligations: Red-throated Loon, Horned Grebe, Great Shearwater, Audubon's Shearwater, Black Skimmer, Gull-billed Tern, Hudsonian Godwit, Upland Sandpiper, Whimbrel, and Arctic Tern are all USFWS Birds of Conservation Concern under the Fish & Wildlife Conservation Act, 1988 amendment. • Black-legged Kittiwake, Horned Grebe, Leach's Storm-petrel, Long-tailed Duck, and Chimney Swift are classified by the International Union for Conservation of Nature (IUCN) as Vulnerable. • Black Scoter, Common Eider, Semipalmated Sandpiper, Blackpoll warbler, Razorbill, and Sooty Shearwater are classified by IUCN as Near Threatened. Further, at a minimum the Final EIS should include analysis of the following nocturnally migrating birds that have documented routes through the Atlantic OCS lease areas: • American Golden-Plover • Bicknell's Thrush • Blackpoll Warbler • Bobolink • Buff-breasted Sandpiper • Chimney Swift • Connecticut Warbler • Pectoral Sandpiper • Semipalmated Sandpiper • Solitary Sandpiper • Upland Sandpiper • Whimbrel • White-rumped Sandpiper • Ipswich Sparrow
349-58	The provisions of the Fisheries Habitat Impact Minimization Alternative, which best fulfills state commitments for renewable energy development while reducing environmental impacts, can be acceptable for impacted bird species with modifications. However, the DEIS and COP fall short of properly addressing the potential impacts to birds from the Project. The DEIS itself is entirely deficient of any environmental impact evaluation, relying solely on the COP, without any regard for primary scientific sources in evaluating risk to bird populations. The FEIS must address population level, cumulative impacts to avian populations from the Project and other offshore wind developments expected in the Atlantic OCS in the reasonably foreseeable future. In doing so, BOEM must consider impacts to a broader range of avian species which may be impacted by the Project, and not limit its evaluation to federally and New York state listed species.

Comment Number	Comment
378-2	Joel Merriman: Yes, great. Yeah, hi, my name is Joel Merriman. I'm the Bird Smart Wind Energy campaign director at American Bird Conservancy and I appreciate the opportunity to provide these comments. ABC is a 501(c)3 nonprofit dedicated to conserving birds and their habitats throughout the Americas. As part of our threat abatement program, we have been working with stakeholders to promote bird-smart wind energy development practices for over 10 years. I would like to start by thanking the Bureau of Ocean Energy Management, the states, and other stakeholders, for the forward-thinking approach that has been taken to identify offshore wind energy development areas. Collaborative studies with Fish and Wildlife Service and others have informed planning for siting; a model that we would like to see replicated in many other parts of the country. However, we think that plans for South Fork wind and other offshore wind facilities fall short on protective measures for birds. We are embarking on a new industry with an incredibly packed pipeline of projects. Predictive modeling and informed opinions of bird impacts is necessary in these early stages, but we must err on the side of caution and validate predictions with solid data. We are excited about the prospect of offshore wind energy, but we can't support this project or this new industry without more robust considerations for birds. We offer some key recommendations for how this might be accomplished. First point, the project documentation does not substantively evaluate likely impacts on land birds, which must be remedied. Huge numbers of these birds make nocturnal migratory flights in fall from the northeastern U.S. to wintering grounds in the Caribbean and South America. For example, a 2015 study found that the black pole warbler, a songbird weighing less than half an ounce, makes a nonstop fall migratory flight from New England and southeast Canada as far as northern South America. We have very little data about their flight heights or behavior when they leave our shores, leaving risk that they may collide with turbines in the offshore space. What's more, these birds migrate in flocks so any such instance may result in relatively large numbers of birds being killed during a single event.
389-4	In Appendix H, Section 3.4.1, the DEIS identifies silver-haired bat (Lasionycteris noctivagans), hoary bat (Lasiurus cinereus), eastern red bat (Lasiurus borealis), tricolored bat (Perimyotis subflavus), and little brown bat (Myotis lucifugus) as non-listed bat species that occur within the project area, including the SFWF and offshore SFEC. The DEIS notes that that most offshore bat activity in the lease area took place at wind speeds under 5 meters (m) per second, which is lower than the average wind speeds in the SFWF. This suggests that bat activity will be low during WTG operation and limited to warmer periods during the summer or fall migration, resulting in low risk of injury or mortality to bats.

Response to comments: Thank you for your comment. The FEIS uses the best available information, and thus complies with the procedural requirements of NEPA to predict potential impacts on birds from the Proposed Action.

Several of these species (red-throated loon, greater shearwater, black-legged kittiwake, long-tailed duck, black scoter, common eider, razorbill, and sooty shearwater) were analyzed in SFW's COP that included an assessment of potential exposure to operating WTGs on the Atlantic OCS in the Vineyard Wind 1 FEIS (Appendix A). The assessment in the COP and the Vineyard Wind 1 FEIS were used to inform the SFW EIS. to the Vineyard Wind 1 FEIS includes an analysis of the percentage of a particular marine bird species that would be exposed to lease areas during each season, plus a discussion of collision risk modeling. In addition, there is also an analysis regarding the species that have some potential to encounter operating WTGs associated with the anticipated development of offshore wind facilities on the Atlantic OCS generally. The estimates of potential collision mortality provided in the FEIS are not relied upon to reach an impact level determination, but were provided to explore the potential for collision mortality associated with the anticipated development on the Atlantic OCS generally, and the proposed SFWF.

Comment theme: Support for avian analysis.

Associated comments

Table I-208 provides the full list of comments received as part of this comment theme.

Table I-208. Support for avian analysis comments.

Comment Number	Comment
317-1	We thank the Bureau of Ocean Energy Management (BOEM), U.S. Fish and Wildlife Service (FWS), State of Rhode Island, and other stakeholders for the data-driven, forward-thinking approach that has been taken to identify offshore wind energy development areas. Siting is the most important component of minimizing wind energy development's impacts on birds, and considerable effort has been expended to do so for Atlantic Ocean offshore wind facilities. This is a model that we would like to see replicated for wind energy development in other parts of the country.
317-12	We reiterate that we support bird-smart offshore wind energy, and that this requires planning and operation with a full understanding of the impacts to wildlife, and a plan to compensate for these impacts. Thank you for this opportunity to provide input, and for considering these recommendations.

Response to comments: Thank you for your comment.

Comment theme: Avian analysis sufficiency.

Associated comments

Table I-209 provides the full list of comments received as part of this comment theme.

Table I-209. Avian analysis sufficiency comments.

Comment Number	Comment
317-9	On a separate but related note, we find the cumulative impacts analysis in the DEIS insufficient with regard to avian impacts, and recommend that this be improved in the Final EIS.
349-62	Given that there are no studies within the United States that document the responses of local avian populations to offshore wind development in United States' waters, BOEM should adopt a conservative approach in the Final EIS's avian impact analysis. Modeling issues stemming from recent survey efforts must be addressed.

Response to comments: The cumulative impact analysis has been updated to be more consistent with previous analyses. Thank you for your comment.

Comment theme: Editorial comments.

Associated comments

Table I-210 provides the full list of comments received as part of this comment theme.

Table I-210. Editorial comments.

Comment Number	Comment
301-44	SFW is committed to developing a post-construction monitoring plan based on an adaptive monitoring framework where information gained during the course of monitoring, as well as monitoring results, will be used to refine and guide future monitoring efforts. However, for clarity and parity with 30 CFR 585.633(b), we request that the end of the sentence in Section 3.4 of DEIS Appendix H (pg. H-52) be edited for the FEIS to read "". . .and potentially lead to recommendations for additional mitigation measures or monitoring methods.
301-91	For consistency with the COP, SFW recommends adding additional text to Table G-1: "T&E species in the vicinity of the sea-to-shore transition and SFEC – Onshore. These potential impacts were considered during the siting process and the HDD work area was setback at least 650 feet (198 m) from the MHWL, so that the entrance point would be in interior land areas and the exit point would be offshore beyond the intertidal zone, to minimize the

Comment Number	Comment
	potential for impacts." and "Construction activities are scheduled to occur outside of the tern and plover breeding period."
301-92	For consistency with the COP, SFW recommends adding text to table G-1: "The delineation of the MA-WEA resulted in the exclusion of 14 OCS blocks that overlapped with high value sea duck habitat (BOEM 2013)."
301-93	For consistency with the COP, SFW recommends adding text to Table G-1: "All components of the SFEC – Onshore will be set within a new underground duct bank in developed areas along existing ROWs, thus avoiding disturbances to land birds."

Response to comments: Thank you for your comment. These edits were made in the FEIS.

Comment theme: Impacts to non-listed birds.

Associated comments

Table I-211 provides the full list of comments received as part of this comment theme.

Table I-211. Impacts to non-listed birds comment.

Comment Number	Comment
389-2	Appendix H, Section 3.4.3 of the DEIS identifies a number of non-listed bird species and groups that may occur in the analysis area and be impacted though collisions, displacement, or avoidance responses by the construction and installation, O&M, and conceptual decommissioning of the project. These species are protected under the MBTA. Birds that use deeper offshore waters at least seasonally may be impacted by the SFWF, including loons (Gavia spp.), shearwaters and fulmars (Procellariidae spp.), storm-petrels (Hydrobatidae spp.), gannets (Morus spp.), seaducks (Merginae spp.), jaegers (Stercorariidae spp.), gulls and terns (Laridae spp.), alcids (Alcidae spp.). Land birds and shorebirds (except for phalaropes [Phalaropus spp.]) are generally only expected to occur offshore in the analysis area during migration. Birds in the analysis area that are more susceptible to collision with WTGs in the SFWF include gulls, terns, phalaropes, cormorants (Phalacrocoracidae spp.), northern gannet (Morus bassanus), and scoters (Melanitta spp.). The offshore SFEC may also impact seabirds and water birds that occur near state waters such as terns, gulls, cormorants and shorebirds during summer and seaducks, bay ducks (Aythyinae spp.), fish ducks (Anatidae spp.), dabblers (Anas spp.), loons, grebes (Podicipedidae spp.), and alcids during migration and winter. Other more pelagic species that could occur include Cory's shearwater (Calonectris borealis), northern gannet, and black-legged kittiwake (Rissa tridactyla). Birds may occur in or fly over the onshore SFEC routes and onshore landing sites, such as breeding or wintering shorebirds, resident landbirds, and a variety of passerines or other migrants along the Atlantic Coast. Breeding shorebirds and waders on Long Island include American oystercatcher (Haematopus palliatus), common tern (Sterna hirundo), least tern (Sterna antillarum), and willet (Tringa semipalmata). Species that overwinter on Long Island include black-bellied plover (Pluvialis squatarola), sanderling (Calidris alba), dunlin (C. alpine), purple sandpiper (C. maritima), and ruddy turnstone (Arenaria interpres). Permanent resident land bird species in the analysis area include corvids (Corvidae spp.), chickadees (Paridae spp.), and tufted titmouse (Baeolophus bicolor). Species expected to occur on Long Island during migration include semipalmated plover (Charadrius semipalmatus), semipalmated sandpiper (Calidris pusilla), and short-billed dowitcher (Limnodromus griseus).

Response to comments: Thank you for your comment. Section 3.4.3 of the DEIS discusses non-listed bird species and groups that may occur in the analysis area and be impacted though collisions, displacement, or avoidance responses by the construction and installation, O&M, and conceptual decommissioning of the project.

Comment theme: Proposed USFWS BA revisions.

Associated comments

Table I-212 provides the full list of comments received as part of this comment theme.

Table I-212. Proposed USFWS BA revisions comment.

Comment Number	Comment
301-90	The BA prepared for USFWS Table 2.1 contains the following discrepancies and should be revised to be consistent with the COP and the DEIS: The WTG spacing is listed as 1 statute mile in BA; COP and DEIS indicate 1 nautical mile. The monopile footprint area is listed as 15.6 acres; the COP and DEIS indicate 14.6 acres. The inter-array cable length is listed as 30 mi; the COP and DEIS indicate 21.4 mi. The inter-array long-term disturbance footprint is listed as 12.5 acres; COP and DEIS indicate 2.5 acres The inter-array cable construction activity duration is listed as 30 days; COP indicates 4 months. The SFEC disturbance area is listed as 73 acres in OCS and 4.4 acres in NYS; COP and DEIS indicates 555.3 acres and 18 acres. The SFEC long-term disturbance footprint is listed as 21.1 acres in OCS and 1.3 acres in NYS; the COP and DEIS indicate 14.8 and 0.6 acres.

Response to comments: In the concurrence letter for the SFWF Biological Assessment, the USFWS concurred with the effect determination for birds. The BA is revised based on comments from USFWS and other updates. The discrepancies identified by the commentor do not modify the identified action in a manner that causes an effect to the listed species. No changes to the EIS are warranted.

Comment theme: Compensatory mitigation.

Associated comments

Table I-213 provides the full list of comments received as part of this comment theme.

Table I-213. Compensatory mitigation comment.

Comment Number	Comment
349-96	As we note above, the DEIS provides an inadequate analysis in quantifying the number of birds likely to be lost in collisions with turbines, and neglects to evaluate such impacts on ESA-listed species and nocturnal migrants. Further, the DEIS does not consider impacts to many of the species occurring in the area that are likely to be affected, resulting in what is likely a gross underestimate of the potential losses of birds. The number of birds affected is uncertain due to the lack of available technology to accurately measure impacts (e.g., collisions) on a species level or the fate of those birds after a collision event (e.g., injury, morbidity, or mortality). We further note that, as discussed above, the agencies still have conservation obligations under frameworks, including ESA and MBTA. Based on studies of ESA-listed species alone (discussed above), it seems likely that birds protected by federal laws will be killed in collisions with turbines under the currently anticipated industry build-out scenario. As such, compensatory mitigation should be provided for bird mortality resulting from this development, and particularly for species of conservation concern. Directed mitigation can result in meaningful beneficial outcomes. For example, the Montrose restoration, a $63 million mitigation package compensated for migratory seabirds in Mexico, efforts in part which led to the recovery and delisting of Pacific Brown Pelican.

Comment Number	Comment
	Mitigation more effectively compensates for impacts when conducted on a project and population-specific basis. This model is encouraged for offshore wind energy development impacts. However, if a project-by-project approach proves difficult to operationalize, a compensatory mitigation fund could be developed and administered by trustees of federal agencies. Following the model of other forms of development, this would most appropriately be funded by the developers whose actions are resulting in the impacts, with funding amounts based on likely or actual impacts (see below). Quantifying compensatory mitigation for birds should initially be based on a generous estimate of the number of birds that could be killed in collisions with turbines, including ESA-listed species and nocturnal migrants. Evaluating mitigation necessary to effectively compensate for these losses should utilize resource equivalency analysis, which accounts for the fact that birds at different life stages do not functionally equate in conservation importance (e.g., one additional hatchling does not functionally replace a breeding adult bird). This approach has been used extensively for addressing bird losses resulting from losses of birds to oil spills and contaminants in California. For example, under NEPA, the Damage Assessment and Restoration Plan / Environmental Assessment for the Luckenbach Spill called for a number of mitigation projects to compensate for the losses of migratory birds in distant countries where those species originate, such as Mexico, Canada and New Zealand, in the amount of $21M. Quantities and supporting analyses should be re-evaluated as collision monitoring data become available and additional mitigation provided as necessary.

Response to comments: The analysis in the FEIS references the analyses in the Vineyard Wind 1 FEIS (Appendix A) on potential losses to birds due to collision. A discussion of impacts on threatened or endangered bird species is discussed in the Biological Assessment submitted to USFWS, which can be found at the following link: https://www.boem.gov/renewable-energy/state-activities/south-fork. A framework for an avian and bat post-construction monitoring program will be developed and implemented in coordination with applicable federal and state resource agencies (see Appendix G for details). Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision makers and incorporated into the Record of Decision.

Comment theme: MDAT model data.

Associated comments

Table I-214 provides the full list of comments received as part of this comment theme.

Table I-214. MDAT model data comment.

Comment Number	Comment
349-65	It is also critical to note the extreme amount of sampling bias across much of the data used in the MDAT avian density models referenced in the COP and DEIS. Not only do the data used in this model include vessel and aerial surveys which come with the sampling bias described above, but there is no standardization across data sources. Much of the data do not come from standardized protocols and are instead opportunistic observations from pelagic birding trips. Additionally, many of these opportunistic observations occur during chumming activities. This does not necessarily over inflate the number of birds overall, but it does confound model results by artificially creating higher densities of seabirds in vessel paths.

Response to comments: The comment is inaccurate in several respects. The MDAT models did not use data from opportunistic observations and chumming activities but instead used data collected from scientific surveys (see Winship et al 2018). Also, the survey effort was standardized across all the datasets before analysis. MDAT models provide a relative density of birds in the area, not an estimate of true abundance as suggested. Thank you for your comment.

Benthic Habitat, Essential Fish Habitat, Inverts, and Finfish

Comment theme: Lighting impacts.

Associated comments

Table I-215 provides the full list of comments received as part of this comment theme.

Table I-215. Lighting impacts comments.

Comment Number	Comment
363-111	The description of how light may impact finfish and invertebrates is yet another example of an uncorroborated, unsupported, and misleading description of a potentially highly detrimental impact to biological resources. The paragraph on light, under the No Action alternative states in its entirety: Artificial light can attract finfish and invertebrates and can disrupt their natural cyclical activity, e.g., spawning. Offshore wind development would result in additional temporary artificial light from construction vessels and long-term artificial light from an additional 2,050 offshore WTGs and OSS foundations. These lighting sources would not be downward directed toward the water surface. Construction vessels would also follow BOEM guidelines for lighting. Therefore, the amount of light penetrating the sea surface would be minimal and would not impact finfish, invertebrates, or EFH. Artificial lighting would not be expected to impact benthic habitat, due to depth of water where artificial light would be used. This analysis is problematic for several obvious reasons. It provides a wholly inadequate description of the known negative impacts of artificial light on marine organisms, which are numerous. For instance, artificially illuminating marine organisms at night can alter the structure of marine ecosystems and trophic interactions between marine organisms. The brief section in this DEIS on light presents an utterly vague and generic description of what type of light(s), what quantity and levels of light and the estimated location of lights will be produced on each turbine or other offshore structure. This information should at least be summarized in the DEIS, as these specifics are necessary in order to properly assess biological impacts. At a minimum, the DEIS must answer the following specific questions: (1) how much light will be emitted, to what distance from each turbine, and to what depths; and (2) what are the predicted impacts from this? It is not sufficient or correct to simply claim, without any resources to support such a claim, that light would be “minimal” and therefore would not impact finfish, invertebrates, or EFH.
310-15	Additional information on potential light impacts on plankton, larvae, squid, and other light sensitive taxa should be developed in the FEIS.

Response to comments: BOEM has analyzed potential effects to aquatic life from offshore energy facility lighting and issued design guidance to avoid and minimize adverse effects (https://espis.boem.gov/final%20reports/5298.pdf). The project EPMs incorporate these design recommendations (Appendix G). BOEM anticipates that future wind energy facilities would comply with this guidance voluntarily or as a condition of permitting.

The project is not anticipated to result in significant light-related effects on aquatic species and habitats.

Comment theme: Anchoring and monitoring plan.

Associated comments

Table I-216 provides the full list of comments received as part of this comment theme.

Table I-216. Anchoring and monitoring plan comments.

Comment Number	Comment
144-8	These include the following: An anchoring plan – Due to the importance of Cox Ledge as an area of Essential Fish Habitat (EFH) it is very important to minimize disturbance to the complex bottom structure to the fullest extent possible. Requiring an Anchoring Plan for any vessel associated with the construction of these platforms which need to anchor would help control additional and unnecessary destruction of EFH.
144-9	Post installation cable monitoring plan – Considering the issues that have already become evident with the BIWF cable becoming exposed and considering the shifting nature of bottom sediments in areas where the cable for SFWF will be installed, it is very important that the developer include a robust plan to monitor the cable and include actions that will be necessary if the cable becomes exposed.

Response to comments: A construction vessel anchoring plan and a post-construction monitoring plan was included in Table G-2 in the DEIS as a potential additional mitigation measure. The FEIS will include the same.

Comment theme: Habitat alternative details.

Associated comments

Table I-217 provides the full list of comments received as part of this comment theme.

Table I-217. Habitat alternative details comments.

Comment Number	Comment
166-8	The fisheries habitat impact minimization alternative does not specify how many or which turbines might be microsited or removed. While we understand that analysis of habitat data is ongoing, we think the potential differences between this alternative and the proposed action could have been more fully specified in the DEIS, and we look forward to additional clarity in the FEIS. Please include a more specific definition of complex habitat, for example percent of gravels, existence of attached epifauna, occurrence of boulders or bedrock in addition to cobble and pebble, etc. In addition, the alternative should indicate how different sites might be ranked in terms of which locations might be dropped from the array to best minimize impacts. For example, would the preference be to maintain spatial continuity of complex habitat? To avoid areas with the highest percent cover of gravels or attached fauna? Considering two locations, one known to have complex habitat, and one with potentially complex habitat, would avoidance of known habitat be the preferred approach, or would both be avoided? We recommend that the FEIS indicate how habitat conditions were assessed at each site based on what data, as well as which locations are most appropriate for micrositing or turbine removal and why.
338-25	Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish 20. The Agencies recommend BOEM and the developer continue working with NOAA on the EFH consultation and to ensure that the data and methodologies used accurately characterize and delineate complex habitats within the Project area.
349-32	The FEIS should also modify its impact assessment based on the impending quantification of complex and non-complex habitats, consider additional ways to avoid and minimize impacts to complex habitats, and include additional mitigation and monitoring requirements for the Project.

Comment Number	Comment
372-17	We acknowledge and appreciate that some sections of the DEIS related to evaluation of habitats were updated based on our coordination through the cooperating agency review; however, we still have concerns that the current analysis does not include a meaningful comparison of alternatives, particularly related to the Benthic Habitat, EFH, Invertebrates, and Finfish analysis. Both the fisheries habitat impact minimization and the vessel transit alternatives consider a reduction in project size, yet the comparison of potential impacts relative to the proposed action is not clear. As we discussed in our cooperating agency review, the fisheries habitat impact minimization alternative was intended to evaluate ways to minimize impacts of the project (from both turbines and cables) on important fish habitats on Cox Ledge within the newly segmented lease area. However, the document does not adequately discuss the distinct characteristics of Cox Ledge or how impacts to habitat and fisheries resources within this lease area would vary among the alternatives. Instead, the document suggests fisheries habitat would fully recover from any development, which is not accurate given the complexity of this area; nor is it consistent with other information presented in the document. A project-specific evaluation within the context of the South Fork lease area is necessary for a meaningful comparison of alternatives. A more thorough analysis of baseline environmental conditions would strengthen the analysis and set the stage to compare impacts among alternatives. While the DEIS includes some discussion of potential impacts to complex habitats, the unique features of Cox Ledge and the importance of this area for marine resources and fisheries are not fully discussed. The Benthic Habitat and Essential Fish Habitat sections do not fully describe the distinct habitat features of this area or analyze the effects to the physical habitat features and the biological consequences of those effects. For example, the document should describe the importance of different habitat types for providing structure and refuge, not just from the presence of large boulders, but also pebbles, cobbles, and small boulders that are important habitat for juvenile species. While the document focuses on the benefits of reef effect from the presence of structures, the analysis does not discuss the potential impact of converting smaller-grained hard habitats that support early life history stages of finfish to artificial reefs that may attract larger predator species. A broader discussion of the potential effects of habitat alteration, including an accurate description of the best available scientific information, would help identify which species may benefit or be adversely affected by the presence of structures. We recommend that you clarify that artificial habitats are included only in the EFH designation for two managed fish species in the region. It should not be expected that the addition of artificial hard substrates will increase EFH for all species and life history stages that have hard habitats included in their EFH designation.
363-55	The description of the Habitat Alternative raises multiple questions that cannot be answered using publicly available information: • What is the habitat value of these benthic and water column areas, and what work is being conducted to characterize that? • What scale informs the habitat characterizations? • Why is habitat use by marine organisms that require sand/mud substrates (e.g. squid, surfclams, fluke) not factored into the analysis? • Are the black shaded areas on the map representing surficial boulder habitat characterized as complex or non-complex? • What threshold will determine whether a turbine location will be excluded if habitat is considered too complex? • Is a similar habitat assessment being performed regarding the inter-array and export cable routes and the area of materials required to be introduced for its protection, where approximately 12.5 acres and 15.4 acres, respectively, of scour protection would be required where boulder substrates prevent burial of the inter-array cable and portions of the offshore SFEC? • What are the potential outcomes of selection of this alternative - would it be equivalent to No Action or the Proposed Action alternatives or something else?
144-16	Section 3.4 Biological Resources identifies the area of Cox Ledge where SFWF is to be located as Essential Fish Habitat (EFH) for more than 25 marine species, many of which are very significant species for commercial or recreational fishing or both. In consideration of this fact and the statement that this project will impact up to 354.8 acres of seafloor, the DEIS should include at a minimum how the Proposed Action will include construction of new fish habitat that exceeds the 354.8 acres that will be impacted, where and how this new habitat will be constructed, and how this new habitat will be monitored to assure that it develops into a high quality habitat that will make some accommodation for impacts to 354.8 acres of EFH.
163-6	The Habitat alternative may provide additional flexibility in project design to avoid areas of complex, hard-bottom substrate. a. However, there is a need for more analysis of alternatives to determine whether the habitat impact minimization alternative may reduce impact to complex fish habitat. The DEIS states that "micrositing of WTGs and cable routes would also reduce impacts to EFH," but the extent of potential impact reduction is not provided. Table 2.3.1-1 provides only high-level information on comparison of alternatives. b. Such analysis may hinge on additional data collection to better delineate areas of complex habitat.
363-59	BOEM must provide clarification of the Habitat Alternative, its effects, methodology for habitat assessment, and the above described information gaps to the public for additional comment before issuing a decision on this project.

Comment Number	Comment
310-22	We encourage BOEM to continue to address challenges with the benthic habitat descriptions and connections to essential fish habitat. BOEM and SFWF representatives, including Inspire Environmental scientists, have received funding to explore this issue in more detail.
338-35	33. On p. 3-26, provide more information on how the area “50.2 acres (2.8% of the SFWF and SFEC footprints)” was calculated to represent conversion from hard-bottom back to soft-bottom habitat during decommissioning. A more meaningful comparison would be providing the percentage of converted habitat that would be reversed.
310-24	Figure 3.4.2[-]1 contains important information on habitat classification within the Lease Area but is low resolution and difficult to read. MA DMF requests an ArcGIS geodatabase with the information in Figure 3.4.2.1.
166-16	Improved map products would better support the impacts analysis. Figure 3.4.2-1 is helpful for understanding the rough distribution of habitats in the project area, but it is difficult to assess individual turbine locations at this scale. Ideally the FEIS would include a map of this size for each turbine location and the adjacent cable corridor. Also, the caption should clarify that the black markings indicate surficial boulder, and the text should describe why boulder can be identified throughout the project area, but complex/non-complex habitat is only identified in specific corridors overlapping the turbine and cable locations. Occurrence of boulders would suggest that the area should be identified as complex habitat. Based solely on Figure 3.4.2-1, it appears that all locations except 2, 3, 4, 7, and 11 overlap with complex habitat and might therefore be considered for removal under the habitat alternative.
166-13	We recognize that additional habitat data analysis and mapping will be completed prior to development of the FEIS, and therefore it is not possible to fully evaluate the impacts of any of the alternatives, including the fisheries habitat impact minimization alternative, on physical habitat and EFH. However, this uncertainty makes the DEIS difficult to review, in the sense that the physical habitat impacts analysis is very incomplete. This information limitation also makes it impossible to compare the habitat alternative to the proposed action and transit alternatives. While the DEIS places all three alternatives in the same category (negligible to minor), we expect the magnitude of the impacts will vary across alternatives because the number of turbines will change. For example, page 3-38 states: “Although the number of wind turbine generators and their associated inter-array cables varies slightly, BOEM expects that benthic resource, EFH, invertebrate, and finfish impacts would range from negligible to minor for all action alternatives.” This point could be followed by a statement such as, “These impacts would vary in degree across alternatives, depending on the final number and siting of turbines. For example, the minor negative impacts of the habitat alternative on habitat would be lesser in magnitude than the minor negative impacts of the proposed action.” We assume that the transit alternative, which removes turbine locations that appear to be within complex habitat, would also have positive habitat impacts relative to the proposed action.
363-54	The “Fisheries Habitat Impact Minimization” alternative lacks sufficient description to understand what it would entail. The DEIS states that the intent of this alternative is to reduce impacts to complex fisheries habitats by excluding certain wind turbines and associated cable locations within “complex fisheries habitats” while maintaining a uniform east/west and north/south grid of 1 nm spacing. In public hearing webinars for the SFWF project, BOEM clarified that NMFS has determined “potentially complex habitat” to be a subset of “complex habitat” that will be further clarified in the Final EIS, pending the results of ongoing analysis. It goes without saying that important fisheries habitat should be excluded from OSW development. However, the DEIS does not support informed comment on this particular alternative. Moreover, unavailability of the EFH assessment, if one has been completed by BOEM or NMFS, hinders the ability to evaluate claims regarding EFH. The DEIS states that habitat conversion “by placement of scour protection would replace EFH for species preferring soft-bottom habitat with EFH for species preferring hard-bottom habitat and could increase over time as these hard surfaces are colonized by sessile organisms.” RODA is unaware of instances in which EFH can be considered “replaced” by introduced materials. More appropriate terminology might be that “scour protection would eliminate EFH for soft-bottom species.” The description of this alternative does not include even a basic definition of what constitutes “complex” or “potentially complex” habitat, nor what indicators would factor into this decision. Later, in the Affected Environment section of the DEIS, it provides additional (but still limited) information that complex habitat includes glacial moraine and coarse sediment, whereas non-complex habitat consists of “[s]and and muddy sand and mud and sandy mud areas” but confusingly notes that complexity was determined by both “substrate sizes and composition and by their use by marine organisms” and that there may be patches of complex habitat within non-complex habitat areas.

Response to comments: Thank you for your comment. BOEM worked closely with NMFS to develop the Fisheries Habitat Impact Minimization alternative including the presented methodology for analysis. BOEM and the applicant have coordinated with NMFS to revise the benthic habitat characterization, which is based on sub-meter (50-centimeter) resolution side-scan sonar data of the SFWF and surroundings, and the entire SFEC corridor (see COP Appendix N2, available at: https://www.boem.gov/renewable-energy/state-activities/south-fork). This characterization considers both complex and non-complex benthic habitats, the former including cobbles and boulders; boulders are depicted as black dots in Figure 3.4.2-1 in the FEIS. The Habitat alternative would reduce impacts on complex fisheries habitat by the elimination of up to four turbine foundations, the use of alternative foundation locations, and micrositing. This alternative would reduce the habitat impacts of the project while achieving desired power generation capacity.

Benthic and pelagic habitats within the project footprint are characterized in detail in the revised EFH assessment for the project (https://www.boem.gov/renewable-energy/state-activities/south-fork). Use of non-complex habitats (which includes sand and mud) by EFH species and their prey organisms is considered in detail in the EFH assessment. The revised benthic habitat characterization and findings of the EFH assessment is incorporated into the FEIS, with details that differentiate between alternatives, as appropriate.

Appendix G includes a summary of all proposed mitigation. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures will be considered by decision-makers and could be adopted in the Record of Decision and required as conditions of approval.

Figure 3.4.2-1 has been revised and is included in the revised EFH assessment as Figure 3.1, and now includes habitat delineations for the entire lease area.

Comment theme: General resource concerns.

Associated comments

Table I-218 provides the full list of comments received as part of this comment theme.

Table I-218. General resource concerns comments.

Comment Number	Comment
352-7	We ask BOEM to view these impacts through the same lens as the Councils do. For nearly 45 years we have cooperated with the Councils to ensure that the bottom habitat impact of our fishing gear is minimized, to the extent that hydraulic clam dredges have been eliminated in an area of cobble and boulder bottom only some 50 miles to the east of the South Fork wind development location. The burden on wind developers to protect complex fisheries habitat should be no less rigorous than the requirements that we must live by each day.
339-3	Benthic Habitat: In OCS Study BOEM 2017-014; “Effects Matrix for Evaluating Potential Impacts of Offshore Wind Energy Development on U.S. Atlantic Coastal Habitats,” BOEM makes clear the importance of protecting benthic habitats, such as the hard bottom habitat which is natural to Cox’s Ledge, and sand shoal habitat that is present along much of the “cable-path” of the SFEC. Both of these habitats within this area will suffer a major negative impact. That impact will trickle down regionally and economically, negatively impacting the commercial and recreational fishermen within the Town of East Hampton. 3.1.9 “Both coral reefs and hard-bottom habitats are susceptible to habitat destruction and/or burial during construction of transmission lines and/or potential contamination due to spills during construction and/or dredging/resuspension of contaminated sediments disturbed during COP activities associated with OSW development. 3.1.10 While soft bottom is less productive than other estuarine environments (i.e., seagrass beds and shellfish reefs), it often is the dominant habitat type, and may contribute more to total productivity than other submerged habitats (NCDEQ 2016). Due to their role in nutrient cycling, benthic invertebrates are among the most important components of coastal ecosystems,” and “Reef species have been known to forage over adjacent soft-bottom habitats during the day (Lindquist et al. 1994.)”

Comment Number	Comment
	Additionally, horseshoe crabs and conchs are both New York commercially harvested species that are known for not moving too quickly. The status of Horseshoe crabs in the Northeast is depleted, of unknown etiology. They summer and breed in local bays and in winter, adults migrate to depths of 30 meters. Jet plowing in the winter when they are burrowed in sand shoals should be considered a major negative effect and mitigated through time of year limits or closures. Conchs/Whelk are also known to be sound-sensitive and speed-challenged and may need mitigation so as not to interfere with breeding or migratory periods. The same can be said for Southern New England winter flounder, who breeds inshore in sand shoal environment in the winter. In Rhode Island for the BIWF, RI's Department of Environmental Management suspended jet plowing from Feb 1-March 31 to protect southern new England winter flounder larvae and breeding in a letter to "Aileen Kenney of DWW on May 7, 2015 Application for Wind Farm Construction, New Shoreham, Rhode Island," re Water Quality Certificate File Number 12-037 "Jet plowing - The proposed cable installation as described in the permit application that requires the use of a jet plow may occur anytime between April 1 and January 31. This time frame is an extension of the current window of October 15 to January 31. No further modifications to this extended dredge window shall be granted and thus, no jet plowing shall occur during the time period of February I to March 3. This time of year restriction is required for the protection of winter flounder." This same condition that RIDEM placed for Southern New England winter flounder (SNE-WF) on the BIWF should be required by BOEM for the SNE-WF stock for the SFWF and SFEC. While not overfished, environmental stressors that have prevented the species from finding shelter as young of the year (YOY) have left the stock depleted. Jet plowing would be a major negative impact to YOY flounders, so a time-related condition limiting jet plowing during breeding season is warranted. "The physical environment provided by shallow soft-bottom habitats is important to fish and invertebrates. Shallow nearshore areas can be refuges for smaller animal species by excluding larger predators. In addition, some fishes and invertebrates (i.e., blue crabs, flounders) burrow into the sediment to avoid predation (Luettich et al. 1999; Peterson and Peterson 1979). Soft-bottom areas can also be used as movement corridors for some species of anadromous fish (e.g., sturgeon and striped bass) during their upstream migrations. Water quality itself in and around the turbines, depending on sedimentation and scour, could become disastrous as was the case of the Thanet Wind Farm, in Thanet England Again from OCS Study BOEM 2017-014, section 3.1.11 "COP activities associated with OSW development may temporarily reduce the amount of, or access to, water column habitat due to physical disturbance and/or water quality degradation. Activities related to offshore wind development may affect the water column by increasing vessel traffic and noise, increasing sedimentation, and potentially increasing contamination from construction activities." Because of sharp tides in and around Cox's Ledge, BOEM must thoroughly analyze, preferably with in-situ methods to determine tidal flow and strength, the possibility of Wind Turbine Generators (WTGs) via tidal function creating sediment plumes, as was the unfortunate end result of the Thanet Wind Farm, seen from space by NASA with sediment plumes from turbines monopoles six kilometer's long and almost 500-feet wide.
366-5	Additionally, horseshoe crabs and conchs are both New York commercially harvested species that are known for not moving too quickly. The status of Horseshoe crabs in the Northeast is depleted, of unknown etiology. They summer and breed in local bays and in winter, adults migrate to depths of 30 meters. Jet plowing in the winter for the SFEC when they are burrowed in sand shoals should be considered a major negative effect and mitigated through winter jet-plowing closures as have been done in Rhode Island for Southern New England Winter Flounder. Conchs/Whelk are also known to be sound-sensitive and speed-challenged and may need mitigation so as not to interfere with breeding or migratory periods. "The physical environment provided by shallow soft-bottom habitats is important to fish and invertebrates. Shallow nearshore areas can be refuges for smaller animal species by excluding larger predators. In addition, some fishes and invertebrates (i.e., blue crabs, flounders) burrow into the sediment to avoid predation (Luettich et al. 1999; Peterson and Peterson 1979). Soft-bottom areas can also be used as movement corridors for some species of anadromous fish (e.g., sturgeon and striped bass) during their upstream migrations.

Response to comments: Thank you for your comment. The project incorporates design features and installation methods to avoid and minimize adverse effects on habitat function from the mechanisms described (see Appendix G: Environmental Protection Measures, Mitigation, and Monitoring). The project will also adhere to all timing restrictions and related mitigation measures imposed as a condition of project permitting.

BOEM and the applicant are coordinating with NMFS on micrositing to avoid and minimize project impacts to benthic habitat to the extent practicable.

Comment theme: Sufficiency of resource analysis.

Associated comments

Table I-219 provides the full list of comments received as part of this comment theme.

Table I-219. Sufficiency of resource analysis comments.

Comment Number	Comment
363-104	"The “affected environment” is described differently throughout the DEIS, to the extent that it cannot be understood by the public. Of primary concern in describing the affected environment related to fisheries, and supporting analysis of the DEIS alternative, are the defective definitions of the area of impact. The DEIS describes an “area of direct effects” to fisheries that is cyclically defined as including “the footprint of the SFWF and offshore SFEC and surrounding areas that could be measurably affected by Project construction and installation, O&M, and conceptual decommissioning.” It states that short term underwater noise would create the largest possible area of impacts, so defines the area of direct effects as that where “[s]ignificant noise effects based on sound attenuation modeling could extend,” or 8 miles from each turbine foundation, 0.5 mile from the SFEC sea-to-shore transition, and 0.1 mile from vessels burying the offshore SFEC. No criteria is provided for the threshold of what constitutes a “significant noise effect,” what species or stock this refers to, or why the environment where effects that are adjudged non-significant occur may not meet the definition of “affected,” particularly if these effects may have significant cumulative impacts. Conflating significance with directness here is sloppy and capricious as they have profoundly different meanings under NEPA. “Significance” carries a specific definition that includes both context and intensity. “Indirect effects” are those which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. The two concepts are not mutually descriptive; an effect can be indirect and significant or even direct and insignificant. The very description of the affected environment is therefore deficient for these two separate, but related, reasons: (1) it does not provide sufficient detail to evaluate whether the described geographic area is the appropriate one to meet the definition of significant effects; and (2) it does not include anywhere a description of the area that will experience indirect effects from the proposed action and alternatives."
163-5	NOAA NMFS has identified data gaps with respect to the SFWF Draft Essential Fish Habitat Assessment (refer to December 14, 2020 letter from NOAA NMFS to BOEM). a. As of December 2020, NOAA has stated that data provided are insufficient "to comment on the impacts of the proposed project on living marine resources nor recommendations to avoid, minimize and mitigate adverse effects on EFH and other marine resources". As such, NOAA has recommended that additional data collection be conducted to meet the mandatory information requirements pursuant to 50 CFR 600.920e. b. Additional supplemental data collection and discussion should include: i. Improved habitat delineations within the project area. 1. Current habitat data do not support accurate delineation between coarse soft sediment substrates (i.e., sand) and small-grained hard bottom (i.e., pebble cobble, boulder). Species' preference and use of coarse soft sediment and small-grained hard bottom can differ and therefore EFH determination depends on sufficient habitat data (e.g., higher resolution acoustic data that can identify complex habitats). ii. Assessment of the potential for construction and operation impacts to Atlantic cod EFH. 1. More detailed discussion on potential project effects (e.g., habitat alteration) to Atlantic cod spawning activity in the area should be included. a. Cod communicate using sound (or grunts) during the spawning season. Previous work has suggested that ambient noise can affect or disrupt spawning activity (Rowe and Hutchings 2006; Zemeckis et al. 2019). This should be discussed in added detail with respect to both construction and operational noise. iii. Discussion of how cable laying practices will attempt to minimize impacts to habitat areas of particular concern (HAPCs). c. While discussion of some of these items is provided within the DEIS, recommendations are still based upon data that NOAA has identified as inadequate for delineating EFH. d. NOAA NMFS also highlighted challenges associated with the current benthic habitat monitoring plan (as of September 30, 2020). The current design may not allow for detection of changes and no discussion of statistical power is provided. Without multi-year and seasonal data collection prior to construction, delineation of annual or seasonal variability from changes associated with project construction or operation may not be possible. e. The DEIS states that ""BOEM and the applicant are currently working with NOAA to refine this baseline assessment as part of the EFH consultation. This information and analysis will be detailed in the EFH report and summarized in the FEIS."" The RIDEM looks forward to these issues being addressed within the FEIS.

Comment Number	Comment
363-110	The DEIS provides information regarding the size and scope of OSW projects under consideration, including up to 5,779 miles of cable that may be added in the geographic analysis area under the No Action alternative alone. Despite this huge amount of cable proposed to be introduced to the environment, noise associated with large increase in vessel traffic, pile driving, and O&M, and the known potential for these impact factors to affect multiple fishery stocks, the DEIS contains very little information about these impacts. Further species-specific and cumulative analyses should be conducted in order to understand how all components and phases of OSW projects would affect the organisms in the project area. Known information regarding these impacts to fisheries is being assessed in the Synthesis of the Science project RODA is conducting in partnership with BOEM, NMFS, ROSA, and others, and should be included in project considerations.
363-102	The impacts also do not vary across the valued ecosystem components (VECs) between the no action and proposed action alternatives. As explained above, this defies logic. Again, focusing on the benthic habitat VEC, it doesn’t make sense that constructing and maintaining a WEA would have similar impacts to the sea bed as not constructing one.

Response to comments: Thank you for your comment. BOEM worked closely with NOAA to develop the Fisheries Habitat Minimization alternative, with which NMFS concurred. BOEM also worked with NMFS to develop the language on the alternative that was included in the DEIS; the analysis language was provided to BOEM by NMFS. Additionally, BOEM is coordinating with NMFS to address their concerns consistent with MSA/EFH requirements.

BOEM and the applicant have revised the EFH assessment in coordination with NMFS and will incorporate updated findings relevant to this comment into the FEIS. The rationale for geographic analysis area definition is provided in Section 3.1 of the FEIS. As stated, each analysis area is defined by the most extensive biologically significant effect likely to result from exposure to project stressors, and the type of exposure and/or sensitivity thresholds vary by resource type. In the case of finfish, the criterion for significant noise effects on finfish is the lowest applicable threshold for biologically significant effects - the behavioral effects threshold of 150 unweighted root-mean-square decibels (see DEIS Table 3.4.2-3). This conservative threshold applies to all finfish species and represents the best available science regarding noise sensitivity. With regard to indirect effects, the DEIS concludes that direct mortality and behavioral effects on finfish within the defined exposure areas is unlikely to result in biologically significant indirect effects based on the nature, extent and duration of the impacts, and existing population dynamics.

Comment theme: Seabed preparation.

Associated comments

Table I-220 provides the full list of comments received as part of this comment theme.

Table I-220. Seabed preparation comments.

Comment Number	Comment
363-57	It is unclear what “seabed preparation” entails or how it is related to the extent of anticipated seafloor disturbance. The DEIS notes on p. E4-11 that these numbers were “calculated by the applicant”, but no work is shown. The actual extent of habitat impact can be readily calculated using known site-specific information such as substrate type, current strength and direction, and other factors. The extent of scour and thus the necessary amount of material for protection will be greater in soft substrate than hard. The public cannot make informed comments on this or any other alternative without this crucial information.

Comment Number	Comment
363-98	The DEIS includes almost no information regarding seabed engineering although it discloses deep in an appendix that construction of the offshore portion of the project would require "temporary" boulder relocation. It is unclear how such an activity could be temporary and does not elaborate on how safety considerations of this activity would be addressed.

Response to comments: The level of detail provided for the project design in the FEIS is consistent with NEPA requirements. Detailed information about the purpose, methods, and extent of boulder relocation and other aspects of project construction are provided in Sections 4.1.1.1 (SFWF) and 4.1.1.2 (SFEC) of the Construction and Operations Plan, which is publicly available at: https://www.boem.gov/renewable-energy/state-activities/south-fork.

BOEM and the applicant have revised the short-term and long-term benthic impact quantities in coordination with NMFS. These revised estimates are incorporated into the revised EFH assessment and will be reflected in the FEIS at a level of detail commensurate with NEPA requirements. Data sources, methods, and information used to estimate impact quantities are described in Appendix N2 of the Construction and Operations Plan, which is publicly available at: https://www.boem.gov/renewable-energy/state-activities/south-fork.

Comment theme: Management of fouling communities.

Associated comments

Table I-221 provides the full list of comments received as part of this comment theme.

Table I-221. Management of fouling communities comment.

Comment Number	Comment
310-38	The EIS should address the management of fouling communities on wind turbines and assess the risk of adverse impacts associated with the management of fouling.

Response to comments: BOEM anticipates that the WTG foundations will become colonized by a diverse community of organisms over time that will contribute to a beneficial "reef effect." With the exception of regular inspections and removal of entangled fishing gear and other marine debris, no management of these communities is warranted.

Comment theme: Impacts from geophysical and geotechnical survey methods.

Associated comments

Table I-222 provides the full list of comments received as part of this comment theme.

Table I-222. Impacts from geophysical and geotechnical survey methods comment.

Comment Number	Comment
363-112	Impacts from geophysical and geotechnical (G&G) survey methods are poorly understood, but there is growing anecdotal evidence that these efforts may be negatively impacting marine resources. RODA has heard from several fishermen operating in various fisheries that certain species that are expected to be found in an area, following G&G surveys work, are no longer present. Pot fishermen have reported mortality in whelk/conch in pots after G&G surveys were conducted in the same area as the pots were set. Currently, few studies have researched this directly, but individual reports from fishermen with a deep understanding of the ocean they operate in, should not be dismissed as hearsay. The only study RODA is aware of found that seismic testing used for geophysical surveying disrupted free-ranging Atlantic cod activity, which could "affect energy budgets and… have population-level consequences." At a minimum, BOEM should acknowledge the potential impacts from G&G surveys to biological resources, and invest in improving our basic understanding of these already on-going efforts.

Response to comments: BOEM developed a programmatic EIS for geological and geophysical (G&G) survey activities on the Atlantic OCS (see https://www.boem.gov/oil-gas-energy/atlantic-geological-and-geophysical-gg-activities-programmatic-environmental-impact). It is important to distinguish the high-resolution geophysical (HRG) survey methods used to support offshore wind energy development from the traditional G&G methods used for oil and gas exploration. The former produce less extensive noise effects and are generally less harmful to aquatic life than the latter. The revised EFH assessment and ESA biological assessment considered HRG survey effects in detail. This information will be incorporated into the FEIS.

Comment theme: Use and impacts of natural materials to reduce impacts to fish habitats.

Associated comments

Table I-223 provides the full list of comments received as part of this comment theme.

Table I-223. Use and impacts of natural materials to reduce impacts to fish habitats comments.

Comment Number	Comment
338-27	22. Additional information is needed on how natural materials would be used to reduce impacts to essential fish habitat: a. BOEM should clarify what is meant by "[t]he use of natural materials and nature-inclusive designs" on p. 3-18. Does this refer to repurposing existing cobble and coarse substrate as secondary cable protection or scour protection? b. More information is needed on the impacts of using natural materials (e.g., rounded boulders) to optimize ecological benefits of scour protection. For example, on p. 3-35, will the developer use materials that mimic natural hard substrates in place of others (e.g., concrete)?
310-25	We recommend use of natural materials for cable protection.

Response to comments: Thank you for your comment. Proposed cable protection materials have been selected to minimize risk of interaction with external hazards, such as fishing gear. Proposed materials include concrete matting, fronded mattresses, rock bags, or rock placement. Proposed scour protection consists of engineered rock that would be placed at the base of each foundation to minimize erosion. Refer to the South Fork COP, Section 3. Clarification was made in Section 3.4.2 of the FEIS regarding the use of natural materials and nature-inclusive designs. Appendix G includes a summary of all proposed mitigation. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures will be considered by decision-makers and could be adopted in the Record of Decision and required as conditions of approval.

Comment theme: Impacts from EMF.

Associated comments

Table I-224 provides the full list of comments received as part of this comment theme.

Table I-224. Impacts from EMF comments.

Comment Number	Comment
310-18	There are several instances in the DEIS where a lack of evidence of EMF impacts is ambiguously described. For example, the DEIS states: “A review of the available literature revealed no documented long-term impacts from EMFs on clam habitat as a result of the existing power cables connecting Nantucket Island to mainland Massachusetts” (page 3-12). Similarly, “There is no evidence to indicate that EMF from undersea AC power cables adversely affects commercially and recreationally important fish species within the southern New England area (CSA Ocean Sciences Inc. and Exponent 2019)” (page 3-93). Please clarify if impacts are not documented because studies were not conducted, or if available studies show no impact as the two causes would elicit opposite responses. The former would support a precautionary approach and the need for additional research while the latter would provide support for the proposed cable installation methods.
310-17	In general, the DEIS could greatly improve its impact assessment by clearly identifying if [EMF] studies have been done on cables of the same size and voltage as this cable. If results from such studies are not available (or such studies have not yet been performed), field measurements should be collected to validate EMF modeling that quantifies EMF minimization associated with burial and shielding. This work is necessary to verify the conclusions that 1) “within the range of natural electrical field effects generated by wave and current actions” (page 3-29) and 2) “EMF levels generated by this limits the potential for widespread behavioral effects on large numbers of individuals, so population-level EMF impacts on lobsters, crabs and other mobile invertebrate species are not anticipated. Therefore, effects to invertebrates from EMF are considered negligible” (page 3-27). In particular, demonstration that the shallowest proposed burial (4 feet) is adequate for limiting EMF exposure to the overlying benthic habitat is needed.
338-32	30. While no effect has been determined from EMF exposure due to AC cables on New England and Mid-Atlantic species, it is important to note that there is a lack of studies on Mid-Atlantic and New England species, which should be made clear in the Final EIS. As stated in the analysis on p. 3-11, some studies found effects of EMF exposure on Mid-Atlantic/New England species in response to EMF exposure. There is insufficient evidence on behavioral effects from EMF for species present in the SFEC area to definitively say there will be no effect. In addition, an EMF monitoring plan should be presented that would monitor EMF levels along the SFEC route post-operation."
310-16	In our NOI letter we requested: “The impact of EMF on specific organisms, in particular flounders (winter, summer, and yellowtail), longfin inshore squid, Jonah crab, lobster, little skate, winter skate, Atlantic cod, and dogfish should be addressed specifically in the EIS.” Some of these species were addressed in Table 3.42-3 on page 3-23, but information is still lacking for several commercially-important species and should be part of the FEIS. The description of existing studies of EMF impacts does not include crustaceans. Several studies have been conducted to date on crustacean species (e.g., Love et al. 2015; Love et al. 2017; Scott et al. 2018), and should be included as part of the FEIS assessment of EMF impacts.
379-17	James Fletcher: Having a long experience on the water for a commercial fisherman, and having a long history with transatlantic phone cables, which put out minutely less electrical current then these long transmission lines or, I’m here to say that there must be more research done because in England and Scotland, the transmission cables are blocking the movement of the salmon, the eels, and the herring back up the rivers. Now I’ve heard and brought this part up, and “oh you don't know”, “we have”, “we shield”, that’s just a bunch of mess. As long as the cables emit electric current and electromagnetic fields, then we have a problem, because you know as more blanks are attracted to them. Is it because the fish and the larvae are accumulating around the cables and are being consumed as a food source? We've not looked into it, but we know the fish are not transferring and the larvae are not going across the cables. A starfish will not cross the transatlantic cable and a starfish probably won't pass, pass these. The other thing that comes up in this is layers of water in the ocean are by depth and have different meanings. These poles in the water are going to totally change that there by all the marine life that use layers are going to be disrupted, whichever way the current runs, if it is running North-to-South they'll be disrupted on the south, South-to-North on the south side, on the north side. We've not looked into it, oh, I’ve got a scientist says this. The scientists, the best available scientists at the time, were going to lynch Galileo, because they knew what he didn't know. They were sure he was wrong, so my point is your science is not very good if what they're saying is correct.
145-11	BOEM must continue to analyze and monitor impacts from electromagnetic fields (EMFs) created by power cords connecting turbines to each other and to land. Many ocean species can detect EMFs, and some have been shown to change their behavior because of EMFs, including fish, sharks, turtles, and marine mammals.

Comment Number	Comment
371-4	Second, were there any studies or research demonstrating the impacts of EMF on finfish and invertebrates that were taken into account?
324-1	The majority of the concerns that have been voiced by our local nearshore fishing community are focused on the SFEC, as that is the only element of the proposed action that will be located in the relatively shallow water column of the nearshore fishing grounds, with the utmost concern given to the unknown effects that the SFEC's EMFs will have on the nearshore fishery. During my 16 year career as an avionics technician I was involved in the extensive testing of several different types of military aircraft which included testing that was focused on electromagnetic frequencies as they related to airborne electronic systems. If nothing else I was made acutely aware of how minute variations in test parameters could make significant differences in test results. That said, to date, in spite of the DEIS's determination that the impacts of electromagnetic frequencies (EMFs) within the project area and along the SFEC route will be negligible, an EMF study has never been performed on a 138KV, 60HZ, AC subsea export cable, of the design and capacity that has been proposed for the action, or any of the alternatives, in a substrate similar to that of the project area or any other area for that matter, making it impossible to accurately determine any of the avoidable or unavoidable adverse impacts that the SFEC might have on the benthic environment of the project area. The BOEM recognized the need for such studies in BOEM's 2007 “Guide to the OCS Alternative Energy Final Programmatic EIS”. Vol.2, Chapter 5, of the BOEM's guide, entitled “Potential Impacts of Alternative Energy Development on the OCS and Analysis of Potential Mitigation Measures” states that “The electromagnetic fields produced by submarine transmission lines may be detected by some fish and invertebrate species (see Section 5.2.11.4). Although individual organisms in coastal habitats could be attracted to or avoid buried cables, the potential for population-level effects on fish or invertebrates from such electromagnetic fields is largely unknown.” (ref. Para. 5.2.13.4, pg. 87) The BOEM guide goes on further to state (ref. pg. 93) that “...while it is expected that the impacts of EMF on populations of aquatic species would be negligible to minor, uncertainties remain and additional studies are needed on the potential effects on species that inhabit the U.S. coasts in the vicinity of proposed projects.” Additionally, the BOEM reported, in an OCS Regulation and Enforcement standards study (OCS Study BOEMRE 2011-09) EFFECTS OF EMFS FROM UNDERSEA CABLES ON ELASMOBRANCHS AND OTHER MARINE SPECIES that offshore wind farm export cables have the potential to impair migration of certain fish species. Included in the BOEM EMF study were numerous references to EMF studies that have been conducted in relation to export cables from European wind farms that raise serious concerns for our nearshore fisheries. To wit "Distribution of four species (Baltic herring [Clupea harengus membras], common eel [A. anguilla], Atlantic cod [Gadus morhua], and flounder [Platichthys flesus]) was significantly different between the east and west sides of the cable and the authors attributed this to partial impairment of migration...Common eels appeared to depart the area when they encountered the cable..." (ref. pg.20). Partial impairment of migration is a very serious concern in the context of the nearshore fishery. Until such time as the results of further EMF studies that are site, species and project specific as they relate to the SFEC become available for analysis, the DEIS's claim that the effects of EMFs generated by the proposed action will have a negligible impact on the commercial fisheries that operate within the project area stands without merit. Until such time as the results of EMF studies that are species, site and project specific in regards to the SFEC have been made available and analyzed the only viable alternative at this time is the no action alternative.
366-7	The DEIS determination that the impacts of electromagnetic frequencies (EMFs) within the project area and along the SFEC route will be “negligible,” is incorrect because there is no baseline from which to determine the impact. There is no baseline to determine at what level does EMF create change in fish behavior. A site specific, in situ EMF study has never been performed on a 138KV, 60HZ, AC subsea export cable, of the design and capacity that has been proposed for the action, or any of the alternatives, in a substrate similar to that of the SFWF habitat area and that of the transmission cable path. Lack of actual hard data, not modeling, makes it impossible to accurately determine avoidable or unavoidable adverse impacts that the SFEC could have on the benthic environment of the project area. It must be addressed by BOEM through physical studies at maximum capacity of the projected wind farm prior to construction for the purpose of siting of transmission cables. BOEM recognized the need for such studies in BOEM's 2007 “Guide to the OCS Alternative Energy Final Programmatic EIS”. Vol.2, Chapter 5, entitled “Potential Impacts of Alternative Energy Development on the OCS and Analysis of Potential Mitigation Measures.” The BOEM Alternative Energy Final PEIS also stated in Section 5.2.13.4, Operation, pg. 5-87, that “The electromagnetic fields produced by submarine transmission lines may be detected by some fish and invertebrate species (see also Section 5.2.11.4 Operation pg. 5-68).” Although individual organisms in coastal habitats could be attracted to or avoid buried cables, the potential for population-level effects on fish or invertebrates from such electromagnetic fields is largely unknown.”

Comment Number	Comment
	It further goes on to state that "...while it is expected that the impacts of EMF on populations of aquatic species would be negligible to minor, uncertainties remain, and additional studies are needed on the potential effects on species that inhabit the U.S. coasts in the vicinity of proposed projects." The BOEMRE 2011-09 EMF study also highlighted data gaps and research priorities and recommended that ""Regulatory agencies should require that details of the cable design, anticipated cable depth and layout, magnetic permeability of the cable sheathing, and loading (amperes) be provided early in the permitting process to allow complete determination of EMF potentially generated by the cable." Utilizing a standard that has never been tested, but only modeled, on a species not native to the east coast (salmonids,) must be corrected so that a proper analysis of those species important as forage and for those species that feed on those forage species must be analyzed as it affects fishermen economically, both recreational and commercially, if the species they normally target are no longer available in the area as catch due to being repelled by EMF. In the case of bottom dwellers like the yellowtail flounder, the EMF effects on post metamorphosed larvae that make the bottom their habitat must be studied before the SFEC is in the water.
339-4	EMF Concerns: The DEIS determination that the impacts of electromagnetic frequencies (EMFs) within the project area and along the SFEC route will be negligible is incorrect because there is no baseline from which to determine the impact. There is no baseline to determine at what level does EMF create change in fish behavior. A live, in-situ EMF study has never been performed on a 138KV, 60HZ, AC subsea export cable, of the design and capacity that has been proposed for the action, or any of the alternatives, in a substrate similar to that of the SFWF habitat area and that of the transmission cable path, or any other area for that matter. Lack of actual hard data, not modeling, makes it impossible to accurately determine avoidable or unavoidable adverse impacts that the SFEC could have on the benthic environment of the project area. It must be addressed by BOEM through physical studies at maximum capacity of the projected wind farm prior to construction for the purpose of siting of transmission cables. BOEM recognized the need for such studies in BOEM's 2007 "Guide to the OCS Alternative Energy Final Programmatic EIS". Vol.2, Chapter 5, entitled "Potential Impacts of Alternative Energy Development on the OCS and Analysis of Potential Mitigation Measures." The BOEM Alternative Energy Final PEIS also stated in Section 5.2.13.4, Operation, pg. 5-87, that "The electromagnetic fields produced by submarine transmission lines may be detected by some fish and invertebrate species (see also Section 5.2.11.4 Operation pg. 5-68)." Although individual organisms in coastal habitats could be attracted to or avoid buried cables, the potential for population-level effects on fish or invertebrates from such electromagnetic fields is largely unknown." It further goes on to state that "...while it is expected that the impacts of EMF on populations of aquatic species would be negligible to minor, uncertainties remain, and additional studies are needed on the potential effects on species that inhabit the U.S. coasts in the vicinity of proposed projects." The BOEMRE 2011-09 EMF study also highlighted data gaps and research priorities and recommended that "Regulatory agencies should require that details of the cable design, anticipated cable depth and layout, magnetic permeability of the cable sheathing, and loading (amperes) be provided early in the permitting process to allow complete determination of EMF potentially generated by the cable." Utilizing a standard that has never been tested, but only modeled, on a species not native to the east coast (salmonids,) must be corrected so that a proper analysis of those species important as forage and for those species that feed on those forage species must be analyzed as it affects fishermen economically, both recreational and commercially, if the species they normally target are no longer available in the area as catch due to possible EMF. In the case of bottom dwellers like the yellowtail flounder, the EMF effects on post metamorphosed larvae that make the bottom their habitat, must be studied before the SFEC is in the water. And before any further decisions are to be made not only for the SFWF project, but for others that are slated to be built in the near future, BOEM must do a supplemental EIS to assess cumulative effects of EMF throughout the 1400 sq. mile RI-MA WEA., based on total buildout of the joint RI-MA-WEA, before many future projects in wind energy areas within the New York Bight and the RI-MA WEAs begin. The area of the RI-MA WEA is a known "fish highway" for a variety of species and life stages of those species. Should a species such as the American sand eel, or loligo squid, no longer make its migratory pathways inshore and offshore yearly due to the sequelae of EMF, severe and major environmental and economic consequences would ensue. BOEM must address this issue now, before it is too late.

Response to comments: The Construction and Operations Plan includes a detailed assessment of potential EMF effects from the project. The EFH assessment includes a detailed analysis of potential EMF and cable heating effects that incorporates the findings of COP Appendix K1 and current best available science regarding aquatic species sensitivity. Analyses of species-specific EMF effects are also presented in the EFH assessment and the NMFS biological assessment.

The analysis presented in Section 3.4.2 of the EIS is supported by detailed modeling of potential EMF effects likely to result from the project (see COP Appendix K1, Offshore Electric and Magnetic Field Assessment, available at: https://www.boem.gov/renewable-energy/state-activities/south-fork). The FEIS is updated to include the findings of the revised EFH assessment, at a level of detail consistent with NEPA requirements. With regard to EMF effects, the analysis and significance determinations presented in the FEIS reflect project-specific modeling and the best available science regarding species sensitivity to induced magnetic and electrical fields. This includes new information published following completion of the DEIS about potential EMF and cable heat effects.

Comment theme: Editorial comments.

Associated comments

Table I-225 provides the full list of comments received as part of this comment theme.

Table I-225. Editorial comments.

Comment Number	Comment
301-69	The reference author "Danheim" should be corrected to "Dannheim" in the following locations: pg. 3-25, second paragraph (twice), pg. 3-28, first paragraph, and pg. 3-32, second to last paragraph.
301-70	Fugro collected SSS and backscatter data, not Inspire, as stated in the first paragraph of Section 3.4.2.1.1. Change "Inspire Environmental (2020) has collected extensive..." to "Fugro (2019a, 2019b) has collected extensive..."
301-39	The potential benefits that may result from the introduction of hard substrate (turbine foundations, scour protection) are linked strongly to increased biodiversity in the following statement: ""This mix of habitat changes implies the potential for both adverse and beneficial effects, depending on the species and could result in a net beneficial effect from an overall increase in biodiversity.” (pg. 3-28). Ecological benefits of the ""reef effect"" created by wind turbines cited in the literature extend beyond biodiversity and include increased primary and secondary production, refugia, and additional habitat. The DEIS does refer to these other benefits. SFW recommends that the FEIS should keep the conclusory statement more general, rather than linking net benefits to increased biodiversity
301-72	There is a typo in the last sentence of Cumulative Impacts paragraph on pg. H-81, change "...would result still result…" to "would still result"
363-56	"Additionally, the map provided in Figure 3.4.2-1 includes estimates of the radius of maximum scour protection and seafloor disturbance for each turbine location that do not appear to be supported by analysis in the DEIS, and in fact does not correlate with other information within the document. • The figure shows a maximum radius of 112 ft. for scour protection and 656 ft. for temporary seafloor disturbance per turbine, equivalent to 39,400 sq. ft. of scour protection and 1,350,000 sq. ft. of seafloor disturbance. • The only other information regarding the extent of seabed disturbance in the DEIS is on p. E4-11, which indicated a maximum-case scenario of 39,765 sq. ft. of scour protection and 40,365 sq. ft. of “seabed preparation” per foundation."
166-38	A numerical value is missing from this sentence on page 3-19: “Long-term changes to benthic habitat within the SFWF, SFEC, and Montauk O&M facility would result from the conversion of approximately of soft-bottom benthic habitat to hard-bottom (e.g., steel piles, rock scour protection, bulkhead improvements) habitat.”
166-37	On page 3-7, summer flounder is listed as a “northeast multispecies.” This is inaccurate and should be corrected. If the intent was to list species by management group, summer flounder should be grouped with scup and black sea bass.

Response to comments: Thank you for your comment. The FIES includes these corrections. Disturbance estimates will be reviewed for consistency and updated for the FEIS as needed.

Comment theme: Support for analysis.

Associated comments

Table I-226 provides the full list of comments received as part of this comment theme.

Table I-226. Support for analysis comments.

Comment Number	Comment
301-16	SFW supports the benthic habitat and Essential Fish Habitat (EFH) findings in the DEIS with respect to the Proposed Action Alternative (p 2-17): • "Project construction and conceptual decommissioning would have a negligible to minor adverse effect for benthic resources, minor for EFH, and negligible to minor for invertebrates and finfish" • "Project O&M would cause fewer impacts to fish, invertebrates, benthic habitats, and EFH than Project construction and installation. The foundation piles and associated scour protection would create an artificial reef effect, which could result in minor beneficial effects to species distribution, community composition, and predator-prey interactions in the vicinity." However, the Fisheries Habitat Impact Minimization Alternative proposes "to reduce impacts to complex fisheries habitats as compared to the Proposed Action, BOEM would require DWSF to exclude certain WTGs and associated cable locations within complex fisheries habitats should micrositing not be possible to maintain a uniform east–west and north–south grid of 1-NM x 1-NM spacing between WTGs with diagonal transit lanes of at least 0.6 NM wide" (p 2-9). The exclusion of WTGs and associated cable locations is an excessively disproportionate measure given that the Proposed Action Alternative's impact findings were negligible to minor for benthic and EFH resources. Over time, as epibenthic and demersal fish communities transform and utilize the surfaces of the turbine foundations and scour protection, similar complex habitat (though not identical) will reform and replace what was removed or disturbed (i.e., habitat recovery). In addition, the DEIS includes discussion of beneficial effects for benthic taxa and demersal fish species that utilize complex hard-bottom substrates. SFW recognizes the importance of minimizing impacts to fisheries habitat and is committed to working with BOEM and the cooperating agencies to identify solutions and practical mitigations. Micrositing the WTGs and associated inter-array cables (within engineering and spacing constraints) to reduce, and in many cases avoid, these negligible to minor impacts to existing complex habitats is a reasonable and feasible mitigation measure. To support ongoing EFH consultation, SFW has provided BOEM with high quality, high resolution mapped benthic habitat data for the Project area. SFW is confident that this data and habitat mapping assessment will lead to responsible micrositing of WTGs (as engineering and navigational requirements allow), and that regulatory agency and stakeholder concerns regarding this issue will be addressed. SFW recommends that, instead of eliminating WTG locations, as proposed in the Fisheries Habitat Impact Mitigation Alternative, BOEM further consider and emphasize more reasonable measures in the FEIS, such as micrositing and other habitat mitigations (e.g., habitat reconstruction)
349-17	BOEM correctly identifies that climate change will result in a wide range of significant adverse environmental impacts in the study area, including to fisheries. These impacts include: • "alter ecological characteristics of benthic habitat, EFH, invertebrates, and finfish, primarily through increasing water temperatures." • ocean acidification, contributing to "reduced growth or the decline of reefs and other habitats formed by shells" and to "the reduced growth or decline of invertebrates that have calcareous shells, ""and lead to shifts in prey distribution and abundance." • ocean warming affects coastal habitats and "influence[s] finfish and invertebrate migration and may increase the frequency or magnitude of disease." • "impacting nearshore habitats through unprecedented freshwater input into estuarine environments resulting in compromised water quality and mortality events for native finfish and invertebrate species, as well as the spread of nonnative species into nursery habitats." These climate impacts will affect a broad range of species utilizing coastal and marine ecosystems including marine mammals, turtles, and fish. As the DEIS observes, a number of impact-producing factors (IPFs) are related to climate change. For instance, "increased storm frequency and severity during breeding season can reduce productivity of bird nesting colonies and kill adults, eggs, and chicks." These same IPFs may result in "changes in nesting and foraging habitat abundance and distribution, and changes to migration patterns and timing." For sea turtles, climate change would alter existing habitats, rendering some areas unsuitable for some species and more suitable for others. These IPFs also have the potential to "result in impacts on marine mammals" including physiological stress and behavioral changes," as well as ""reduced breeding, and/or foraging habitat availability, and disruptions in migration." Additionally, finfish and essential fish habitat may be affected by climate change, primarily from offshore wind developers must responsibly account for the effects on coastal and marine ecosystems in their development of offshore wind in the biological assessments submitted to BOEM. South Fork responsibly accounts for these effects in the biological assessments of the DEIS.

Comment Number	Comment
372-16	We are pleased the DEIS includes the evaluation of the fisheries habitat impact minimization alternative that considers ways to minimize impacts to important and vulnerable fisheries habitat while meeting the purpose and need for the project. As you know, the project is proposed for a location on Cox Ledge with particularly complex and unique habitat conditions, especially in comparison to other lease areas on the outer continental shelf (OCS). We appreciate your collaboration in the development of this alternative and in our review and analysis of the data and habitat information. It is important to ensure the FEIS fully analyzes potential impacts of development on Cox Ledge and considers the information provided through our EFH consultation. We look forward to continuing to work with you in this regard.

Response to comments: Thank you for your comment.

Comment theme: Resource analysis area.

Associated comments

Table I-227 provides the full list of comments received as part of this comment theme.

Table I-227. Resource analysis area comments.

Comment Number	Comment
301-71	The FEIS should clarify how the "area of direct effects" described in footnote on pg. 3-4 and Figure C-3 relates to the “area of potential effect” used for habitat mapping and EFH.
363-105	In several portions of the document, the description of impacts to fisheries and protected resources uses an entirely different geographic area without specifying the criteria. This appears to be acknowledged in the affected environment description: “The larger geographic analysis area used as part of some analyses is discussed in Appendix E.” However, Appendix E only describes the cumulative activities scenario, and that suffers from similarly casual treatment. The geographic analysis area in the cumulative activities scenario for benthic habitat, essential fish habitat (EFH), invertebrates, and finfish is described as including the Northeast Large Marine Shelf Ecosystem; for benthic habitat only it includes a radius of 10 miles surrounding the MA/RI WEAs and the SFEC. The provided justification that this scale “would account for some transport of water masses and for benthic invertebrate larval transport due to ocean currents,” even though “sediment transport beyond 10 miles (16.1 km) is possible” and “transport related to proposed Project activities would likely to be on a smaller spatial scale” defies comprehension and is demonstrably arbitrary. Additionally, the DEIS states that “BOEM and the applicant are currently working with NOAA to refine this baseline assessment as part of the EFH consultation. This information and analysis will be detailed in the EFH report and summarized in the FEIS.” A description of baseline conditions is the heart of NEPA’s requirement for the affected environment section, against which impacts of alternatives can be compared. As with other statements referenced in these comments, deferring this elemental information to the FEIS moots the entire documents validity.
372-6	Under the Marine Mammal, Sea Turtle, and Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish sections, there is a discussion of an “area of direct effects.” While the area itself is defined in a footnote for each resource noted above, the approach to how and why it is used in the analysis, and how it relates to the broader geographic analysis area, is not explained in the Analysis Approach section of the document (section 3.1).
372-7	In addition, the definition of the “area of direct effects” does not appear appropriate for the evaluation of all impact producing factors (IPFs) or resources affected by those IPFs. According to the footnotes, the “area of direct effects” is based on the maximum extent of area that will be affected by construction noise. While it would be appropriate to consider this area when evaluating impacts to marine resources from noise, this approach may not be appropriate for the analysis of all IPFs. For example, when evaluating effects on benthic habitat, the impacts may not extend throughout the “area of direct effect,” and, more importantly, benthic habitat has only been generally characterized for the lease area, making it impossible to evaluate and compare impacts to those resources across a broader area. The geographic scope of potential project effects may vary depending on the IPF and the presence of resources being impacted by those IPFs, which should be reflected in the analysis. Given these concerns regarding the “area of direct effects” and its use in only three resource chapters, we suggest you remove references to the “area of direct effects” unless referring to a specific impact area associated with a specific effect (e.g., discussing the area of direct effects associated with South Fork’s pile driving noise) and after having defined that IPF-specific area.

Response to comments: Thank you for your recommendations. Clarification was added to the FEIS in Section 3.4.2 and Appendix C. The rationale for geographic analysis area definition is provided in Section 3.1 of the DEIS. As stated, each analysis area is defined by the most extensive biologically significant effect likely to result from exposure to project stressors, and the type of exposure and/or sensitivity thresholds vary by resource type. In the case of finfish, the criterion for significant noise effects on finfish is the lowest applicable threshold for biologically significant effects - the behavioral effects threshold of 150 unweighted root-mean-square decibels (see DEIS Table 3.4.2-3). This conservative threshold applies to all finfish species and represents the best available science regarding noise sensitivity. In contrast, the marine mammal behavioral effects threshold for non-impulsive noise sources like vibratory pile driving is substantially lower, 120 dB RMS. This equates to a greater extent of potentially significant biological effects for this project element, justifying a different analysis area. The geographic analysis areas in Appendix E are used in the cumulative effects analysis. In the case of biological resources, the analysis areas consider broader relevant parameters like population distribution and/or large marine ecosystem boundaries.

Comment theme: Consistency with COP.

Associated comments

Table I-228 provides the full list of comments received as part of this comment theme.

Table I-228. Consistency with COP comments.

Comment Number	Comment
301-74	The project parameters should be compared with the project description in the COP, because the DEIS combines different components and presents different numbers than in the COP. The numbers in the text on pgs. 3-16 to 3-18 and pg. 3-26 should also be checked.
301-75	The timeframes referenced on pg. 3-16 should be compared with the project description in the COP.

Response to comments: Thank you for your comment. Section 3.4.2 of the FEIS is revised accordingly. The FEIS is also revised to incorporate the current project schedule.

Comment theme: Proposed analysis clarifications.

Associated comments

Table I-229 provides the full list of comments received as part of this comment theme.

Table I-229. Proposed analysis clarifications comment.

Comment Number	Comment
338-29	24. The Agencies support the development of an Anchoring Plan as an additional mitigation and monitoring measure. The developer should consider the feasibility of mooring for areas where vessels will be anchoring frequently to limit benthic disturbance and to protect sensitive habitats (e.g., squid spawning sites, as stated on p. 3-19). Please clarify when and how sensitive habitats would be delineated. How does this differ from complex fisheries habitat referred to in the Habitat Alternative? 25. The last paragraph on p. 3-8 states: “Invertebrates with commercial importance, such as lobster, Atlantic sea scallop, squid, and ocean quahog, are present in the SFWF and offshore SFEC.” Atlantic Surfclams are also an important commercial species that are present in the SFWF and offshore SFEC and should be included in this sentence.

Comment Number	Comment
	26. The last paragraph on p. 3-8 also states: "…bay scallop, lobster, channeled whelk (Busycotypus canaliculatus), and ocean quahog are present within the Montauk O&M facility site." Ocean quahogs would not be present at the Montauk O&M facility site. However, wild hard clams (Mercenaria mercenaria) and wild and cultured eastern oysters (Crassostrea virginica) would be present at this facility.

Response to comments: Thank you for your comment. Section 3.4.2 of the FEIS is revised to include the requested clarifications and refinements.

Comment theme: HAPC.

Associated comments

Table I-230 provides the full list of comments received as part of this comment theme.

Table I-230. HAPC comments.

Comment Number	Comment
301-73	The DEIS mentions HAPC for juvenile Atlantic cod, though there is no HAPC for Atlantic cod in the SFWF Project area according to the EFH mapper. The EFH Assessment being prepared by BOEM should address this.
363-132	Habitat Areas of Particular Concern (HAPC) are specific types of areas that constitute a subset of EFH. The Magnuson-Stevens Act directs their inclusion in fishery management plans based on the habitat's ecological function importance, sensitivity to human-induced environmental degradation, extent of stress induced by development activities, and rarity. NMFS policies state that an area's status as an HAPC should lead to special attention regarding the adverse effects from fishing or other activities in the designated area, and an EFH concurrence for actions affecting HAPCs should be subject to a higher level of scrutiny than those that do not. Concerns about HAPCs and EFH in the SFWF project area were raised by commenters during the preparation of the Environmental Assessment for lease issuance. In response, BOEM made no substantive changes to the EA but committed to "consult with the NMFS regarding any special leasing considerations to minimize or avoid impacts essential fish habitat and HAPCs and will review submitted plans to ensure that sensitive benthic habitats are avoided in the siting of meteorological towers and/or buoys." It has failed to meet that commitment. The DEIS states that the area of "direct effects" for the SFWF project overlaps HAPC for two fish stocks: summer flounder and juvenile Atlantic cod. Importantly, it is impossible to evaluate whether the project will have impacts to other HAPCs, or expanded portions of the referenced HAPCs, given the deficiencies in the DEIS's definition of affected environment described earlier in these comments. BOEM must evaluate whether HAPC for any managed fish stock in the entire area of indirect effects for the proposed SFWF project as well as a cumulative activities scenario. Despite the importance of these areas for fish stocks and fisheries management, the documents in the SFWF docket pay them treatment much closer to ignorance than "special attention." The term "HAPC" appears in the EFH assessment submitted with the COP only in the references section as part of the title of the NEFMC's omnibus habitat amendment. The DEIS, for its part, provides just a few words on the definition of HAPC and limits the entirety of its analysis to two statements: 1. "Neither summer flounder HAPC [] nor juvenile cod HAPC [] occur within the footprint of the O&M facility; therefore, no significant impacts to HAPCs are anticipated from Project O&M." 2. "Construction is not expected to affect HAPCs for summer flounder (i.e., HAPC is limited to areas of [submerged aquatic vegetation]) because DWSF would take measures to avoid all [submerged aquatic vegetation] during construction." The first statement may well be true; as no map is provided it is difficult to compare the footprint of the HAPCs with the affected environment of the proposed action or the cumulative action scenario. The second statement, however, appears facially inaccurate; how would HDD, jetplowing, and related activities be conducted with total avoidance of vegetation? At a minimum, BOEM must provide far greater detail supporting its conclusion of no impacts.

Response to comments: Thank you for your comment. Designated HAPC occurring in the project vicinity includes inshore juvenile Atlantic cod and summer flounder. Inshore cod HAPC is not present within the area exposed to short-term and/or long-term project effects and would therefore not be affected by the project. Summer flounder HAPC includes all nearshore areas with submerged aquatic vegetation, including eelgrass, attached algae, and drifting algal mats. Section 3.4 of the FEIS is revised to reflect HAPC occurrence and potential project effects as detailed in the revised EFH assessment, at a level of detail consistent with NEPA requirements.

Comment theme: Consistency with Magnuson Stevens Fishery Conservation and Management Act.

Associated comments

Table I-231 provides the full list of comments received as part of this comment theme.

Table I-231. Consistency with Magnuson Stevens Fishery Conservation and Management Act comment.

Comment Number	Comment
349-33	Initially, we note that the Magnuson Stevens Fishery Conservation and Management Act requires federal agencies to consult with the National Marine Fisheries Service (NMFS) on activities that could adversely affect EFH. The National Oceanic and Atmospheric Administration (NOAA) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." The Project will take place in EFH designated for many species, including several overfished populations such as Atlantic cod, winter flounder, and yellowtail flounder. There are also four fish species listed under the United States' Endangered Species Act (ESA) that are present in the Project area, including giant manta ray, Atlantic salmon, Atlantic sturgeon, and sturgeon.

Response to comments: Thank you for your comment. BOEM submitted to NMFS a biological assessment and a revised EFH assessment for the project consistent with ESA and MSA consultation requirements. Both documents may be accessed at https://www.boem.gov/renewable-energy/state-activities/south-fork.

Comment theme: Best available science.

Associated comments

Table I-232 provides the full list of comments received as part of this comment theme.

Table I-232. Best available science comments.

Comment Number	Comment
163-8	Section 3.4.2.2.3 (page 3-29) states: "Sturgeon species have been reported to respond to low-frequency AC electric signals, but insufficient information is available to associate exposure with significant behavioral or physiological effects (Gill et al. 2012)" and "Elasmobranchs (e.g., skates, rays, and sharks) are capable of detecting EMF, but it is unclear if they can discern human-made EMF from the earth's natural magnetic field (Hutchison et al. 2018). Studies show that skates react to EMF produced by DC cables by slowing their swimming speed, swimming closer to the seabed, and making wider turns (Hutchison et al. 2018)." a. Hutchison et al. 2020 should also be cited in reference to the skate study. b. While the studies mentioned suggest that potential impacts may be limited in scope, both reinforce the need for additional research on these species' interactions with EMF (e.g., directed studies on sturgeon and skates' reactions to AC cables).

Comment Number	Comment
144-19	Even though the DEIS includes significant characterization of the geology of the area, information collected through extensive geophysical surveys of the area over the last 2 years, it contains no new information about the biological resources that are key to the existing fishing interests in the area. This is because while developers have been devoting significant resources to geophysical surveys they have spent very little time or money surveying existing fish resources and recreational or commercial fishing activities in the area. This failure to collect necessary data on fish and fisheries including recreational fishing leads to insufficient ability of the DEIS to predict impacts of the Proposed Action to existing fish resources.

Response to comments: Thank you for your comment. The siting of the RI/MA WEA fully considered the available biological information about fisheries resources in the region,. With regard to EMF effects, the analysis and significance determinations presented in Section 3.4.2 of the FEIS reflect project-specific modeling and the best available science regarding species sensitivity to induced magnetic and electrical fields. This includes new information published following completion of the DEIS about potential EMF and cable heat effects.

BOEM has funded a 4-year study examining movement patterns of fishes in Southern New England, including within the lease area (see https://www.boem.gov/sites/default/files/documents/environment/environmental-studies/Movement%20Patterns%20of%20Fish%20in%20Southern%20New%20England_0.pdf). This ongoing study is being conducted by NMFS, researchers from regional universities, and non-profit organizations, and will be completed in 2023. The developer has completed two Atlantic cod spawning surveys (https://www.boem.gov/renewable-energy/state-activities/south-fork). The FEIS includes new science available since completion of the DEIS.

Comment theme: Impact on cod stock.

Associated comments

Table I-233 provides the full list of comments received as part of this comment theme.

Table I-233. Impact on cod stock comments.

Comment Number	Comment
144-21	NOAA Fisheries states that Complex Habitat such as that in moraines, including Cox Ledge is critical to survival of juvenile cod. In 2015 the New England Fisheries Management Council even proposed Cox Ledge as a Habitat Management Area (HMA) because of the importance of this area in rebuilding the George's Bank Cod stock. Nevertheless, the DEIS does not consider the impact that the Proposed Action may have on the cod stock or the ability of the cod stock in Southern New England to rebuild.
144-20	Although there are many species which are important to recreational anglers in the SFWF area, the key species of interest in this area is the Atlantic Cod, Gadus morhua. Cod in the Cox Ledge area are considered part of the George's Bank stock and this stock is listed as "Overfished" by NOAA Fisheries. Rebuilding plans have required allowable catch to be drastically reduced in recent years in an attempt to end overfishing of this stock and area closures have been implemented to protect areas of critical habitat. Cox Ledge has been shown to be an area of Essential Fish Habitat (EFH) in the DEIS and so will play an important part in rebuilding this stock of cod.
144-22	In light of the importance of cod in the area of the SFWF the DEIS needs to include more consideration of potential impacts to cod and more consideration of design changes, location changes, and operational changes both during and after construction that may reduce impacts on critical fish stocks such as cod. This is especially important since they are currently in a rebuilding phase according to NOAA Fisheries.

Comment Number	Comment
372-18	Cox Ledge is known to be a spawning ground for Atlantic cod and serves as the center of a distinct spawning stock for this species. This stock is very important to the area's commercial and recreational fisheries, and is heavily regulated due to the declining abundance and vulnerability resulting from reduced recruitment in recent years. However, there is minimal discussion related to Atlantic cod or the potential impacts to cod spawning activity or habitat. Discussion of the baseline features, as well as finfish and invertebrate species that occupy these areas, will allow for a more robust analysis of impacts. Overall, the document would benefit from more details related to the species that are expected to be impacted by the project and the degree of that impact. We will continue to work with you on these issues and your evaluation of the fisheries habitat impact minimization alternative as you prepare the FEIS.
310-6	Additional resources are available to assess potential impacts to cod through the Atlantic Cod Stock Structure Working Group.
310-5	Construction impacts may be avoidable if pile-driving occurs outside of the spawning period, but the full spatial and temporal extent of cod spawning is still poorly established. o A potential mitigation measure is proposed in Table G-2: "No pile-driving activities would occur from January 1 to April 30." Please clarify if this will prevent pile-driving during the cod spawning season using the most recent available monitoring data of cod distribution on Cox Ledge.

Response to comments: Thank you for your comment. Section 3.4.2 of the EIS considers the effects of the project on fish and fish habitat. However, more detail regarding impacts to cod has been included in the revised EFH assessment (https://www.boem.gov/renewable-energy/state-activities/south-fork), including specific information regarding Atlantic cod occurrence in the project area and vicinity. The FEIS is updated to include the findings of the revised EFH assessment, including new science and information, at a level of detail consistent with NEPA requirements.

BOEM has funded a 4-year study examining movement patterns of fishes, including Atlantic cod, in Southern New England (see https://www.boem.gov/sites/default/files/documents/environment/environmental-studies/Movement%20Patterns%20of%20Fish%20in%20Southern%20New%20England_0.pdf). This ongoing study is being conducted by NMFS, researchers from regional universities, and non-profit organizations, and will be completed in 2023. The developer has completed two Atlantic cod spawning surveys (https://www.boem.gov/renewable-energy/state-activities/south-fork).

Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures will be considered by decision-makers and could be adopted in the Record of Decision and required as conditions of approval.

Comment theme: Cold pool.

Associated comments

Table I-234 provides the full list of comments received as part of this comment theme.

Table I-234. Cold pool comments.

Comment Number	Comment
157-3	CONSIDERATION OF NATURAL RESOURCES - ENVIROMENTAL IMPACT POTENTIAL OF THE WEAKENING OF THE COLD POOL / CUMULATIVE IMPACT ANALYSIS Solutions such as offshore wind energy capture may help society transition from fossil energy, but Earth system studies using advanced modeling must be undertaken to fully understand the importance of considering the numerous coupled responses of the atmosphere, oceans, and land surface when examining the benefits and risks of the cumulative impacts large-scale offshore wind energy industrial projects. The weakening of the cold pool supports the potential of generating the most catastrophic ecological event on the continental shelf the world has ever seen. Given the gravity of a catastrophic shift in cold pool dynamics, great care should be taken to show at high probability that the chance of an impact is vanishingly small. Adequate science leading to the evaluation of cumulative impacts is not presented in the DEIS and is probably not yet available. This science need is critical. Without definitive science showing the probability of a catastrophic ecological event on the continental shelf as a direct result of wind energy extraction is extremely low, BOEM must take the No Action option for the South Fork Wind Farm COP within Lease Area OCS-A 0517. The analysis in the DEIS has not shown turbines can be placed in the water and wind extracted from the layer above the ocean, at scale, without causing a catastrophic ecological event on the continental shelf. The harvesting of ocean wind energy has the potential to become a huge new industry in the United States very quickly. A lesson learned by the fishing industry is that the resources of the ocean are not limitless. Fishery participants are only allowed to harvest, after modeling is performed to determine how the removal of a portion of the stock will impact the biomass as a whole and the ecosystem as a whole, factors of uncertainty are measured and applied, safe harvest levels are determined, and regulations are put in place to govern the conservation and management of the resource. The cold pool of the mid- Atlantic Bight on the OCS is so unique to this planet and so important to the ecosystem of the area we simply cannot proceed without the thorough evaluation of the adverse impacts of the removal of wind energy from the ecosystem over the cold pool. The field surveys, empirical studies, and ecosystem modeling has not been conducted as is needed to address these concerns.
363-133	The DEIS inadequately analyzes the potential impacts on the Mid-Atlantic cold pool, instead relying on a biological opinion (BiOp) prepared by the National Marine Fisheries Service. However, the DEIS glosses over that the opinion is focused only on Vineyard Wind I project and not the cumulative buildout of over 2,000 turbines along the east coast, which may result in a sufficient impact to adversely affect the cold pool. Also, the DEIS directly quotes the BiOp but chooses to leave the scale of the VW project out of the quote making it harder for the public to understand the context. The Science Center for Marine Fisheries (SCeMFiS) prepared a report titled “Could federal wind farms influence continental shelf oceanography and alter associated ecological processes? A literature review.” SCeMFiS is a National Science Foundation Industry/University Cooperative Research Center that “utilizes academic, recreational and commercial fishery resources to address presently urgent and emerging scientific problems that could limit sustainable fisheries.” The report highlights the unique feature that the Mid-Atlantic cold pool is and its importance to the region. The DEIS does not improve the public’s understanding of potential interactions between turbines and stratification processes that characterize the cold pool. The SCeMFiS report reviews available research but discussion of impacts on the cold pool is limited as there are not large scale OSW developments comparable to what is planned for the Atlantic to use as a basis. There is some research from Europe that can inform our inferences, however the cold pool is unique to the U.S. because of its size and level of stratification. The report outlines available research that indicates turbines and their foundations likely will have an impact on both atmospheric and oceanic processes but are influenced by multiple factors including “study site, wind speed conditions, turbine size, farm size and orientation, and underlying oceanographic and atmospheric conditions.” Foraging, and other biological necessities, by marine mammals and fish species may be affected by changes in the cold pool. If the cold pool is disrupted and primary production is reduced, prey species would also be expected to decline, negatively affecting multiple trophic levels. Additional research is needed to estimate the extent of potential changes to the size, location, and strength of the cold pool.
310-20	The DEIS identifies potential hydrodynamic disturbance as “a topic of emerging concern” (p. 3-13) due to potential turbine impacts on the Mid-Atlantic Bight cold-pool. Given the ecosystem-level impacts of this potential alteration, this topic should receive greater attention in the FEIS. Water temperature should be closely monitored in and adjacent to the lease area to assess possible mixing of currently stratified waters and other potential thermal impacts.

Response to comments: Thank you for your comment. Potential effects on the cold pool were considered in Section 3.4 of the DEIS, the ESA biological assessment (BA), and the revised EFH assessment. The BA and revised EFH assessment may be found at https://www.boem.gov/renewable-energy/state-activities/south-fork. Section 3.4.2 section of the FEIS is revised and updated in coordination with NMFS to provide additional analysis of potential impacts to the cold pool, based on currently available science and understanding on this topic. BOEM is funding a study modeling hydrodynamics and particle tracking in the Mid-Atlantic Bight (https://www.boem.gov/sites/default/files/documents/environment/environmental-studies/NSL-19-04.pdf).

Comment theme: Noise impacts to eggs, larvae, sessile species, and less mobile species.

Associated comments

Table I-235 provides the full list of comments received as part of this comment theme.

Table I-235. Noise impacts to eggs, larvae, sessile species, and less mobile species comments.

Comment Number	Comment
163-7	On page 3-23, the DEIS states: "Additionally, although eggs, larvae, sessile species, and less mobile species (i.e., whelks, longfin squid egg mops) are less sensitive than other fish species to pile-driving noise, they are more vulnerable because of their lack of motility." A citation should be provided to support the assertion that eggs and larvae of some species are less sensitive to noise. a. Limited studies exist on this topic and additional research is needed to clarify the potential effects of pile driving noise on species of invertebrates that hear by way of particle motion. b. Additionally, research on seismic noise has suggested that scallop larvae (New Zealand scallop, Pecten novaezelandiae) are more likely to develop body malformations and developmental delays in the presence of seismic airgun sounds. The researchers contend that ""if larvae in the wild are subject to intense noise exposure during development, this could reduce recruitment and so have a delayed impact on stocks of mature animals"" (Aguilar de Soto et al. 2013). It is important to note that seismic noise differs substantially from pile-driving noise, but the research still highlights the need for additional work to evaluate potential impacts of pile-driving noise on egg and larval life history stages.
366-2	The area chosen for the construction of the South Fork Wind Farm is named Cox's Ledge, which is a spawning site for several local species. Atlantic cod, yellowtail flounder and bluefish among others, use this area to reproduce. Both open-water pelagic-spawners like cod and bluefish, and bottom-spawners such as yellowtail flounder, have been attracted for centuries to the area. Yellowtail flounder and bluefish spawn in spring and summer while Atlantic cod and winter flounder spawn in the winter and early spring. The eggs of these species are either deposited on the bottom where fertilization occurs, and then the fertilized gametes float to the surface where they will hatch, as in the case of yellowtail flounder; or pelagic midwater spawners such as the cod and bluefish. The SFWF construction impact will be majorly negative to gametes and larval fish abundant in the region. Hatched larvae are highly susceptible to noise from vibration. In hatcheries, aeration can kill larval fish due to noise levels (Banner A., Hyatt M., Effects of Noise on Eggs and Larvae of Two Estuarine Fishes, Trans.Am.Fish.Soc.,1 ,1973). These early life stages of these species must be fully analyzed with peer-reviewed studies as to the impact of low-frequency noise such as that which would take place during construction, including pile driving, jet plowing and studies specific to the relationship of particle motion as a "stimulus when evaluating the effects of sound upon aquatic life."

Response to comments: Thank you for your comment. Section 3.4.3 of the FEIS incorporates the findings of the revised EFH assessment, including analysis of impacts of project construction and operation on early life stages of fishes and invertebrates, at a level of detail consistent with NEPA requirements. Appropriate citations are included in the FEIS.

Comment theme: Applicant-committed measures.

Associated comments

Table I-236 provides the full list of comments received as part of this comment theme.

Table I-236. Applicant-committed measures comments.

Comment Number	Comment
310-28	We recommend that the scour protection be sloped to its outer edge so there is no edge with the surrounding seafloor. Stone with a variety of sizes is recommended. Additional variety in grain size and porosity is beneficial for marine organisms. The method for placing scour protection has not been identified. The method should be accurate in its placement of material to minimize the extent to which the seafloor disturbed.
144-12	Pile driving monitoring plan – As the previous comment, since pile driving has the potential to harm fish for miles around the active area a robust monitoring plan is critical to assuring that impacts are identified and minimized to the extent possible. Agree with monitoring.
310-26	Table G-1 indicates the following environmental mitigation to protect sensitive seafloor habitats: “A plan for vessels would be developed prior to construction and used to identify no-anchor areas inside the maximum work area (MWA) to protect sensitive habitat or other areas to be avoided” (page G-3). Within the DEIS, one sensitive habitat is identified, "squid spawning sites” (page 3-19). What are the others and how will they all be identified?
144-10	Monitoring and minimizing scour protection – With the EFH present in the area of the SFWF installation of scour pads must be minimized so that alteration of this EFH is no greater than necessary. Rather than simply placing engineered rip-rap in a circle up to 112 feet out from turbine bases, complex scour protection needs to be employed. This should include 3 dimensional structures such as large reef balls that will both reduce the need for large scour pads by dispersing currents near the sediment surface and make up for some of the complex bottom habitat that is lost during installation of the monopiles and scour protection required (for reference see p.31 of https://www .risaa.or g/newsletter/0121/Jan2021.pdf). This step could contribute to a positive effect on fish habitat at the base of the OWE platforms and could add to the reef effect that has been discussed in the DEIS.
338-28	23. In Appendix G, Table G-1, states that “the SFWF and SFEC offshore would minimize impacts to complex bottom habitats to the extent practicable.” More detailed information is needed on the extent to which “micrositing” will be used to minimize impacts to benthic habitats. If this statement refers to the habitat alternative described on p. 3-34, what scenarios (e.g., A-D) would be most probable?

Response to comments: Thank you for your comment. The project incorporates design features and installation methods to avoid and minimize adverse effects on habitat function. Project EPMs and additional mitigation measures include sound source verification and attenuation effectiveness monitoring.

The project anchoring plan will specify details to protect sensitive seafloor habitats such as complex benthic habitat.

Table G-1 provides environmental protection measures that SFW has committed to use. The Habitat alternative will incorporate EFH conservation recommendations provided by NMFS, which may result in fewer turbine locations and micrositing of turbines and cables to reduce or eliminate impacts to complex habitat.

Comment theme: Trust species.

Associated comments

Table I-237 provides the full list of comments received as part of this comment theme.

Table I-237. Trust species comment.

Comment Number	Comment
371-3	Next, the Trustees question whether BOEM addressed certain issues when preparing the DEIS. First, did the essential fish habitat management groups also take into consideration bait fish such as Atlantic mehhaden, sand lances, bay anchovies, Atlantic and river herring, mullet and longfin squid?

Response to comments: Impacts to prey of EFH species are considered in Section 3.4.2 of the FEIS as well as in the revised EFH assessment (https://www.boem.gov/renewable-energy/state-activities/south-fork). The species mentioned are also considered NOAA trust species; an assessment of project effects on NOAA trust species is provided in Appendix B of the revised EFH assessment.

Comment theme: Mobile gravel.

Associated comments

Table I-238 provides the full list of comments received as part of this comment theme.

Table I-238. Mobile gravel comment.

Comment Number	Comment
166-18	Finally, related to habitat description and delineation, we are confused by the terminology ‘mobile gravel’ as used in the appendices. It seems this term is intended to indicate areas where gravels (e.g., pebbles and cobbles) occur within a mobile sand matrix; however, we think it would be more appropriate to characterize the sand as mobile. More important than the terminology, the analysis should indicate whether the dynamic nature of these seafloor habitats is material to the estimation of impacts. Is the implication that sediment movement will facilitate rapid return of the habitat to pre-construction conditions?

Response to comments: FEIS language was revised in Section 3.4.2to clarify information regarding mobility of sediments.

Comment theme: Mitigation measure - Atlantic sturgeon.

Associated comments

Table I-239 provides the full list of comments received as part of this comment theme.

Table I-239. Mitigation measure - Atlantic sturgeon comment.

Comment Number	Comment
338-36	Marine Protected Species 34. P. 3-33 states that “no Atlantic sturgeon would be injured or killed” by the proposed action. The potential impact of construction and operation activities (e.g., noise, sediment disturbance) are not completely understood and, depending on the time of year and location, there is a potential for behavioral disturbance or injury. Therefore, the Agencies recommend that Time-of-Year-Restrictions be used as a mitigation measure in areas where/when Atlantic sturgeon aggregation is likely to occur. As part of the ongoing Article VII proceeding, DWSF has agreed to the following condition in State waters:

Comment Number	Comment
	"No in-water seabed disturbing work, including jet trenching trials, shall occur between May 1 to June 30 and September 1 to November 15 in any year to avoid the risk for incidental take of Atlantic Sturgeon, except that DWSF may be permitted to perform some limited seabed disturbing work activities (i.e., diver clearance and maintenance of the horizontal directional drill ("HDD") exit pit, and backfill of the HDD exit pit) May 1 through May 15 and November 1 through November 15. If backfill of the HDD exit pit occurs May 1 through May 15 or November 1 through November 15, DWSF shall develop an Atlantic Sturgeon Monitoring and Impact Minimization Plan. Such Atlantic Sturgeon Monitoring and Impact Minimization Plan must meet the substantive requirements of 6 NYCRR Part 182, and shall be included as part of the EM&CP. DWSF shall provide the Atlantic Sturgeon Monitoring and Impact Minimization Plan to New York State Department of Environmental Conservation ("NYSDEC") forty-five (45) days prior to filing of the EM&CP for NYSDEC's review and comment."

Response to comments: FEIS text is updated for consistency.

Comment theme: Horizontal directional drilling (HDD).

Associated comments

Table I-240 provides the full list of comments received as part of this comment theme.

Table I-240. Horizontal directional drilling (HDD) comment.

Comment Number	Comment
363-97	The process and impacts of horizontal directional drilling (HDD) should be explained in the DEIS. HDD is expected to be used close to shore and is likely to result in sediment disturbance and bentonite release. There is concern about the impacts to the seafloor from use of HDD Drilling Fluid. Fish stocks, and even fishing traps, can be highly affected by sediment movement. There, the extent to which drilling could undermine the seafloor and/or create additional sediment could have direct fisheries impacts. According to RODA members, bentonite, if released, could result in short-term burial and smothering of benthic epifauna and infauna, clog fish gills, and cause increased turbidity around the area of release. This begs the following questions: What are other potential impacts to wildlife and other living marine resources from releases of the HDD Drilling Fluid? Are there any recent studies on impacts to fish stocks and other living marine resources?

Response to comments: HDD methods are described in detail in Section 3.2.3.4 of the Construction and Operations plan, which is publicly available at: https://www.boem.gov/renewable-energy/state-activities/south-fork. The project includes environmental protection measures (FEIS, Appendix G) to avoid and minimize risks to aquatic life from accidental releases of drilling fluids. HDD installation of the sea-to-shore transition was selected over other available methods to avoid impacts to sensitive nearshore marine and coastal dune habitats.

Comment theme: Special aquatic site.

Associated comments

Table I-241 provides the full list of comments received as part of this comment theme.

Table I-241. Special aquatic site comments.

Comment Number	Comment
169-36	IV.FAILURE TO DETERMINE WHETHER THE PROJECT AFFECTS A SPECIAL AQUATIC SITE. Where a proposed permit would allow discharge into a special aquatic site, the Corps undertakes a two-step analysis to determine what presumption to apply to its analysis of whether to grant the permit. First, the Corps must properly define the project's "basic purpose" under 40 C.F.R. § 230.10(a)(3). See, e.g., Sierra Club v. Van Antwerp, 362 F. App'x 100, 105-06 (11th Cir. 2010); Town of Abita Springs v. U.S. Army Corps of Eng'rs, 153 F. Supp. 3d 894, 919 [*866] (E.D. La. 2015). Second, the Corps must determine whether the "basic purpose" is "water dependent." See 40 C.F.R. § 230.10(a)(3); Sierra Club, 362 F. App'x at 106; Abita Springs, 153 F. Supp. 3d at 919. An action is water dependent if it requires access or proximity to, or a location on, water in order to fulfill its basic purpose. See 40 C.F.R. § 230.10(a)(3). Thus, when a project's basic purpose is to provide boat access to a river, the project is water dependent because it must be located in water to achieve its basic purpose. See Nat'l Wildlife Fed'n v. Whistler, 27 F.3d 1341, 1345-46 (8th Cir. 1994). In contrast, a proposed gold mine is not water dependent even if the applicant wishes to mine in a watershed because mining gold does not always require access or proximity to water. See Bering Strait Citizens for Responsible Res. Dev. v. U.S. Army Corps of Eng'rs, 524 F.3d 938, 947 (9th Cir. 2008). Here, providing renewable energy to the Northeastern United States is not water dependent. If the Corps finds that a proposed project by its general nature is not water dependent, the Corps must presume that practicable alternatives to the project are available in less sensitive areas. See 40 C.F.R. § 230.10(a)(3). Likewise, the Corps must presume that such practicable alternatives have less adverse impact on the aquatic ecosystem. See id. Once a project is determined to be non-water dependent, the burden shifts to the permit applicant to rebut the first presumption by "clearly demonstrat[ing]" that a practicable alternative is not available, id., and to rebut the second presumption with ""detailed, clear, and convincing information proving that an alternative with less adverse impact is impracticable."" Sierra Club, 362 F. App'x at 106 (quoting Greater Yellowstone Coal. v. Flowers, 359 F.3d 1257, 1269 (10th Cir. 2004)). If the basic purpose of a proposed project is water dependent, then these presumptions do not apply. Thus, if a project is located in a special aquatic site, Corps' determination of the "project's basic purpose and whether it is water dependent are threshold questions that determine the procedure the Corps must follow in granting the applicant a permit." Id. If the Corps incorrectly defines the project's basic purpose or improperly determines that the project is water dependent, then it will not follow the procedure set forth by the 404(b)(1) Guidelines, resulting in a decision that is arbitrary and in violation of the Administrative Procedure Act ("APA"). See id.; see also, e.g., Nat. Res. Def. Council v. EPA, 808 F.3d 556, 570 (2d Cir. 2015) (agency action violates APA where agency followed incorrect procedure). The DEIS makes no mention of "special aquatic sites" as defined in 40 C.F.R. §§ 230.40-230.45, particularly 40 C.F.R. §§ 230.43 (vegetated shallows) and 40 C.F.R. §§ 230.44 (coral reefs). The failure of the DEIS to specifically review whether the Project has any effect on "special aquatic sites" and the specific review related thereto is clear error."
169-19	The DEIS fails to mention, much less take a hard look at, whether the Project will affect a special aquatic site. Yet the determination of whether the Project affects a special aquatic site is a threshold determination for the Corps' regulations.

Response to comments: Impacts to "other special aquatic sites" are encompassed by the wetland analysis in the FEIS, as these sites represent a subset of the waters of the U.S.

Comment theme: Severe weather impact to marine life.

Associated comments

Table I-242 provides the full list of comments received as part of this comment theme.

Table I-242. Severe weather impact to marine life comments.

Comment Number	Comment
169-39	VII.THE DEIS FAILS TO PROPERLY ANALYZE THE EFFECT ON MARINE LIFE AND FISHERIES. The DEIS analysis does not account for the additional stress on the marine population caused by the increase in temperatures caused by the Project itself. See, Harvard Wind Study. The DEIS analysis does not account for the additional stress on the marine population caused by the devastation caused by a category 4 or category 5 hurricane hitting the WEA and destroying the WTGs, resulting in a catastrophic release of oil and contaminants into the marine environment. Such incomplete analysis does not comply with NEPA, and does not provide information sufficient for either BOEM or the Corps to make the required determinations.
169-21	The DEIS fails to properly analyze the effect on marine life and fisheries. The DEIS does not account for the additional stress on the marine population caused by the increase in temperatures caused by the Project itself. See, Harvard Wind Study cited above. Such incomplete analysis does not comply with NEPA, and does not provide information sufficient for either BOEM or the Corps to make the required determinations.

Response to comments: The proposed project is designed to withstand catastrophic weather events, consistent with BOEM requirements. The EIS also considers the potential impacts of spills. See Section 3.3.2.

The cited study considers the theoretical temperature effect of 0.5 terawatts of land-based turbines on continental air temperatures. There is no evidence that the findings of this study would translate to similar effects on water temperature from a much smaller offshore project. The potential effects of ocean-based WTGs on circulation patterns is a topic of ongoing study; the EIS considers the current available science consistent with NEPA requirements.

Comment theme: Impact jet plowing and pile driving impacts.

Associated comments

Table I-243 provides the full list of comments received as part of this comment theme.

Table I-243. Impact jet plowing and pile driving impacts comments.

Comment Number	Comment
366-3	The same can be said for Southern New England winter flounder, a depleted species flatfish who breeds inshore in sand shoal environment in the winter. In Rhode Island for the BIWF, RI's Department of Environmental Management suspended jet plowing from Feb 1-March 31 to protect southern New England winter flounder larvae and breeding in a letter to "Aileen Kenney of DWW on May 7, 2015 Application for Wind Farm Construction, New Shoreham, Rhode Island," re Water Quality Certificate File Number 12-037 "Jet plowing - The proposed cable installation as described in the permit application that requires the use of a jet plow may occur anytime between April 1 and January 31. This time frame is an extension of the current window of October 15 to January 31. No further modifications to this extended dredge window shall be granted and thus, no jet plowing shall occur during the time period of February I to March 3. This time of year restriction is required for the protection of winter flounder." This same condition that RIDEM placed for Southern New England winter flounder (SNE-WF) on the BIWF should be required by BOEM for the SNE-WF stock for the SFWF and SFEC. While not overfished, environmental stressors that have prevented the species from finding shelter as young of the year (YOY) have left the stock depleted. Jet plowing would be a major negative impact to YOY flounders, so a time-related condition limiting jet plowing during breeding season is warranted.

Comment Number	Comment
366-4	In OCS Study BOEM 2017-014; “Effects Matrix for Evaluating Potential Impacts of Offshore Wind Energy Development on U.S. Atlantic Coastal Habitats,” BOEM makes clear the importance of protecting benthic habitats, such as the hard bottom habitat which is natural to Cox’s Ledge, and sand shoal habitat that is present along much of the “extension cord” transmission cable of the SFEC. Both hard bottom and sand shoal habitats and the animals that proliferate within them in the SFWF WEA area will suffer a major negative impacts biologically from pile driving and jet plowing. Biological impacts to stocks of fish may trickle down regionally and economically, negatively impacting recreational, charter boat and commercial fishermen who depend on that area. 3.1.9 “Both coral reefs and hard-bottom habitats are susceptible to habitat destruction and/or burial during construction of transmission lines and/or potential contamination due to spills during construction and/or dredging/resuspension of contaminated sediments disturbed during COP activities associated with OSW development. 3.1.10 While soft bottom is less productive than other estuarine environments (i.e., seagrass beds and shellfish reefs), it often is the dominant habitat type, and may contribute more to total productivity than other submerged habitats (NCDEQ 2016). Due to their role in nutrient cycling, benthic invertebrates are among the most important components of coastal ecosystems,” and “Reef species have been known to forage over adjacent soft-bottom habitats during the day (Lindquist et al. 1994.)

Response to comments: Section 3.4.2 of the FEIS incorporates the findings of the revised EFH assessment consistent with NEPA requirements. This analysis includes a revised characterization of benthic habitats developed by BOEM and the applicant in coordination with NMFS and considered the effects of project construction and operation on these habitats.

Appendix G includes a summary of all proposed mitigation. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures will be considered by decision-makers and could be adopted in the Record of Decision and required as conditions of approval.

Comment theme: Cumulative effects of EMF on fish migrations.

Associated comments

Table I-244 provides the full list of comments received as part of this comment theme.

Table I-244. Cumulative effects of EMF on fish migrations comment.

Comment Number	Comment
366-8	"And before any further decisions are to be made not only for the SFWF project, but for others that are slated to be built in the near future, BOEM must do a supplemental EIS to assess the cumulative effects of EMF on fish migrations throughout the 1400 sq. mile RI-MA WEA., based on total buildout, before many future projects in wind energy areas within the New York Bight and the RI-MA WEAs begin. The area of the RI-MA WEA is a known anecdotally as a “fish highway” for a variety of species and life stages of those species. Should a species such as the American sand eel, or loligo squid, no longer make its migratory pathways inshore and offshore yearly due to the sequelae of EMF, severe and major environmental and economic consequences would ensue for the fishing communities of the East End. BOEM must address this issue now, before it is too late. "

Response to comments: BOEM is no not aware of any literature to support the assumption that EMF will impede migration of any species throughout the RI-MA WEA. The applicant provided a detailed assessment of potential EMF effects in Appendix K1 of the Construction and Operations Plan (available at: https://www.boem.gov/renewable-energy/state-activities/south-fork). The EFH assessment relied on this information and the best available science to assess potential EMF and heat effects from project operations on commercially important fish and invertebrate species. Information from the EFH assessment is incorporated into the FEIS in Section 3.4.2. The EFH assessment is available at https://www.boem.gov/renewable-energy/state-activities/south-fork.

Comment theme: Construction timing restrictions.

Associated comments

Table I-245 provides the full list of comments received as part of this comment theme.

Table I-245. Construction timing restrictions comment.

Comment Number	Comment
363-127	The Project installation should not take place during a time of year when horseshoe crabs are known to be in the area, as opposed to inshore or in estuarine coastal waters and spawning grounds. Nearshore horseshoe crabs should also be avoided during shoreside infrastructure development, as they rely on beach dune habitat, which frequently erodes away with winter storms in the New England and northern Mid-Atlantic region.

Response to comments: Project construction will adhere to all timing restrictions and related mitigation measures specified in the project environmental protection measures (Appendix G, Table G-1) and additional mitigation measures required as a condition of federal permitting (Appendix G, Table G-2). Proposed SFEC construction methods such as the use of HDD are designed to avoid impacts to nearshore, beach, and dune habitats.

Comment theme: Egg and larval stage finfish impacts.

Associated comments

Table I-246 provides the full list of comments received as part of this comment theme.

Table I-246. Egg and larval stage finfish impacts comment.

Comment Number	Comment
338-34	32. While juvenile and adult finfish would be able to leave the area when sedimentation increases from construction begins, egg and larval stage fish would be more susceptible to construction effects; especially smothering of benthic egg masses. These impacts should be addressed in the DEIS.

Response to comments: Sedimentation effects on eggs and larvae are considered in detail in the revised EFH assessment (https://www.boem.gov/renewable-energy/state-activities/south-fork). This information is incorporated into the FEIS in Section 3.4.2, at a level of detail consistent with NEPA requirements.

Comment theme: Seabed energy.

Associated comments

Table I-247 provides the full list of comments received as part of this comment theme.

Table I-247. Seabed energy comment.

Comment Number	Comment
310-23	"Sand and muddy sand and mud and sandy mud areas are categorized under non-complex habitat because they do not include a substantial portion of coarse-grained sediment" (page 3-5). The FEIS should include an assessment of seabed energy and whether or not there are areas of active sand movement that could result in the uncovering of hard/complex seafloor features.

Response to comments: Thank you for your comment. The FEIS is updated to acknowledge the mobility of sediments.

Comment theme: Benthic habitat analysis.

Associated comments

Table I-248 provides the full list of comments received as part of this comment theme.

Table I-248. Benthic habitat analysis comments.

Comment Number	Comment
17-1	Good evening and thank you for your time in reviewing the following comment. For the most part, the South Fork Wind Farm and South Fork Export Cable Project appears to be a wonderful idea for renewable energy and will most assuredly help produce energy in an environmentally friendly manner. Overall, I am in support of what the Bureau of Ocean Energy Management and Office of Renewable Programs seek to accomplish with this project and hope that the project is approved so that America can actively participate in the movement to better our planet through technological advancements in renewable energy resources. However, I do believe that the potential damage to the Benthic Habitats should be further analyzed as some information appears vague and incomplete. The BOEM draft mentions that potential disturbance to the benthic habitats will likely be affected in the process of construction and drilling for the project. Specifically, BOEM mentions effects will likely occur to the glacial moraine, coarse sediment, sand, and mud (p. 3-4). Permanent effects are anticipated to occur for approximately 354.8 acres of bed surface with temporary damage occurring throughout other areas outlined for drilling (p. 3-16). Although BOEM considers these impacts and even mentions how some parts of the benthic habitat will likely "rapidly recover" there are no anticipated dates or timeframes for when said recovery is expected to occur or how these habitats are expected to return to their present nature. According to the EPA "Environmental Factor Guideline: Benthic Communities and Habitats" the evaluation for potential human disturbances to benthic habitats should be determined using three evaluations: (1) the habitat before human disturbance; (2) existence of the habitat at the time of proposal; and (3) remaining habitat after implementation. These evaluations are required to better determine what sort of effects are anticipated to happen to the benthic habitats and which developments will likely result in irreversible damage. Although BOEM mentions which habitats will be permanently damaged as a result of this project, the current status of the predicted benthic habitats is unclear. Without specific details of present habitats and their current viability, the potential loss is assumed unimportant and may lead to catastrophic results for marine ecosystems. It is not enough to say benthic habitats exist and will be damaged. Contrarily it is necessary to include benthic habitats span for X amount of acreage and are presently in Y status without human disturbance. For example, BOEM mentions that 354.8 acres of benthic habitat will likely be permanently damaged but never mentions the present condition of these habitats. In other words, a concrete ratio of damage is not present leaving one to conclude that because the benthic habitat is vaguely mentioned it is unimportant in comparison to the positive outcome the project would have. In other words, BOEM is encouraged to analyze the present status of the benthic habitats that will likely be affected, demonstrate their existence in quantity and viability before the proposed start date of the project; and anticipate the remaining effects to these habitats after project completion with more concrete data and analysis. At this time the anticipated acreage and hypothetical damage are merely hypothetical with no clear detriment defined because we do not know the current status and extent of these habitats. If more evidence in this area is provided, objectively we will be better able to grasp the present existence of these habitats and the project's future effects on them. For these reasons, I encourage further analysis of the benthic habitats and the project's potential effects on them. EPA Guideline: https://www.epa.wa.gov.au/sites/default/files/ Policies_and_Guidance/Guideline-BenthicCommunities-Habitats-131216_2.pdf

Comment Number	Comment
166-14	We agree that avoiding placement of piles, scour, or cables within complex habitat will reduce impacts to physical habitats and EFH. We also agree that seafloor disturbance during installation may be short term in sandy or muddy-sand areas. However, the FEIS should be clear about when permanent conversion of habitat may occur, and what the expected effects might be, and should estimate how much conversion is expected depending on how many and which turbine locations are used. In terms of impacts determinations, if there are permanent changes in habitat types, this outcome is not consistent with the definitions of negligible or minor provided in Table 3.1.1-1, which imply a temporary change. It would be useful to state how much conversion, as an absolute amount or as a percent of the project area, is allowable under a minor determination, vs. a moderate or major impact determination. Overall, a more quantitative impacts analysis would elucidate the benefits of the habitat or transit alternatives relative to the proposed action. This analysis could include information such as how much complex habitat presently occurs within the project site, the expected area of overlap with piles, foundations, and cable routes, overall and by turbine location, how much complex habitat will be created where there is currently sand, and how much natural hard bottom would be converted to artificial hard bottom. Relative to artificial hard bottom, options for scour protection materials are listed but not described in any detail in the COP. The New England Council’s submarine cables policy recommends using materials that mimic natural, nearby habitats where possible. It would be helpful to identify the characteristics of any cable protection materials, should burial depths of 4-6 feet not be achieved, because these materials have the potential to mimic natural complex habitats, and thus contribute to the net amount of complex habitat that would exist in the area once the project is constructed.

Response to comments: Thank you for your comment and your support for the project. The benthic habitat impact analysis has been revised in response to incorporate the conservation recommendations of NMFS. These updates are incorporated into the Final EIS in Section 3.4.2, at a level of detail consistent with NEPA requirements.

Comment theme: Calculation errors.

Associated comments

Table I-249 provides the full list of comments received as part of this comment theme.

Table I-249. Calculation errors comment.

Comment Number	Comment
372-19	During our review of the document we found several inconsistencies in impact area calculations found in both tables and text, including impact areas described in Chapters 2 and 3. In some cases the calculated areas varied within the same section. For example, among area calculations presented in Table 3.4.2-2, only the operation and maintenance facilities and the long-term disturbance calculation for the SFEC align with those presented in the text of the corresponding section. There are also multiple, conflicting noise impact distance calculations cited for finfish and invertebrates. All presented impact area and distance calculations in the document should be consistent for the resource being assessed. Should different considerations for a particular analysis result in a different impact area calculation, the assumptions or information considered should be clearly identified and discussed. We recommend all impact calculations be reviewed and made consistent in the FEIS

Response to comments: Thank you for your comment, the FEIS calculations are revised as appropriate.

Comment theme: Cox Ledge habitat and species.

Associated comments

Table I-250 provides the full list of comments received as part of this comment theme.

Table I-250. Cox Ledge habitat and species comment.

Comment Number	Comment
163-4	The OCS-A-0517 lease area abuts Cox Ledge, a known spawning site for Atlantic cod (e.g., Kovach et al. 2010, Zemeckis et al. 2014) and habitat utilized by American lobster (e.g., Fogarty et al. 1980). a. These species both benefit from hardbottom, complex habitat on Cox Ledge. Increased benthic rugosity provides structure and refuge to juvenile fish; these areas often attract large numbers of fish. b. As a result of the unique habitat on Cox Ledge, over 30 species of fish and invertebrates have EFH designated within the area. c. While the ongoing fish movement ecology research project (AT-19-08) is discussed briefly within the DEIS, the implications of potential study findings are not addressed. The BOEM ongoing study description states: "Although there is some information on the fish utilization and fish movement on Cox Ledge, there is still a lot that is not known" (BOEM 2019). Given that species utilization of the complex habitat at Cox Ledge is not well documented, a determination that adverse impacts to EFH are expected to be minor may be unsubstantiated.

Response to comments: Thank you for your comment. BOEM prepared an EFH assessment for federally managed species in the project area (https://www.boem.gov/renewable-energy/state-activities/south-fork). The ongoing BOEM study is designed to provide additional information about species utilization in the RI/MA area, particularly Atlantic cod, because there is currently limited information. This information limitation was noted in Appendix J. BOEM believes that the results of this ongoing study is not essential for a reasoned choice among alternatives.

Comment theme: Noise analysis refinement.

Associated comments

Table I-251 provides the full list of comments received as part of this comment theme.

Table I-251. Noise analysis refinement comment.

Comment Number	Comment
379-9	Rich Hittinger: Great. Thank you very much. And thank you too, BOEM, for the opportunity to make these comments. First thing out, I'll say some of my comments are actually in the form of questions, but you can take them as comments and, hopefully, I can get an answer at some point. I understand that driving 31-foot-diameter piles into the sea floor will emit tremendous sound pressure, but on page 3-23, Table 3.4.23, seems to indicate that finfish, out to a radius of 39,265 feet will be harmed during the installation of these 31-foot-diameter monopiles. That's a diameter, a circular diameter, of 12.9 nautical miles. I'm just wondering if that, if this is actually true and, if so, I'd like to know what is the anticipated radius of expected finfish mortality? I'm sure it would be much smaller, but I'd like to know what that is.

Response to comments: Thank you for your comment. Impact pile driving of the monopiles will produce underwater noise sufficient to cause fish mortality, with the extent of impact varying depending on the sensitivity of specific hearing groups to noise effects. BOEM has revised the noise impact analysis for the revised EFH assessment in coordination with NMFS, resulting in smaller impact areas for injury and mortality level effects. These revised findings are incorporated into the FEIS in Section 3.4.2, at a level of detail consistent with NEPA requirements.

Comment theme: Impacts associated with changes to bottom substrate.

Associated comments

Table I-252 provides the full list of comments received as part of this comment theme.

Table I-252. Impacts associated with changes to bottom substrate comments.

Comment Number	Comment
363-129	Habitat alteration is of concern, particularly the decrease in soft-bottom habitat, which is important to numerous species that are fished commercially and recreationally in the proposed SFWF energy area. The Rhode Island Department of Environmental Management (RIDEM) wrote a letter to BOEM commenting on the unfinalized Supplemental Environmental Impact Statement for Vineyard Wind 1. They present a brief summary of predicted impacts to species of commercial interest. As many studies show, they highlight how some species may benefit while others could be negatively impacted. Those that are structure-oriented may benefit (e.g., black sea bass, tautog), whereas species with soft-bottom habitat preferences (e.g., flatfish, squid, and scallops) will likely be negatively affected. Researchers in Europe point out that wind turbines have been installed in regions characterised by a soft sandy benthic environment, such as the North Sea, where hard substrate and intertidal regions are uncommon, and that they therefore represent a large-scale increase in local habitat heterogeneity that may lead to a regional shift from sediment associated benthic to hard bottom and intertidal communities. Potential lower income, revenue, and economic viability of fisheries associated with soft-bottom is anticipated but not comprehensively analyzed in the DEIS. There may be cascading effects on fish communities as a result of the type of epifaunal organisms—i.e., food resources for larger fish, that settle on and colonize turbine surfaces. For instance, a study including stomach content analysis by Reubens et al. (2011) showed that pouting demonstrated preference for prey species found on turbines, including Jassa herdmani and Pisidia longicornis. WEAs will be subject to varying environmental conditions, and as such, resultant impacts to local species and ecology need to be studied and evaluated on an individual basis.
363-128	We commend the improvement over past analyses that only focused on species that benefit from structure and hard substrate associated with offshore infrastructure projects. In the DEIS, BOEM does a better job acknowledging that all species may not benefit from these changes in substrate, incomplete understanding of whether stock abundance will increase, and where there will just be a redistribution of biomass. RODA reiterates that increases in hard substrate as a net benefit for biological species is an egregious oversimplification, and recommends that habitat conversion be looked at holistically for all species found in the region. Below, we outline some consideration for BOEM to include as they work to better inform how habitat alteration will impact species distribution.
363-131	As there are potentially enormous consequences from shifting habitat types on species distribution, RODA disagrees that “Project O&M would cause fewer impacts to fish, invertebrates, benthic habitats, and EFH than Project construction. The foundation piles and associated scour protection would create an artificial reef effect, which could result in minor beneficial effects to species distribution, community composition, and predator-prey interactions in the vicinity.” This is an oversimplification of the very complex concept of habitat preference. To begin to understand these changes, stock redistributions need to be monitored and assessed over the lifespan of the project.

Response to comments: Thank you for your recommendation. The SFWF and SFEC would be constructed in areas where complex (i.e., hard bottom) benthic habitats currently exist, therefore the introduction of new hard surfaces in proximity to these existing habitats is unlikely to result in a wholesale shift in aquatic community structure. However, Section 3.4.2 of the FEIS incorporates the findings of the revised EFH assessment (available at https://www.boem.gov/renewable-energy/state-activities/south-fork) for the project at a level of detail consistent with NEPA requirements. The EFH assessment considers the currently available scientific research on this topic, including variable effects of introduced structures on aquatic communities.

Comment theme: Backfilling and water withdrawal details.

Associated comments

Table I-253 provides the full list of comments received as part of this comment theme.

Table I-253. Backfilling and water withdrawal details comment.

Comment Number	Comment
141-13	Habitat Alteration (p. 3-19, Section 3.4.2.2.3). The DEIS compares the trenching effect of boulder dragging to cable trenching or jet plow impacts. However, these cable trenching techniques include backfill of material into the trench. We recommend that the FEIS more fully explain whether areas of boulder scarring would be backfilled. If backfilling is not proposed, the FEIS should describe how this affects the overall benthic habitat recovery time for impacted areas.
141-18	Water Withdrawal from Jet Plowing The DEIS discusses water withdrawal associated with jet plowing cable into the seabed (3.4.2.2.3, p. 3-24). According to the DEIS, water would be taken from near the bed surface, which could entrain eggs and larvae of finfish including flatfish species (e.g., windowpane flounder, winter flounder, witch flounder, yellowtail flounder, and summer flounder), important commercial groundfish species (e.g., Atlantic cod, haddock, Atlantic pollock), and other recreationally and commercially important species (e.g., monkfish, Atlantic herring, Atlantic mackerel, silver hake, Atlantic butterfish). Mortality rates for entrained eggs and larvae are assumed to approach 100%. The DEIS estimates 1,647 cubic yards (cy)/hour of water would be required, and based on a 12-hour work day, 19,764 cy of water would be used per day (though the draft states 16,470 cy/day which would be representative of a 10-hour day). Where 1 cy equals 202 liquid gallons, almost 4 million gallons of water (3,992,328) would be used per day over a 1 to 2 mile distance. According to the DEIS the total distance of cable required for the project, including inter-array and export cables located in federal and state waters, ranges from 70.9 - 83.2 miles, depending on where the cable comes ashore. If almost 4 million gallons of water is required to jet plow 2 miles of cable, then approximately 142 - 166 million gallons would be withdrawn. If the distance covered is closer to 1 mile (instead of two) then the water withdrawal would be doubled. While this volume may seem small compared to the volume of water throughout the entire water column in the geographic analysis area, it is unclear what the magnitude of entrainment loss will be for bottom-tending early life stages (i.e., eggs, larvae, young-of-year juveniles) of fish and invertebrates within the jet plow's area of influence. Entrainment rates will likely vary depending on the time of year and bottom type. Recommendation: •In order to better understand the direct impact to finfish and invertebrates, particularly those of commercial importance, it would be helpful to include more detail in the FEIS about water withdrawal from the jet plow, including where the intake is located relative to the sea floor, the intake velocity, area (swath) potentially affected by the jet plow intake, and an estimate of possible entrainment loss given the total distance expected to be jet-plowed, time of year jet-plowing will take place, and bottom types expected to be affected. This information would help to support the DEIS conclusion that " ... adverse impacts from water withdrawals are anticipated to be negligible to minor." A discussion of mitigation and avoidance strategies for withdrawal induced impacts should also be provided.

Response to comments: Thank you for your recommendation. Clarification is provided in Section 3.4.2 of the FEIS and revised EFH assessment, as appropriate.

Comment theme: SFEC analysis area.

Associated comments

Table I-254 provides the full list of comments received as part of this comment theme.

Table I-254. SFEC analysis area comment.

Comment Number	Comment
141-12	We recommend that the FEIS clarify the statement that "cable burial, placement of cable protection, vessel anchoring, temporary cofferdam placement, and construction within the temporary cofferdam at the sea-to-shore transition would temporarily impact approximately 573 acres, or 11.5% of the 4,944-acre SFEC." (p. 3-17, Section 3.4.2.2.3) The 4,944-acre area appears to be defined by a 330-foot suspended sediment disturbance area around the 61.8-mile combined SFEC offshore and SFEC-NYS corridors. (See Footnote, Table 3.4.2-2, p. 3-16.) The relevance of the percentage area of the described work in comparison to the 330-foot suspended sediment disturbance area is not clear and should be clarified in the FEIS.

Response to comments: Thank you for your recommendation. The FEIS is revised to clarify the description of the disturbance area.

Comment theme: Level of harm

Associated comments

Table I-255 provides the full list of comments received as part of this comment theme.

Table I-255. Level of harm comment.

Comment Number	Comment
144-5	This section should indicate the level of “harm” that may be inflicted on fish close to the source compared to the level at a greater distance and also include a discussion of the radius around active pile driving wherein fish mortality may occur. Since many readers depend on reading the summary tables without diving into the full document, these types of misleading statements are very important and need to be corrected.

Response to comments: Thank you for your recommendation. Table ES-1 is revised to be consistent with related updates to the impact analysis.

Comment theme: Table G-2 mitigation and monitoring measures.

Associated comments

Table I-256 provides the full list of comments received as part of this comment theme.

Table I-256. Table G-2 mitigation and monitoring measures comments.

Comment Number	Comment
166-12	In order to reduce potential impacts, we recommend that BOEM require the following mitigation measures shown in Table G-2: (1) anchoring plan to limit disturbance to bottom habitat (especially on Cox Ledge) during construction of platforms, (2) post installation cable monitoring plan to proactively mitigate for any cable exposure and risk to mobile gear from shifting bottom sediments (e.g., Block Island Wind Farm situation), (3) pile-driving sound source verification plan and monitoring plan to better understand how energy is propagated through the water and seafloor to help assure the required 10 dB reduction in sound is achieved to minimize harm to fish, (4) geophysical survey vessel collision avoidance of whales, turtles, and other protected species requiring protected species observers to help avoid any species interaction and to collect biological samples in the wind farm area, and (5) scientific survey mitigation through funding to help consider ways to address the likely missing NOAA (National Oceanic and Atmospheric Administration) survey data in the wind energy area, which has potentially major implications for stock assessments and catch limit advice.
141-14	We recommend that a long-term monitoring plan be developed to measure the recovery rate of benthic habitat from construction related disturbance and to monitor the area for the migration of invasive species into the impacted construction area. The monitoring protocol should also include an action plan to address incomplete recovery or areas affected by invasive species correlated to the construction disturbance.
154-10	Pile-driving sound source verification plan (page G-7). We request these requirements be expanded to monitor sound traveling through the substrate as particle motion. Ongoing science is exploring particle motion (“shaking”) aspects of fish and invertebrates’ responses to sound. These data will inform more accurate future modeling of underwater noise effects.
335-2	Furthermore, the project will impact the marine environment, habitat and alter the manner in which NMFS surveys are conducted. NSC strongly advises that this project mandate fisheries and habitat monitoring for the life of the project and that it fully funds and accounts for mitigation for NMFS survey impacts.

Comment Number	Comment
338-26	21. The Agencies recommend that the Benthic Habitat Monitoring Plan include multiple pre- and post- benthic habitat surveys in order to detect potential changes in benthic habitat resulting from the Proposed Action. In addition, the development of standardized recommendations for all offshore wind benthic habitat monitoring plans will help ensure consistency and allow for better comparability between projects.
349-37	We additionally recommend that BOEM and Deepwater Wind South Fork (DWSF) work closely with Massachusetts and Rhode Island fishery managers and NMFS to consider and implement appropriate mitigation measures to avoid, minimize, and mitigate potential adverse impacts to EFH, finfish, benthic resources, and invertebrate populations which may be affected by construction activities, particularly during vulnerable times of spawning, larval settlement, and juvenile development. The DEIS identifies several mitigation measures that DWSF intends to take vis-à-vis benthic habitat, EFH, invertebrates, and finfish including: (1) minimizing impacts to complex bottom habitats and important habitats for finfish to the extent practicable; (2) conducting site-specific benthic habitat assessments and Atlantic cod spawning surveys to inform siting of the Project; and (3) committing to collaborative science with fishing industries, non-governmental organizations, agencies, and scientists to better understand the interactions between marine species and habitats and their interaction with offshore wind development. While these measures are necessary, we encourage BOEM to require DWSF to undertake several additional actions identified as “potential additional mitigation and monitoring measures,” including but not limited to (1) requiring an anchoring plan for all areas where anchoring is being used to avoid construction impacts on sensitive habitats, including hard bottom and structurally complex habitats; and (2) requiring post-construction monitoring to document habitat disturbance and recovery and require that DWSF consult with NMFS and BOEM before conducting monitoring to address agency comments prior to implementation. Because the Project will take place in and around complex habitats, BOEM should require DFSW to institute the “potential” anchoring plan it identifies in the DEIS, to further minimize and avoid impacts to complex habitats. Moreover, because the offshore wind industry is in its infancy, a comprehensive monitoring effort is crucial. Thus, BOEM and/or DWSF, in consultation with Rhode Island and Massachusetts fishery managers and NMFS, should conduct long-term monitoring before, during, and after construction to document impacts to benthic habitat and EFH, and habitat recovery, and if necessary, design appropriate adaptive mitigation strategies to address the impacts identified. Monitoring data should be made readily available to stakeholders and the public.
363-125	Importantly, the long-term and time-dependent impact of introduced surfaces (turbines, scour protection, and other structures associated with the SFWF offshore wind project needs to be prioritized. BOEM should ensure that the developer is responsible for carrying out studies that assess invasive species presence within the wind energy area, preferably designed by experts in this field of study. These studies should also analyze cascading ecological effects, especially as they relate to important local fisheries.
284-7	We are aware that there are still some uncertainties around the magnitude and extent of the sound fields that will be generated by the first full-scale offshore wind projects constructed in the US and recommend use of applicable sound field measurements from other locations that could help more clearly articulate anticipated pile driving noise for this project in the DEIS and the IHA, including analyses of sound field measurements taken earlier this year during the installation of the two turbine CVOW project in federal waters off Virginia. Monitoring the magnitude and extent of sound propagation during construction of the first US wind farms is critical and should be financially supported by BOEM to facilitate the growth of responsible offshore wind energy development in the US. A thorough network of non-proprietary sound monitoring stations around an early wind farm construction project, such as Vineyard Wind 1 and/or South Fork, can become a framework for multiple concurrent research and monitoring projects on several key taxa of marine life that can help inform refinement, through an adaptive management approach, the best management practices, permit conditions and other requirements for subsequent projects. This was a topic of broad agreement in a workshop recently hosted by NYSERDA on setting research and monitoring priorities for cumulative impacts of offshore wind power generation on fish and mobile invertebrates, with equal applicability to marine mammals and sea turtles.

Response to comments: Thank you for your recommendations. BOEM considered these suggested mitigations. Sound field and attenuation effectiveness monitoring are included as potential mitigation measures as detailed in EIS Appendix G, Table G-2. Appendix G includes a summary of all proposed mitigation. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies under several environmental statutes, including CZMA, ESA, MSA, and MMPA, not all of which are under BOEM's statutory or regulatory authority. These additional mitigation measures will be considered by decision-makers and could be adopted in the Record of Decision and required as conditions of approval.

Comment theme: Pile driving sound source verification.

Associated comments

Table I-257 provides the full list of comments received as part of this comment theme.

Table I-257. Pile driving sound source verification comment.

Comment Number	Comment
144-11	Pile driving sound source verification – It is well understood that driving monopiles greater than 30 feet in diameter will require a huge amount of energy. How that energy is created and how it propagates through the water and seafloor must be well understood if there is any chance of verifying that the required maximum noise levels and minimum attenuation are achieved. Remedies such as bubble curtains and containment sleeves may not achieve the anticipated level of sound reduction due to transmission of sound and shock movement through the seafloor. Sound source verification will help assure that the required 10dB reduction in sound is achieved.

Response to comments: Sound source verification is included in Table G-2 and will be considered for inclusion in the Record of Decision and terms and conditions of COP approval.

Comment theme: Impact duration.

Associated comments

Table I-258 provides the full list of comments received as part of this comment theme.

Table I-258. Impact duration comment.

Comment Number	Comment
363-101	The proposed action impacts assessment does not analyze short-term and long-term independently. The DEIS correctly points out that short-term impacts will be adverse, continuing with our example of benthic habitat, resulting from over 24 hours of pile driving turbines into the seabed causing the suspension of sediments in the water column, mortality of invertebrates and other species, accidental leakage of oils etc. from construction vessels. The DEIS wrongly concludes that the proposed action will have positive long-term impacts on benthic habitat. The proposed action will modify local benthic habitat, converting areas of sandy bottom to hard structures, in the form of scour protection around turbines and cable protection mats. This could have long-term impacts on local ecological communities, which have not been analyzed. By definition, changing the benthic habitat from its natural state to a modified one in order to accommodate turbines results in long-term major adverse impacts. A plan for assessing these impacts should also be the responsibility of the developer.

Response to comments: The benthic habitat characterization and significance determinations have been revised in coordination with NMFS and incorporated into the FEIS.

Comment theme: Atlantic cod spawning surveys.

Associated comments

Table I-259 provides the full list of comments received as part of this comment theme.

Table I-259. Atlantic cod spawning surveys comment.

Comment Number	Comment
363-122	As referenced previously, the environmental protection measures proposed by SFWF are listed in Table G-1 of the DEIS. One of these states that "[s]ite-specific benthic habitat assessments and Atlantic cod spawning surveys informed siting of the SFWF and SFEC offshore." There is no documentation in the DEIS whatsoever to understand or evaluate this claim. At a minimum, a document must be provided explaining what data that went into the assessments and how it impacted siting decisions. Moreover, this seems facially impossible, as Ørsted's cod studies are reported to have started in 2019 and SFWF's COP was submitted on June 6, 2018

Response to comments: The COP has been updated since initial submittal to reflect new information and additional assessments developed in coordination with BOEM and NMFS. The updated COP and supporting technical reports, including the benthic habitat assessments (Appendix N1 and N2), are available at: https://www.boem.gov/renewable-energy/state-activities/south-fork.

Comment theme: Reef effect.

Associated comments

Table I-260 provides the full list of comments received as part of this comment theme.

Table I-260. Reef effect comment.

Comment Number	Comment
363-124	In addition to increases in foreign vessels, the "presence of structures" is a potential vector for enabling growth of invasive species and subsequent shifts in biological communities. The presence of structures is discussed throughout, including in the Marine Mammal Associated IPFs and Sub-IPFs table. The draft EIS and many other reports often grossly oversimplify and misrepresent the concept of an 'artificial reef effect'. With regard to the impact on habitat conversion and prey aggregation, the DEIS states that: The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans (Taormina et al. 2018), providing a potential increase in available forage items and shelter for seals and small odontocetes compared to the surrounding soft-bottoms. This oversimplifies the complexities and nuances of how introduced hard substrate may impact ecological communities; the result is not always beneficial. Moreover, what 'beneficial' means in the above paragraph is not defined. If the public is being fed the narrative that the artificial reef effect is so wonderful, these beneficial impacts need to be better defined and addressed out front that the Northwestern Atlantic has not seen large scale wind project development, and thus we simply do not know what the ecological impacts will be. This should not be understated, given the severe negative impacts such as decreases in biodiversity and water quality that can result from increases in invasive species. A few studies in Europe have already documented negative impacts associated with new and/or invasive-dominated fouling assemblages. For example, Wilhelmsson and Malm (2008) show further evidence that human-built structures support fouling assemblages that are significantly different from natural hard substrata. Additionally, they call for "evaluations of the risk of the wind turbine parks to act as stepping stones for invasive species, [which is] relevant to include in further studies and environmental impact assessments". The potential impacts of new invasive species on the ecology of coastal waters should be a major concern of offshore wind developers. There is evidence that wind turbine structures may act as stepping stones for non-native species. For example, offshore wind projects in the Southern North Sea were rapidly colonized by non-indigenous species, particularly in the intertidal region. Not all surfaces are natural rock equivalents, in terms of their ecological impacts, and thus the oft-mentioned artificial reef effect must be more accurately discussed, that is, include an analysis of potential negative consequences, in the final EIS.

Response to comments: The DEIS discusses the potential for SFWF and SFEC structures serving as potential stepping stones for invasive species, recognizing that there is substantial uncertainty associated with this risk. The FEIS incorporates current best available science about the artificial reef effect and invasive species at a level of detail consistent with NEPA requirements. These topics are also considered in the revised EFH assessment (https://www.boem.gov/renewable-energy/state-activities/south-fork).

Comment theme: Invasive species – construction vessel concerns.

Associated comments

Table I-261 provides the full list of comments received as part of this comment theme.

Table I-261. Invasive species – construction vessel concerns comment.

Comment Number	Comment
363-123	The introduction and/or growth of non-native marine species into new regions where they can have adverse effects on local ecosystems is considered to be a serious threat to ocean biodiversity. To date, OSW structures are a new and unquantified vector for the potential spread of invasive species, particularly given the large number of vessels predicted to enter the U.S. EEZ associated with their development. Invasive species are first mentioned in the DEIS in relation to vessel introduction, that is, the release of invasive species during discharge of ballast and bilge water from vessels: Another potential impact related to vessels and vessel transit includes the release of invasive species during discharge of ballast and bilge water. The DEIS provides a very inadequate justification for how this problem will be avoided. In short, the argument is made that USCG regulations will “reduce the likelihood” of this occurring, which is not true historically. The justification is as follows: However, vessels are required to adhere to existing state and federal regulations related to ballast and bilge water discharge, including USCG ballast discharge regulations (33 CFR 151.2025) and EPA National Pollutant Discharge Elimination System Vessel General Permit standards, which would reduce the likelihood of discharge of ballast or bilge water contaminated with nonnative species and those nonnative species becoming established as a result of offshore energy related vessel activities. Arguing or claiming that just because vessels are required to adhere to regulations, that alone will reduce the likelihood of introducing more invasive species, is both false and not a sufficient analysis of potential risks. International vessel traffic increases resulting from the SFWF project need to be quantified in order to better assess potential risks of introducing invasive species, which could result in negative consequences to the local ecology and potentially alter fish populations on the local level. Invasive species should not be dismissed or not considered as a serious potential problem, as they are in this DEIS.

Response to comments: The DEIS details potential ports of origin for construction vessels, recognizing that this project detail would be finalized once a construction contractor is selected. The risk of construction vessels serving as vectors for invasive species must be considered in the context of the environmental baseline. The applicant has estimated that 31 construction vessel trips could originate from ports in Europe or other worldwide locations. Cargo vessels and tankers accounted for over 54,000 vessel hours within the RI/MA and MA WEAs alone in 2018 (see DEIS Appendix H, Section 3.5.6.1), some portion of which undoubtedly originated from foreign ports. Project vessels would be subject to mandatory mitigation measures required by NMFS and other federal agencies as a condition of project permitting.

Comment theme: Key life stage concerns.

Associated comments

Table I-262 provides the full list of comments received as part of this comment theme.

Table I-262. Key life stage concerns comment.

Comment Number	Comment
363-121	BOEM should not lease areas for OSW development in areas identified as essential for a key life stage for any species or segment of a population. For example, portions of Cox Ledge are proposed to be developed as part of the SFWF project. Atlantic cod has distinct spawning populations, one of which occurs south of Cape Cod including Cox Ledge. Spawning in this area occurs from December to April. OSW projects can affect spawning cod in multiple ways. Firstly, Atlantic cod have a specific spawning behavior called lekking mating system. Within the spawning aggregation, the males create small territories and perform mating behaviors to attract females, which requires open space. Secondly, sound plays a role in the spawning behavior of Atlantic cod. They use grunts to communicate during spawning. Research has shown that background noise, including vessel traffic, can mask the grunts leading to a potential mismatch in timing or location of the spawning aggregation. Research is needed to determine the level of noise produced, whether it is sustained or intermittent, what causes any increases in noise production, and its impact on spawning populations reliant on acoustic communications for successful spawning.

Response to comments: The DEIS includes analysis of construction and operational noise effects likely to result from the project. This assessment considers noise from construction and O&M vessels and WTG operations, including a summary of operational noise monitoring from the nearby Block Island Wind Farm. The revised EFH assessment (https://www.boem.gov/renewable-energy/state-activities/south-fork) provides additional analyses of construction and operational noise effects on Atlantic cod and other high-value fish species. These findings are incorporated into the FEIS in Section 3.4.2, at a level of detail consistent with NEPA requirements.

Comment theme: Cox Ledge analysis.

Associated comments

Table I-263 provides the full list of comments received as part of this comment theme.

Table I-263. Cox Ledge analysis comments.

Comment Number	Comment
349-34	It is important to note that the Project overlaps, in part, with Cox Ledge. The New England Fisheries Management Council (NEFMC) recommended designating portions of Cox Ledge, which partially overlaps with the area of the Project, as a habitat management area (HMA) to protect EFH for several managed species. The DEIS also categorizes the habitat types in the Project area as either: (1) complex habitats or (2) non-complex habitats. Glacial moraine and coarse sediment are classified as complex habitat because boulders, cobbles, and pebbles, are predominant in such areas. These geological features provide a "heterogeneous variety of hard surfaces and fine material that provide habitat for many different species." In contrast, sand, mud, and muddy sand are categorized as non-complex habitat. More specifically, glacial moraine habitats are a complex habitat that is composed of consolidated and unconsolidated geologic debris that is directly deposited by glacial movement, as opposed to reworking from meltwaters or transgressive seas. In the contiguous United States, glacial moraines are mainly limited in distribution to the outer continental shelf near New England. Glacial moraines are important habitats for a diversity of fish and benthic species. Given their relative structural permanence and complexity, glacial moraines create a unique bottom topography, which enable a high level of biodiversity. Although the glacial moraine habitats in the area of the Project contain high density areas of boulders and cobbles, such features are not continuous and tend to be located in patches. Complex, hard bottom habitat provides EFH for a number of species, including both juvenile and adult Atlantic cod. Offshore, both juvenile and adult cod prefer structurally complex hard bottom habitats comprising mostly pebbles, cobble, and boulders. Cobble substrate is critical for the survival of juvenile cod because it helps juvenile cod avoid predators. Studies have also shown that hard bottom habitats are important for cod reproduction. In the area of the Project, adult and juvenile cod EFH are mainly located in the complex glacial moraine and coarse sediment habitats. Boulders and cobbles, which are more prevalent in complex habitats, also provide EFH for other species such as black sea bass juveniles and adults, as well as certain invertebrates that attach to hard surfaces, including mussels, oysters, starfish, sea urchin, etc.

Comment Number	Comment
	Complex habitats have been shown to take longer to recover from offshore wind construction. Specifically, in a study of the Block Island Wind Farm, zero percent of complex habitat areas containing mainly cobbles and pebbles had completely recovered from baseline conditions after the wind farm had been in operation for nearly two years. In contrast, non-complex habitats demonstrated a much higher rate of recovery. As noted in the DEIS, BOEM, in conjunction with NMFS, is still working to quantify benthic habitats in the Project area as either complex or non-complex and to assess the areal extent of impacts to complex habitats, which BOEM intends to include in the FEIS. Despite the fact that BOEM and NMFS have not completed their assessment of benthic habitat impacts, the DEIS concludes that the overall impacts from construction would be negligible to minor for EFH and negligible for benthic habitat. Without a finished evaluation of the types of habitat present and the impacts to complex habitats, the impact level estimate in the DEIS is incomplete and potentially inaccurate. Accordingly, the impacts to EFH and benthic habitats must be revised in the FEIS to account for the forthcoming habitat quantification and impact study. Moreover, the expected negligible/minor impacts appear unrealistic in light of the fact that the Block Island study demonstrated no recovery of complex habitats after two years. BOEM should consider the Block Island study, and whether this affects its original impact estimates, in the FEIS. The FEIS should also provide a more particularized analysis of the impacts to EFH corresponding with complex habitats in the Project area, including Atlantic cod.
162-1	The South Fork Wind Farm is proposed to be sited on and near Coxes Ledge, east of Block Island. The South Fork Wind farm is to service Long Island with electric energy. Coxes Ledge is clearly defined as "Essential Fish Habitat" for a number of regional keystone marine species. This designation of "Essential Fish Habitat" is defined in the Magnuson Stevens Act. Many of the marine species found at Coxes Ledge have significant economic and environmental value, such as squid, scallops, lobster, cod, and herring to name a few. Coxes Ledge is an area well documented for spawning, habitat, nursery, and forage for marine species like cod, herring, sea scallops, black sea bass, lobster and many more. Coxes Ledge is defined as The Most Significant Environmental Area within the BOEM RI Special Area Management Plan prepared in 2015. Coxes Ledge is a unique area of ocean currents and tidal movement where we see Rhode Island Sound converge with the Atlantic Ocean. Conditions at Coxes Ledge encourage bait fish to congregate and provide great forage and feeding opportunities for larger marine mammals like whales and porpoise. Coxes Ledge is a popular destination for regional whale watching tours. There are over 50 marine species of economic importance found at Coxes Ledge. Complex structural bottomland that serves as essential fish habitat should not be disturbed and certainly should not be replaced with man made structures. As defined in the BOEM document "Managing Impacts From Wind Energy", wind turbine construction should avoid sensitive environmental areas. The applicants recent subdivision of the former RIMA WEA should not be a consideration in siting turbine bases, and the applicant may have artificially constricted their ability to site the turbines responsibly. This is just plain wrong. By siting turbine bases away from structural and complex bottomlands, we avoid the need for laying connection cables on top of the bottomlands. When cables are laid out on top of hard structure the impact of the EMFs they emit is greater because marine life is closer to the cable. By being able to bury cables in softer, non-complex bottomland we can decrease the impact of EMF emissions and also eliminate the need for concrete mats. Improvements in wind turbine technology have increased the energy output capability of wind turbines thus allowing the applicant to site fewer turbine bases on the complex, structural habitat at Coxes Ledge. The applicant has repeatedly stated at public meetings in East Hampton NY, the project host community, that they would micro site the turbine bases to avoid sensitive environmental bottom lands at Coxes Ledge. I believe that it is fair to ask them to honor their word on this important matter.

Response to comments: Thank you for your comment. The revised EFH assessment (https://www.boem.gov/renewable-energy/state-activities/south-fork) includes revisions to the benthic habitat characterization for the project area and an assessment of species-specific effects resulting from project construction and operation. The FEIS is updated with information from the EFH consultation for the project at a level of detail consistent with NEPA requirements. This includes full consideration of the importance of Cox Ledge benthic habitats, EMF and cable heat effects on benthic habitats and species, and other project impacts. BOEM is working closely with NMFS to avoid and minimize benthic habitat impacts to the extent practicable.

Comment theme: Invasive species.

Associated comments

Table I-264 provides the full list of comments received as part of this comment theme.

Table I-264. Invasive species comment.

Comment Number	Comment
355-7	Habitat The document states: “Long-term changes to benthic habitat within the SFWF, SFEC, and Montauk O&M facility would result from the conversion of approximately of soft-bottom benthic habitat to hard-bottom (e.g., steel piles, rock scour protection, bulkhead improvements) habitat. This change would reduce the amount of available habitat for soft-sediment invertebrates while increasing habitat for the hard-surface invertebrates. Additionally, impacts to hard-surface invertebrates from the addition of hard surfaces (e.g., cable protection) would not change the habitat type, but would result in temporary impacts to individuals and predators until the area could recolonize. These new hard substrates may provide favorable habitat for invasive species to colonize before native species colonize.” “…impacts to invertebrates from long-term habitat alteration are considered negligible.” If in fact invasive species do colonize the area, we have no idea that the disruption will be “negligible”. How was this determined? Again, we need to take the whole wind energy development area into consideration and analyze the cumulative effects. A change over in species make up due to the massive increase in structure could have a lot of negative effects for the species that currently inhabit that area and that possibility should not be ignored or only mentioned as a benefit to the recreational community. It needs to also be considered that there are semelparous species that occupy that area and the surrounding areas to reproduce. Therefore, any disturbance and/or mortality that disrupts that process can have negative consequences to the following years generation, stressing the food web and the fishing industry that depends on them.

Response to comments: Section 3.4.2 of the FEIS considers the relative extent of new colonizable surfaces created by the SFWF and SFEC, and the potential implications should these surfaces provide a stepping stone for invasive species establishment. The level of detail is consistent with NEPA requirements.

Comment theme: Noise impacts on fish.

Associated comments

Table I-265 provides the full list of comments received as part of this comment theme.

Table I-265. Noise impacts on fish comments.

Comment Number	Comment
310-12	Noise impacts to commercially-important invertebrate species are largely unknown, but should not be dismissed. Invertebrates possessing statoliths or similar pressure-sensing organs could be impacted by pile driving and other construction activities. Such potential impacts should be addressed in the FEIS.
310-14	A more comprehensive description of the potential impacts of sound on finfishes and efficacy of mitigation measures is needed. Cod, in particular, should be included with a specific focus on potential impacts of sound on cod spawning behavior. Among mitigation measures, time of year restrictions and sound attenuation devices need to be better described.

Comment Number	Comment
310-4	An analysis of impacts to cod is not presented in the DEIS. The SFWF overlaps with the only known Atlantic cod spawning aggregation in the Mid-Atlantic/Southern New England region. Cod exhibit site fidelity (Zemeckis et al. 2017), are sensitive to sound (Chapman and Hawkins 1973), and their spawning aggregations are sensitive to disturbance (Dean et al. 2012). There are important resource concerns in light of new information regarding potential noise impacts on cod spawning behavior (Stanley et al. 2017). Recent data also suggest that Gulf of Maine winter spawning fish mix in with this assemblage, so project impacts could also affect the Gulf of Maine fishery given transiting and mixing winter spawners in the lease area. The FEIS needs to address the timing of cod spawning activities, the location and extent of spawning aggregations, and how these impacts will be avoided. A single year of spawning failure could have “irreversible” or “irretrievable” impacts (sensu DEIS section 4.2) to this distinct stock of cod which is only known to spawn on Cox Ledge.
284-6	Without a detailed description of what the anticipated pile driving noise will be at its source, we are challenged to ascertain the extent of the mitigation that will be achieved by the proposed requirement to reduce noise by 10dB through mitigation. Although a 10dB noise reduction is significant, the information currently provided is insufficient to provide assessment on what the resulting noise will be at different distances from the source, and thus prediction of the potential impacts to marine life that will be exposed. If BOEM does not intend to impose a construction noise threshold, then required noise mitigation should not be limited to 10dB and should instead include use of best technology available or combination of approaches which have the potential to far exceed a 10dB reduction. We urge requiring testing of the efficacy of noise mitigation approaches, mandatory public sharing of testing results, and making continual adjustments and improvements within and among projects using an adaptive management approach.
310-11	The impacts of sound on finfish are described for each alternative. However, the issue is not well-described comprehensively. Section 3.4.2.2.2 (Environmental consequences associated with the No Action alternative) describes potential impacts to black sea bass but not cod. Section 3.4.2.2.3 (Environmental consequences associated with the Proposed Action alternative) does not provide any species-specific information.
145-7	A major impact from offshore wind energy production is noise pollution during surveying, construction, maintenance, and operation of wind turbines. Many marine species, which rely heavily on sound for survival, are critically sensitive to noise impacts. These include species throughout the food chain, from plankton to fish to marine mammals. To prevent permanent or fatal injury to exposed marine life, BOEM must analyze--and mandate the use of--methods of noise pollution mitigation through a range of noise reduction techniques, technologies, and avoidance measures.

Response to comments: The EIS, ESA biological assessment, and revised EFH assessments fully consider the impacts of construction and operational noise on aquatic habitats and species. The project includes a range of mitigation measures to avoid and minimize these effects to the greatest extent practicable. Refer to Appendix G, Table G-1 for lessee-proposed environmental protection measures and Table G-2 for mitigation measures that BOEM will consider for incorporation in the Record of Decision.

Section 3.4.2 of the FEIS is updated to include the findings of the revised EFH assessment, at a level of detail consistent with NEPA requirements. This revision includes additional detail about sound impacts by fish hearing group.

The FEIS includes the anticipated noise levels presented in COP Appendix P1 (available at: https://www.boem.gov/renewable-energy/state-activities/south-fork).

Comment theme: Micrositing.

Associated comments

Table I-266 provides the full list of comments received as part of this comment theme.

Table I-266. Micrositing comments.

Comment Number	Comment
310-7	The FEIS needs to describe how both the invertebrate and benthic habitat data will be used for micrositing. The DEIS states that “detailed benthic habitat mapping is underway, and BOEM will work closely with NMFS during the EFH consultation process to quantify impacts to benthic habitat, which will then be used to analyze impacts to invertebrates. This analysis will be included in the EFH assessment and summarized in the FEIS” (page 3-8). The FEIS should identify how these assessments will be used for decision-making and micrositing.
141-8	Impacts from Micro-siting of Wind Turbines and Interconnection Cables Micro-siting of wind turbine monopiles is identified in the DEIS as a primary technique for impact avoidance proposed for the Habitat Alternative. Micro-siting efforts will by design rely upon detailed information regarding bottom conditions in the project lease area. However, despite observations EPA and others offered in previous comments on the Administrative DEIS, detailed information is not provided in the DEIS to inform the understanding of the impacts associated with the Habitat alternative. Consequently, it remains difficult to differentiate the impacts associated with the Habitat Alternative from the other two build alternatives. The DEIS (page 3-34) notes that, "Quantities of benthic habitat types impacted by the Project cannot be calculated until the data analysis is completed during the EFH consultation. Therefore, the DEIS provides a qualitative analysis of general impacts. Quantification of areal extent of impacts to complex habitat will be provided in the FEIS." Information to understand the differences between the alternatives will be critical for any decisions regarding the selection of a preferred alternative for the project. Recommendations: •We recommend that the level of information presented in the FEIS support any conclusions presented regarding micro-siting for WTG installations. We also recommend that information be provided to explain why specific WTG locations were maintained and eliminated under the Habitat alternative. •We also recommend that the discussion of micro-siting of the inter-array cables be significantly enhanced in the FEIS to identify how complex fisheries habitat will be avoided through alternate routing of cables. As is the case for individual turbine micrositing we recommend that the level of information provided fully support decisions to avoid one cable route over another to avoid impacts. We also recommend that the analysis of alternatives fully consider a sub-option that describes the impacts of each build project with the largest commercially available WTG. Recent experience with the Vineyard Wind project demonstrates how the implementation of a larger WTG can reduce the required number of WTG installations and the total length of cable. Given the location of the project on Cox's Ledge, a recognized high value habitat, we believe such an analysis is a critical element of the impact assessment for the project.

Response to comments: Section 3.4.2.2.5 of the FEIS is updated to include additional information on complex habitat from the revised EFH assessment, as well as NMFS recommendations from the EFH consultation for the micrositing of turbines to reduce impacts to complex habitat.

Comment theme: Project impacts to species of commercial or recreational importance.

Associated comments

Table I-267 provides the full list of comments received as part of this comment theme.

Table I-267. Project impacts to species of commercial or recreational importance comments.

Comment Number	Comment
166-19	The document should include greater detail on how the impacts of the proposed action and the other two alternatives vary across different species of commercial and recreational importance, especially the species that overlap the most with the wind farm area and analysis area (e.g., Section 3.4.2.1.2 includes some species without nexus to the wind farm or surrounding area). This level of detail is important for determining the likely impacts to a species that is rebuilding (e.g., Atlantic cod) and evaluating the effectiveness of mitigation and monitoring measures going forward for this wind farm and other future projects. Species-specific impacts are important to include because even if the impacts are negligible to minor at the population level, the adverse impacts could be more substantial at higher spatial resolution resulting in localized depletion, disruption in cod spawning, alteration to squid recruitment, etc., all of which indirectly impact fishermen in this region. For species with complex population structure, like Atlantic cod, it is important to maintain local spawning components throughout the species' range. Both the planned and potential mitigation measures in Appendix G should also specify how these measures are likely to reduce impacts to commercial and recreational species to the species-level. The Atlantic Cod Stock Structure Working Group concluded there are more than two stocks of Atlantic cod, including a likely separate Southern New England stock, which overlaps with Cox Ledge EFH area (Peer Review of the Atlantic Cod Stock Structure Working Group Report 2020). This area could be greatly beneficial for stock rebuilding given this and other surrounding complex habitat areas are important for cod spawning and survival of juvenile cod. The DEIS does not consider how the proposed action will impact the Southern New England cod stock or cod rebuilding more broadly. Impacts to herring, mackerel, and squid, and other ecologically important forage species (e.g., sandlance) should be included in the FEIS. Construction of the wind farm will likely at least temporarily negatively impact these forage species (displacement due to underwater noise), which could result in predators of these species (e.g., cod, pollock) moving elsewhere (again, at least temporarily). This outcome in turn could negatively impact the commercial, for-hire recreational, and private recreational fishermen who fish in those areas. This impact could be partially offset by the "reef effect" as it does for the impact on marine mammals as stated on page 3-59; however, this point should be clearly stated. Time of year restrictions related to pile driving should be considered as a mitigation measure, since some species, including longfin squid, could be disproportionately affected if most pile driving occurs in summer during their spawning season.
310-27	Information regarding the distribution and temporal persistence of shellfish and longfin squid mops and their vulnerability to project activities should be provided in the FEIS.
339-2	Fisheries: The area chosen for the construction of the South Fork Wind Farm is known as Cox's Ledge, which is a spawning site for several local species. Atlantic cod (Gadus mohua), yellowtail flounder (Limanda ferruginea), and bluefish (Pomatomus salatrix,) to name just a few, use this area to reproduce. Open-water pelagic-spawners like cod and bluefish, or bottom-spawners such as yellowtail flounder, many species have been attracted for centuries to the area. The SFWF construction impact will be majorly negative to the gametes and larval fish abundant in the region. Yellowtail flounder and bluefish spawn in spring and summer while Atlantic cod and winter flounder spawn in the winter and early spring. The eggs of these species are either deposited on the bottom where fertilization occurs, and then the fertilized gametes float to the surface where they will hatch, as in the case of yellowtail flounder; or pelagic midwater spawners such as the cod and bluefish. In either case once the larvae hatch, they are highly susceptible to noise from vibration. In hatcheries, aeration can kill larval fish due to noise levels (Banner A., Hyatt M., Effects of Noise on Eggs and Larvae of Two Estuarine Fishes, Trans.Am.Fish.Soc.,1 ,1973). These early life stages of these species must be fully investigated as to the impact of low-frequency noise such as that which would take place during construction, including pile driving, jet plowing and studies specific to the relationship of particle motion as a "stimulus when evaluating the effects of sound upon aquatic life." Until studies such as these, specific to our region's fisheries, are done and evaluated including peer-review, we must insist on "No Action" alternative.
310-10	Section 3.19 characterizes invertebrates as maturing quickly and consequently being less vulnerable to construction impacts. However, this characterization is not representative of many commercially-important invertebrate species in the project area including horseshoe crabs, whelk, Jonah crabs, and lobsters. More species-specific assessments are necessary to capture the diversity of life history strategies and potential project impacts among invertebrate species present in the project area.

Response to comments: The revised EFH assessment (https://www.boem.gov/renewable-energy/state-activities/south-fork) considers in detail the effects of construction noise on federally managed fishes and invertebrates. Appendix B of the EFH assessment characterizes project impacts to NOAA Trust Species, including horseshoe crabs. Section 3.4.2 of the FEIS is updated with additional information from the EFH assessment, including additional information about benthic species responses, consistent with NEPA requirements.

Comment theme: Mortality-level effects for larval and juvenile species.

Associated comments

Table I-268 provides the full list of comments received as part of this comment theme.

Table I-268. Mortality-level effects for larval and juvenile species comment.

Comment Number	Comment
154-3	Inadequate Information: Fisheries Mortality Effects from Pile-Driving Noise The DEIS states, that "significant noise effects based on sound attenuation modeling could extend outward in a circle up to 8 miles from each SFWF monopile foundation" (footnote, page 3-4), and DEIS Table 3.4.2-3 on page 3-23 indicates mortality or mortal injury effects up to 7.4 (statute) miles and 4.9 miles for small and large fish, respectively. RIFAB is concerned that these areas affected by pile-driving are significant and are predicted to result in substantial mortality, especially for eggs, larvae and juveniles of species spawning in the project area. The DWSF Construction and Operations Plan (COP) notes there are 37 species with essential fish habitat inside the project area, but no modeling of mortality effects is carried out. This lack of modeling is a critical information deficiency that must be corrected. Without it, a complete assessment of impacts on fish habitat and fisheries cannot be realized.

Response to comments: Section 3.4.2 of the FEIS considers mortality-level effects on fish eggs and larvae resulting from project construction, consistent with NEPA requirements. Additional information is provided in the revised EFH assessment (https://www.boem.gov/renewable-energy/state-activities/south-fork).

Comment theme: Benthic habitat definition.

Associated comments

Table I-269 provides the full list of comments received as part of this comment theme.

Table I-269. Benthic habitat definition comment.

Comment Number	Comment
166-15	As a foundation for any further analysis, it would be helpful to explain more specifically how complex habitat is defined, beyond occurrence of glacial moraine and coarse sediment as compared to areas of sand and muddy sand (see section [3.4.2.1.1], page 3-5). BOEM's presentation during the February 11 public information session suggested that greater than 5% gravel coverage is a threshold that was used to identify complex habitat, but we could not find this definition in the DEIS. We recommend the definition in NOAA Fisheries' habitat mapping recommendations. This definition should in turn be clearly mapped to the data used to classify habitats, and classification challenges should be identified, at least briefly, in the chapter about impacts analysis. For example, pebble and cobble habitats are important to many finfish and invertebrate species, as stated in the DEIS. However, if acoustic mapping methods are unable to detect features at the scale of a few centimeters, how are pebble or cobble areas identified within the lease area? Ultimately the habitat delineations must be consistently and clearly mapped to the available data. We are particularly concerned about accurate habitat delineations in the southern part of the project area that overlaps Cox Ledge.

Response to comments: The FEIS includes refined benthic habitat type definitions developed in coordination with NMFS. Additional information on benthic habitat is provided in the revised EFH assessment (https://www.boem.gov/renewable-energy/state-activities/south-fork).

Comment theme: Impacts to the horseshoe crab.

Associated comments

Table I-270 provides the full list of comments received as part of this comment theme.

Table I-270. Impacts to the horseshoe crab comment.

Comment Number	Comment
363-126	The SFWF DEIS omits crucial information about the Atlantic horseshoe crab (Limulus polyphemus), a vulnerable species native to the East Coast of the United States and known to be present within the New York Bight including the proposed SFWF Project Area. Demand for horseshoe crab continues to increase, while its population has been in decline. The lack of analysis of the horseshoe crab's abundance and life stages within the SFWF area and surrounding waters is problematic, particularly because of the horseshoe crab's multi-use ecological and economic importance: (1) to fishermen's livelihoods, including as an important source of bait in the commercial fishing industry; (2) in biomedical research and use, including to U.S and global public health and in the production of COVID-19 vaccines; (3) as an important food source for migratory shorebirds, including the endangered red knot; and (4) as a food source for numerous marine species. Despite their economic, public health, and ecosystem importance, the only mention of the horseshoe crab in the DEIS is as follows: Economically important species, including Atlantic sea scallop, bay scallop (Argopecten irradians), horseshoe crab (Limulus polyphemus), Atlantic surfclam, squid, and ocean quahog, are also associated with soft sediments. It is unclear whether the South Fork Wind Fisheries Research and Monitoring Plan (as of May 2020) will collect additional information on horseshoe crabs beyond identifying them. Considering that direct loss of habitat and potential physical harm or death are likely to occur to the majority of horseshoe crabs present in the Area during construction, focused research is warranted, especially considering that they are substantially slower moving when buried in soft sediments in marine waters. Baseline data is urgently needed prior to construction, especially given the proximity of the project to a major spawning ground. Any adverse impacts to the horseshoe crab population would have subsequent consequences to biomedical research and public health. Given that there will be a substantial and permanent loss of soft-bottom (sand/mud) habitat in the proposed Project area, it is crucial that this loss of habitat be quantified and that predicted impacts to the horseshoe crab population and resultant losses to the commercial fishery be established.

Response to comments: Section 3.4.2 of the FEIS includes a revised benthic habitat characterization, presented in detail in the revised EFH assessment, which quantifies short-term and long-term impacts to non-complex (sand and mud) habitats. Appendix B of the EFH assessment characterizes project impacts to NOAA Trust Species, including horseshoe crab.

Comment theme: EFH species impacts.

Associated comments

Table I-271 provides the full list of comments received as part of this comment theme.

Table I-271. EFH species impacts comment.

Comment Number	Comment
349-35	Additionally, the DEIS notes that the Project may have localized effects on habitat availability and habitat suitability for some EFH species and that localized impacts to EFH that are not abundant or widespread in the area of the Project could have a greater effect on that EFH when compared to impacts to EFH that are abundant in the area. In the FEIS, BOEM should discuss which EFH species are abundant and non-abundant and how this affects the overall impact to these species' EFH.

Response to comments: The FEIS incorporates relevant information from the revised EFH assessment, at a level of detail consistent with NEPA requirements. The EFH assessment may be accessed at https://www.boem.gov/renewable-energy/state-activities/south-fork.

Comment theme: Lobster habitat.

Associated comments

Table I-272 provides the full list of comments received as part of this comment theme.

Table I-272. Lobster habitat comment.

Comment Number	Comment
310-8	The DEIS characterizes lobsters as only using complex bottom types. While complex bottom is the preferred habitat, adult lobsters use all bottom types, especially in offshore waters. In addition, adult lobsters regularly traverse soft bottom types when making both localized and long-distance movements. It should also be noted that this area is part of the Southern New England lobster stock, which the 2020 stock assessment declared is depleted and requires significant management action to stop the decline in stock abundance. Any construction activities in regions where the stock remains may adversely affect an already significantly depleted stock and such impacts need to be better described in the FEIS.

Response to comments: Section 3.4.2 of the FEIS is updated to modify the habitat description and to provide additional detail on impacts of the project on lobster and other species, at a level of detail consistent with NEPA requirements.

Comment theme: Decommissioning impacts.

Associated comments

Table I-273 provides the full list of comments received as part of this comment theme.

Table I-273. Decommissioning impacts comment.

Comment Number	Comment
371-6	And finally, was there any analysis of the change in impacts if the interconnection cable is left in place after project decommissioning? Will decommissioning have the same impact on the - 12.18 acres of noncomplex foheries habitat that will occur during project construction?

Response to comments: BOEM regulations (30 CFR 585.902) require that cables be removed and the seafloor returned to its original conditions after project decommissioning.

Comment theme: SAV and the impacts to eelgrass beds or other aquatic vegetation.

Associated comments

Table I-274 provides the full list of comments received as part of this comment theme.

Table I-274. SAV and the impacts to eelgrass beds or other aquatic vegetation comment.

Comment Number	Comment
141-17	Section 4.2.1 of the SFWF Montauk O&M Facility In-Water Work Assessment of Potential Impacts to Natural Resources from In-Water Work states that a recent SAV survey has not been completed. The report acknowledges that dredging and pile driving activities have the potential to physically damage eelgrass beds or other aquatic vegetation if present within the in-water work area. Consistent with the requirements of the Clean water Act 404(b)(1) Guidelines, potential impacts to all special aquatic sites must be assessed. EPA recommends a field survey be conducted to identify any potential SAV and mudflat impacts at the Montauk O&M facility.

Response to comments: The O&M facility impacts analysis is updated based on currently available information. No SAV is present in the facility footprint. The closest eelgrass bed is several hundred feet from any potential bed-disturbing activities. For additional detail, refer to Section 3.1 of the revised EFH assessment (https://www.boem.gov/renewable-energy/state-activities/south-fork).

Comment theme: Cable installation disturbance to the benthic habitat.

Associated comments

Table I-275 provides the full list of comments received as part of this comment theme.

Table I-275. Cable installation disturbance to the benthic habitat comment.

Comment Number	Comment
322-2	Submarine Cable Installation The Project, as proposed, requires the installation of 28 miles of inter-array cable. The inter-array cables between the WTGs and offshore substation (OSS) are proposed to be buried to a target depth of 4-6 feet below the seabed. The DEIS identifies the possible use of a mechanical cutter, mechanical plow, and/or a jet plow as an alternative to mechanical dredging. The DEIS should be revised or supplemented to indicate which of these methods would result in the least amount of disturbance to the benthic habitat and which of the methods would facilitate the most rapid and complete habitat recovery.

Response to comments: These alternative equipment types produce comparable effects on benthic habitats, therefore the analysis presented in the EIS is representative.

Comment theme: Boulder relocation.

Associated comments

Table I-276 provides the full list of comments received as part of this comment theme.

Table I-276. Boulder relocation comment.

Comment Number	Comment
166-17	…[I]n the COP (page 3-38, and Appendix F Figure 3) there are maps of areas that may require boulder relocation. How were these areas identified?

Response to comments: These areas were identified through refined benthic habitat characterization from side-scan sonar survey data. Additional details may be found in the COP, Appendix N2: South Fork Wind Benthic Habitat Mapping to Support Essential Fish Habitat Consultation (https://www.boem.gov/renewable-energy/state-activities/south-fork).

Comment theme: Impact determinations.

Associated comments

Table I-277 provides the full list of comments received as part of this comment theme.

Table I-277. Impact determinations comments.

Comment Number	Comment
144-4	Second, the summary tables Table ES-1. Key Environmental Impact Statement Findings for the Proposed Action and Table 2.3.1-1. Comparison of Impacts by Alternative are misleading when they characterize impacts of the proposed action. For example, Table ES-1 lists impacts of the proposed action on benthic habitat, essential fish habitat, invertebrates and finfish during construction and installation as "a negligible to minor adverse effect on for benthic resources, minor for EFH (essential fish habitat), and negligible to minor for invertebrates and finfish" while the detailed analysis of Biological Resources on page 3-23 includes a table of expected impacts to finfish (Table 3.4.2-3.). This table lists likely injury to finfish greater than 2 grams in size out to a radius of 39,265 feet from each monopile during installation. This is a diameter of 12.9 NM. In no way could this be construed as "a negligible to minor adverse effect".
338-32	29. As mentioned on p. 3-11, while the Project area is relatively small compared to the Geographic Analysis Area, it represents a very important habitat for many species; particularly Atlantic Cod that use the area to spawn. Since Atlantic Cod are site-specific in their spawning activity, disruptions to this area by construction or other underwater noise could be detrimental to the success of a spawning season. Describing impacts from construction as minor due to the large geographic scale of the geographic analysis area is dismissive of the importance of this area both as a spawning site and an area of protection for various species.
166-20	Table 2.3.1-1 lists negligible to minor impacts [due to noise] for invertebrates and finfish; however, Table 3.4.2-3 lists injury from underwater construction noise to finfish larger than two grams out to a radius of 39,265 ft from each monopile during installation. This is a diameter of 12.9 nm, suggesting a larger impact than what is listed in Table 2.3.1-1.
141-7	Comparison of Alternatives Although all action alternatives are deemed to result in similar impacts when characterized under broad categories (e.g., "negligible" to "minor"), both the Transit and the Habitat alternatives would result in measurably less construction, maintenance and decommissioning related impacts (p. 3-76, Section 3.4.2.3). According to the DEIS the Habitat alternative is specifically designed to "reduce impacts to complex fisheries habitats as compared to the Proposed Action" Under this alternative, BOEM would require the applicant to exclude certain WTGs and associated cable locations within complex fisheries habitats should micro-siting not be possible. These exclusions would reduce impacts to hard-bottom substrates (defined as Rock Substrate and/or the four substrate groups: Gravels, Gravel Mixes, Gravelly, and Shell); hard-bottom substrates with epifauna or macroalgae cover; vegetated habitats (e.g., submerged aquatic vegetation [SA V] and tidal wetlands) and/or; reduced impacts associated with reductions in sediment movement, suspension, and deposition. Despite the lowered impacts inherent to the Habitat alternative by design, the DEIS finds that all alternatives have similar impacts when characterized using the broad DEIS metrics ("negligible," "minor," "moderate," or "major" impacts). The DEIS acknowledges the impact reductions for the Habitat and Transit alternatives but notes that the impacts would not change "substantially." Supporting information in the DEIS to document this conclusion is limited.

Comment Number	Comment
	Recommendation: •We recommend that the FEIS provide more specific information to document and quantify the reduced impacts associated with the Habitat and Transit alternatives. Based on our understanding, both the Habitat and Transit alternatives would avoid impacts by directly reducing the number of WTGs and total amount of inter-array cable proposed for the project. Therefore, the FEIS should provide more specific information to differentiate the impacts between alternatives and better support or revise the general conclusions reached in the DEIS. The FEIS should also explain how "substantial" a reduction in impacts would be necessary to result in a discernible difference in the impacts of the various alternatives, especially given the broad evaluation metrics (e.g., negligible, minor, moderate, major).
372-9	Throughout the document, there are several examples where the results of the analysis are not consistent with the definitions for significance criteria outlined in Table 3.1.1-1 and Table 3.1.1-2. The analysis is further complicated because some resource areas have additional and unique significance criteria defined in other tables. For example, the analysis identifies long-term and permanent impacts to benthic habitats; however, the conclusions suggest a negligible to minor impact. Based on the definitions outlined in Table 3.1.1-1, many of the impacts described in the document appear to meet the definition of a moderate impact rather than a negligible or minor impact. This is also true for the significance criteria outlined in Table 3.4.2-1, which are specific to Benthic Habitat, EFH, Invertebrates, and Finfish. While impact duration and recovery are not a component of the significance criteria in Table 3.4.2-1, they appear to be considered in the ultimate conclusions. In some cases, the duration of impacts and recovery times described are unsupported or inconsistent with the definition in the document, yet they appear to be contributing to the conclusions related to significance level. We provide examples in our technical comments where definitions related to duration of impacts, expected recovery, and significance criteria appear to be inconsistent or inaccurately applied in the document. The FEIS should address these comments and clarify which significance criteria definitions are being considered in the analysis and in the ultimate conclusions related to the anticipated level of impact for Benthic Habitat, EFH, Invertebrates, and Finfish.

Response to comments: Thank you for your recommendation. BOEM refined the significance criteria for this resource group, see FEIS table 3.4.2-1. The FEIS incorporates additional details for each alternative consistent with NEPA requirements, see FEIS section 3.4.2.2.4 and 3.4.2.2.5.

Comment theme: Sea scallop larval distribution.

Associated comments

Table I-278 provides the full list of comments received as part of this comment theme.

Table I-278. Sea scallop larval distribution comment.

Comment Number	Comment
310-21	Additional information is also needed regarding possible impacts to larval distribution and settlement, particularly for sea scallops. Models of scallop larvae dispersal currently exist and could be adapted for this area. See, for example, Tian et al. (2009) and Cowles (2017).

Response to comments: Thank you for your recommendation. BOEM has revised Section 3.4.2 of the FEIS to include information regarding impacts to EFH for federally managed species, at a level of detail consistent with NEPA requirements. Additional details may be found in the revised EFH assessment (https://www.boem.gov/renewable-energy/state-activities/south-fork). BOEM is also funding a study that models impacts of offshore wind farms on hydrodynamics in the Mid-Atlantic Bight, including modeling of sea scallop larvae distribution (https://www.boem.gov/sites/default/files/documents/environment/environmental-studies/NSL-19-04.pdf).

Socioeconomics

Comment theme: Project economic benefits.

Associated comments

Table I-279 provides the full list of comments received as part of this comment theme.

Table I-279. Project economic benefits comments.

Comment Number	Comment
131-2	In addition to the environmental benefits, the Project will provide economic and employment benefits during construction, operation, and maintenance, and decommissioning of the Project. During the construction period it is expected the Project will incur up to $816.18M in capital expenditures, up to $25.9M annual operating expenses and a decommissioning cost of approximately $133M. During construction up to 1,587 FTE jobs would be created, including up to 428 direct jobs. Operations and maintenance would create approximately 98 jobs. The economic benefits as noted above will be drastically reduced within the current US based equipment capabilities but these restrictions are expected to be addressed over time as the industry's capability in the US meets forecasted demand. It is imperative; however, the developer and contractors utilize as much local and regional workforce as possible to equalize the costs of the project in all categories and should begin in earnest towards that end now.
303-1	Elected leaders have declared 5,200 megawatts of offshore wind energy capacity in Virginia to be in the public interest. Economic studies, such as the recent study by the American Wind Energy Association, cited by BOEM, in the DEIS, have shown that this rapidly emerging U.S. industry can create up to 83,000 jobs and $25 billion in annual economic output by 2030.
301-20	BOEM's classification of the cumulative impacts on demographics, employment and economics as "minor adverse and minor beneficial" does not fully assess or reflect the plethora of reports and data concerning the demonstrated benefits and economic impacts of offshore wind from other markets. One of the primary drivers behind the states' sustained and large-scale commitment to offshore wind is the potential to create, over time, an entirely new and significant U.S.-based heavy industry. A recent study by the Special Initiative for Offshore Wind estimates that approximately 20 GW of state-sponsored offshore wind procurements through 2030 will require close to $70 billion in capital investment. As U.S-based and foreign suppliers become convinced of the durability and scalability of the U.S. offshore wind market, they will make the necessary investment in local factories, a diverse workforce, and inventory. Moreover, offshore wind can produce economic benefits by providing clean energy, stabilizing often volatile energy markets and prices and helping address the challenges many states face with the imminent retirement of aging fossil- and nuclear-fueled generation. NYISO reports, "[b]y 2028, more than 8,300 MW of gas-turbine and steam-turbine based capacity in New York will reach an age beyond which 95% of these types of capacity have deactivated." A moderate or major beneficial cumulative rating is warranted in the FEIS when these beneficial economic impacts are fully considered
299-14	BOEM's failure to issue a ROD approving SFW will likely have catastrophic negative consequences, and hundreds of millions of dollars in high-tech manufacturing investments will be made in markets outside the U.S. This is an undesirable and entirely avoidable outcome.
359-2	Based on actual experience in Europe, this industry can be expected to trigger the creation of thousands of jobs, revitalize port communities, create a US supply chain, and invest billions in the United States economy. The White Paper from the Special Initiative on Offshore Wind estimated in early 2019 that 20GW of offshore wind procurements by 2030 will generate up to $70 billion of capital investment. A study by the American Wind Energy Association ("AWEA") from March 2020 states that the U.S. offshore Wind could support up to 83,000 jobs and $25 billion per year in economic output by 2030. That same study also estimated that $1.3 billion of infrastructure investment had already been announced to support the U.S. OSW; since then several more significant announcements have followed raising the estimate to above $2 billion. This does not include investment that other industrial actors such as Nexans will make soon or are already making and were not publicly announced. As demonstrated by announcements such as the offshore wind turbine installation vessel to be built for Dominion Energy in Texas or the service and operation vessel to be built for Eversource and Ørsted between the states Florida, Mississippi and Louisiana, or Nexans industrial investment in South Carolina, the offshore wind industry is now starting to have positive economic impacts well beyond the states whose policies drove its creation.

Comment Number	Comment
	Nexans is an industrial group that produces electrical cables for a wide range of applications and industry. Producing high voltage undersea cable is a key component of our business. By the end of 2021, Nexans will have invested a total of $200 million to upgrade its existing manufacturing facility near Charleston, South Carolina. That facility will produce submarine electrical cables in unbroken lengths of up to 50 miles and will allow specialized laying ships to load those unbroken lengths at the factory quay side before steaming to locations on the U.S. outer continental shelf or elsewhere in the world, and then install them for offshore wind farms such as South Fork Wind Farm. Our investment in this factory will create not only direct economic benefits for South Carolina but potentially indirect economic benefits for Tennessee, Texas, Georgia, Ohio and Connecticut (not counting the direct and indirect economic benefits during cable installation that will flow to the states for which the offshore wind projects are constructed).
360-22	Despite significant evidence in the record to the contrary, the DEIS incongruously determines that the overall cumulative impacts on demographics, employment, and economics from the full development scenario would likely only qualify as “minor adverse and minor beneficial.” The final EIS should account for all the reasonably foreseeable demographic, employment, and economic benefits created by future offshore wind projects. In particular, BOEM should evaluate foreseeable economic impacts to account for all the significant domestic jobs and supply chain logistics that offshore wind energy will support, as well as the infrastructure benefits; there is sufficient evidence in the record to support the final EIS adjusting its classification of demographics, employment and economics from “minor adverse and minor beneficial” to either moderate beneficial or major beneficial. Although the DEIS identifies local port improvements as a significant cumulative economic benefit of future wind projects, it does not appear to take account of specific jobs and economic development commitments, or the foreseeable supply-chain effects throughout the country related to these projects—all of which support a final EIS determination of moderate to major economic benefit. Land-based wind provides an excellent framework for considering broader benefits. There are currently 530 manufacturing facilities across 43 states that serve the land-based U.S. wind industry. Many of these facilities are in states that do not have any operating wind farms. Based on the growth of the onshore wind supply chain, and the initial comparable growth in the offshore wind sector, there is every reason to expect significant, multi-state economic benefits beyond the immediate project areas as offshore wind deployment increases. In April 2020, the American Wind Energy Association (AWEA) published a study that analyzed the economic impacts from offshore wind. AWEA’s analysis found the offshore wind industry is expected to invest $57 billion domestically in offshore wind energy development (of $106 billion in total investment, including investment outside the United States). As cited in the DEIS, AWEA’s analysis expects this development activity and project deployment to contribute $25.4 billion in annual economic output and approximately 82,500 jobs by 2030. About 60 percent of total offshore wind energy jobs would support project development and construction, while the remaining 40 percent of the jobs would support operations and maintenance. These investments and jobs will span many coastal and non-coastal communities, including locations far from the identified offshore wind development. Many of the jobs created will be in high-paying, skilled trades, spanning over 70 different occupations. The efficient build-out of the U.S. offshore wind potential will require a massive investment in new and revitalized ports and harbors infrastructure, including centers for the pre-assembly and load-out of major equipment to the wind farm and the servicing of the wind farms over their operating lives. The specific investments made and announced to date bear out AWEA’s analysis and historical experience with the onshore supply chain. Local ports will certainly benefit, and the early-stage development of a robust supply chain has already begun to benefit communities from New England to the Mid-Atlantic to Louisiana. These investments are directly attributable to the development of offshore wind projects considered in the DEIS. An indicative set of examples linked to the projects included in the DEIS spans a range of locations and industries: • Wind project developers have committed to establishing a foundation manufacturing facility in New Jersey; • Project developers have committed to domestic subsea high-voltage cable manufacturing in several locations; • Project developers are funding $110 million in steel fabrication and port facilities in Maryland; Project developers are investing in new U.S. shipbuilding, with contracts in place for the construction of new crew transfer vessels and plans to build the first U.S. installation vessel; • Public-private partnerships in Connecticut will invest over $157 million in the port of New London; • Over $10 million will be invested in New York State port infrastructure, as well as a new operations and maintenance hub near Port Jefferson and another $10 million in workforce training. Offshore wind developers’ offtake agreements with individual states provide some additional insights into the scope of forthcoming economic benefits. For instance, the Connecticut Department of Energy and Environmental Protection cited “an estimated $890 million in direct economic development in Connecticut, including Bridgeport Harbor and the local supply chain” in announcing the Park City Wind procurement, along with an estimated 2,800 job years. Similarly, the New Jersey Board of Public Utilities cited $1.17 billion in economic benefits and 15,000 jobs when announcing an agreement with Ocean Wind. In announcing deals with Empire Wind and Sunrise Wind, the New York Department of Public Service noted that “the two awarded projects will spur New York's clean energy industry with $3.2 billion in combined economic impacts to upstate, downstate, and Long Island, more than 34 | P a

Comment Number	Comment
	$85 million investments in long-term port facilities and cutting-edge technologies and are expected to deliver over 1,600 direct new jobs in project development, component manufacturing, installation, and operations and maintenance." In the way of example, one future offshore wind project, Mayflower Wind, will provide benefits to individuals and communities across Massachusetts: residential and business ratepayers will benefit from low-cost energy generated by the project, saving over $2 billion on electric bills over the project's lifetime; wind power from the project will enhance electric system reliability, especially in peak winter months; the project will support new jobs and supply chain growth across all phases—development, construction, and operations, and of those jobs 75% of all operations and maintenance jobs will be local; governments at all levels benefit from the increased revenue and economic activity, and the US government has received $135 million for the federal offshore lease payment and the project is estimated to provide nearly $2.5 billion in total economic benefits to the Commonwealth; and citizens across the region will benefit from cleaner air, as the project is expected to eliminate over two million metric tons of greenhouse gas emissions annually once in operation, equivalent to removing five million cars from the road. In addition, as part of its winning bid and power purchase agreements with Massachusetts electric distribution companies under the Commonwealth's offshore wind solicitation, Mayflower Wind committed $7.5 million for port upgrades and infrastructure improvements, $5 million for workforce development, $10 million to support offshore wind innovation and entrepreneurship, $5 million for applied research, $10 million for direct science in support of permitting requirements, and $5 million in strategic electrification for low-income communities. The above investments are just a sampling of the economic benefits that will flow from deployment of offshore wind in the U.S. The final EIS should reflect that South Fork, and the subsequent projects included in the DEIS cumulative impacts analysis, represent the foundation of significant economic benefits linked to transportation, manufacturing, installation, and operation of offshore wind facilities.
299-6	The DEIS understates the economic benefits of the SFW project and the cumulative benefits of 22 GW of OSW. While the study clearly recognizes the significant new investment in workforce, ports and harbors, manufacturing and other supply chain activities, it understates the overall beneficial economic and employment benefits of offshore wind. The wind industry is the fastest growing energy sector in the U.S. and contains one of the quickest growing occupations. This DEIS acknowledgement should reflect a more favorable quantification of OSW's role as a domestic economic development and job creation engine. The OSW industry is a large maritime energy infrastructure construction industry. OSW projects spur billions of dollars of investment into payrolls, taxes, supply chain, ports, and other businesses. The International Energy Agency finds that global offshore wind capacity may increase 15-fold and attract around $1 trillion in cumulative investment by 2040. In the U.S. $70 billion in supply chain revenue is forecasted by 2030. It requires an enormous number of jobs to complete an OSW project. There are at least 74 different occupation types required for the development, manufacturing, assembly, installation, operation and maintenance of an OSW project. Overall there are 821 classified occupations and as a result the offshore wind industry is comprised of 9% of all occupations. Growth in the offshore wind industry is astronomical and significantly outpaces the metric used by the Bureau of Labor Statistics (BLS) to classify increases in employment as "growth much faster than average." When employment growth is projected to increase at a rate of above 8% BLS labels that growth as "much faster than average." In Europe, employment in offshore wind experienced a 95% increase from 20,000 in 2008 to 210,000 in 2018. The European offshore wind job growth rate is 12 times the minimum rate for labelling it as "much faster than average." Finally, the Global Wind Energy Council forecasts that the global project pipeline and industry's continued growth will lead to 900,000 jobs in offshore wind globally. The American Wind Energy Association (now part of the American Clean Power Association) forecasts that the OSW industry could create up to 83,000 jobs and $25 billion in annual economic output by 2030. Many of these jobs will be in construction and funneled through local suppliers who enter the OSW industry. A study by the Special Initiative for Offshore Wind estimates that the nearly 20 GW of OSW procurements expected through 2030 will require close to $70 billion in capital investment. These investment benefits will extend beyond the Northeast region and will have a meaningful impact in other regions of the country, such as the Gulf of Mexico and the Midwest, where adjacent industries such as oil and gas development provide relevant competencies and opportunities for business diversification. The SFW project has utilized – and will continue to utilize – businesses located in non-Northeast states such as Florida, Louisiana, and Ohio. Including SFW, the State of New York currently has five, the State of New York currently has five OSW projects that have been awarded contracts. These projects are projected to create more than 6,800 jobs and more than $12.1 billion of combined economic activity. The supply chain for these projects consists of five ports receiving $644 million in investments with anticipated economic benefit on Long island, in New York City, and upstate. The economic benefits from construction and operation of SFW are illustrative of the tremendous potential the OSW industry offers to the Northeast region specifically and the country more broadly. Navigant Consulting's economic analysis provides that the SFW's "U.S. capital expenditures will be approximately $150 million and New York in-state capital expenditures will be approximately $49.1 million." For the U.S. more broadly "the Value Added that is attributable to the project is approximately $213.2 million in the construction phase (starting in 2020) and approximately $9.5 million on an annual basis in the operations phase (in 2018 dollars). The Project will support an estimated 1,741 local job-years during the construction phase and approximately 87 additional local annual jobs during the operations phase."

Comment Number	Comment
	The jobs and economic opportunities are already starting to mount – with port investments, vessel construction and factory announcements – even as this industry remains in its infancy. The DEIS however understates these investments and the economic benefit and employment. The DEIS excludes hundreds of millions in port investments and the direct jobs created in construction for port upgrades nor account for long term jobs that result at the facilities for any work associated with OSW. Port upgrade investments include: \$250 million at Paulsboro, NJ, \$157 million at New London, CT, \$113 million at New Bedford, MA, \$51 million in Sparrows Point, MD. In addition, Davies/Port of Quonset has previously served as a staging facility for Block Island Wind project and invested \$30 million in a 150 MT crane designed for OSW and currently \$20 million in additional investments are anticipated. The domestic supply chain is already seeing the growth, as developers and suppliers look to minimize their own costs and logistical risks. This domestic supply chain means good paying jobs, investment in coastal communities, and a brand-new economy for Americans to call their own. These points deserve greater weight in the DEIS and should support a declaration that these economic benefits are significant.
360-27	Offshore wind development has had a tremendous impact on the revitalization of coastal communities in Europe, turning once underutilized ports and their surrounding communities into booming economies. The east coast of the U.S. will benefit comparably, and these benefits will not be limited to the current geographic scope for evaluating demographic, economic, and employment impacts in the DEIS. In its final EIS, BOEM should fully account for all the foreseeable beneficial economic impacts, which in the aggregate support a moderate to major beneficial rating.
320-5	A study by the Special Initiative for Offshore Wind estimates that the nearly 20 GW of offshore wind procurements expected through 2030 will require close to \$70 billion in capital investment. The jobs and economic opportunities are already starting to trickle in – with port investments, vessel construction and factory announcements – even as this industry remains in its infancy. We are already seeing the growth of a domestic supply chain, as developers and suppliers look to minimize their own costs and logistical risks. This domestic supply chain means good paying jobs, investment in coastal communities and a brand-new economy for Americans to call their own.
349-114	The DEIS appropriately acknowledges future economic growth associated with offshore wind development off the Atlantic coast. According to the DEIS, initial jobs created by South Fork are likely to be between 326 to 428 full time employment (FTE) opportunities. Additionally, jobs will be created through the supply chain, which could range from 518 to 686 FTE opportunities. The DEIS estimates that South Fork will inject between “\$178.9 and 237.5 million into the regional economy, including taxes, over a 2-year period beginning in 2021, or \$89.4-\$118.8 million on an annual basis.” Cumulatively, the DEIS projects that: Offshore wind development would provide a regional market and ongoing demand for workers skilled in the professions and trades needed for construction, installation, maintenance, and repair of offshore wind facilities. Construction activities related to future offshore wind projects are expected to create an average of 11,668 FTE jobs from 2020 through 2030, including direct, indirect, and induced jobs. Overall, the DEIS concludes that the cumulative impact on demographics, employment, and economics from the offshore wind development contemplated would be “minor beneficial.” While recognizing the beneficial economic impacts of building the project and offshore wind generally, there is reason to conclude that these benefits are undercounted by BOEM. For example, a March 2020 study by the American Wind Energy Association, which analyzed the economic impacts from offshore wind, found that the industry is expected to invest \$57 billion in offshore wind energy development, which is expected to contribute \$25.4 billion in annual economic output and approximately 82,500 jobs by 2030 based on a high estimate of a 30 GW offshore wind build out. The AWEA study suggests that the economic benefits from offshore could be considerably higher than the DEIS states, indicating that perhaps over 4 times more jobs could be created per GW of offshore wind placed online than the DEIS suggests. We urge BOEM to re-examine the cumulative impact on demographics, employment, and economics to ensure that it properly reflects the vast potential of offshore wind to create jobs and economic opportunity while generating clean, renewable energy.
167-3	Further, it is important to note the economic opportunities that will be created by offshore wind to the north of Long Island. Southern New England—and especially Rhode Island and southern Massachusetts—has faced economic struggles in recent years. Rhode Island has lagged the rest of the region consistently. That is likely why state business leaders are excited by the prospects of new jobs, with groups championing the fact that they hope to see 6,000 supply chain jobs created for every 100 turbines built. It is promising that in recent months we have seen state officials in Rhode Island partnering with industry to offer virtual training for local businesses to meet the needs of the wind industry. In fact, a study by the Workforce Development Institute found that the offshore wind industry calls for employing 74 different occupations for various steps of designing, building and operating a wind farm. In nearby Massachusetts, the Clean Energy Center (MassCEC), a state economic development agency, has identified a host of potential economic opportunities within the commonwealth related to offshore wind. This includes not just the ports used for staging and construction but also cables, secondary steel, substations, monopile and gravity foundation manufacture and assembly sites, nacelle, tower and blade construction and assembly sites as well as component storage. This will help create jobs spanning from white collar to blue collar, entry-level to the highest-levels of expertise. For a region that, again, has seen historically stagnant growth, this as a significant net-positive that would not otherwise be created.

Response to comments: Section 3.5.3.2.3 of the FEIS describes the estimates of local expenditures, income and jobs expected to generated by the project, where local is defined as that state (or states) associated with the project. These estimates are generated assuming existing levels of U.S. based offshore wind related industries and infrastructure. Additional details of these estimates are provided in Appendix F in the Sections labeled ""Estimates of South Fork Wind Farm Capital and Operating Expenditures"" and ""Additional Analysis Assumptions."" The expected expenditures, income and jobs in the U.S. as a whole are not included in these estimates, nor are expected expenditures, income, and jobs in countries outside the U.S.

In addition, Section 3.5.3.2.2 of the FEIS describes energy generation of future offshore wind activities under the No Action Alternative. Table 3.7-1 in Attachment 3 of Appendix E describes energy generation of future non-offshore wind activities under the No Action Alternative. Table 2.1.1-1 in Section 2.1.1 describes the potential electrical generation range of the proposed Project. BOEM notes however, that a comprehensive forecast of impacts to energy supply and costs under the proposed Project and alternatives depends on numerous variables that are beyond the scope of the EIS.

BOEM agrees future offshore wind projects included in the No-Action Alternative are likely to lead to development of additional industries and infrastructure in the U.S. If the U.S.-based offshore wind industry increases in the future then the estimates of local expenditures, income, and jobs would likely be higher. BOEM notes however that a comprehensive forecast of future industries and infrastructure in the U.S. that could develop as a result of future offshore wind projects under the no-action alternative to be outside the scope of the EIS.

The assessment of cumulative impacts of the SWFW on demographics, employment, economics considers the incremental effect of the Project when combined with the all of the offshore wind projects included in the No-Action Alternative, and also considers the impacts not only to employment, but also to other impact producing factors (IPFs) including port utilization and traffic, as well as land disturbance, presence of structures, new cable emplacement/maintenance, light, and noise. When considering all of these IPFs, BOEM anticipates the impacts resulting from the Proposed Action alone would range from negligible to minor adverse and minor beneficial to moderate beneficial. Therefore, BOEM expects the overall impact on demographics, employment, and economics from the Proposed Action alone to be minor beneficial because the effect that would occur would be small.

In addition it is noted that the"" 48 to 98"" operations jobs cited in the comment, should actually be ""47 to 96"" operations jobs. This change is made in the FEIS.

Comment theme: Project-related air quality impacts to demographics, employment, and economics.

Associated comments

Table I-280 provides the full list of comments received as part of this comment theme.

Table I-280. Project-related air quality impacts to demographics, employment, and economics comments.

Comment Number	Comment
360-26	Additionally, because future offshore wind facilities would produce fewer GHG emissions than fossil-fuel-powered generating facilities with similar capacities, the reduction in GHG emissions due to future offshore wind projects (or avoidance of increased GHG emissions from equivalent fossil-fuel-powered energy production) would result in long-term beneficial impacts on demographics, employment, and economics. Again, the DEIS uses a narrow geographic area to assess air quality, despite the regional shift from thermal, higher-emissions power plants to zero-emissions offshore wind.
363-92	Current infrastructure in the U.S. does not support the manufacturing or installation of offshore wind turbine components and thus energy development companies are poised to purchase them from foreign countries. For example, GE Renewable Energy, a main supplier of wind turbines and turbine parts, recently opened a new offshore wind factory and development center in China.90 Construction and transportation of turbines, and their custom components, contribute to carbon emissions91 which must be taken into account when evaluating net carbon benefits. A number of the materials consumed in the construction of a wind power plant contribute to carbon emissions, e.g. hard coal, iron, and crude oil. A clear example of the DEIS's omission of supply chain components is presented in Table 2.1.1-1, which lists the SFWF "project components" and footprint. This table includes no information about the materials of turbine components, batteries, or scour protection, nor the footprint of parts production including rare earth mining, vessel traffic, HDD staging and implementation, the cofferdam, and extraction for boulders or other materials used for protection. RODA urges developers to invest in manufacturing in the U.S. to not only promote a domestic workforce and ensure U.S. environmental standards are adhered to. Whether production is conducted domestically or abroad, BOEM must consider and include environmental impacts from the offshore wind supply chain. Acknowledging the environmental impacts from supply chains of WEAs can result in changes in behavior, e.g. shorter transportation routes, to minimize emissions from transportation of turbines and components to offshore sites. Existing ports in seven different states (the furthest being Virginia) have been identified as locations for construction and staging. The use of far ranging ports will contribute to the carbon emissions of transportation; while denying the most impacted ports much of the economic benefit. There is the potential for economies of scale where larger turbines have lower carbon emissions associated with construction. Larger turbines should be used by all projects for this reason but the number of turbines should not be increased; this may have the added benefit of increasing safety for fishermen operating in or around a WEA.
360-23	Several other economic impacts of the clean electricity provided by offshore wind projects will be long-term and beneficial, beyond the current geographic scope. In the case of carbon emissions (for which benefits will be global), ACP has estimated that each megawatt-hour of offshore wind energy generation will avoid 0.49 metric tons of carbon dioxide emissions. For the full 22 gigawatts of offshore wind projects evaluated in the DEIS, this would result in reductions of roughly 42.5 million metric tons of carbon dioxide annually, equivalent to the emissions of over nine million cars.
360-25	The DEIS also correctly identifies that offshore wind will displace fossil fuel-generated power plants and result in long-term benefits to communities as an environmental justice benefit. However, the DEIS does not appear to credit these effects as economic benefits as well, despite the well-documented linkage between air quality and economic productivity. For example, an April 2018 report by LBNL identified several studies demonstrating economic benefits from reducing pollution via deployment of offshore wind along Atlantic Coast: "Buonocore et al. (2016) find that offshore wind in the Mid-Atlantic would provide between $54/MWh to $120/MWh of health and climate in benefits in 2017 and Millstein et al. (2017) find central estimates of air quality benefits from existing onshore wind worth $26/MWh, $110/MWh, and $44/MWh in the Northeast, the Mid-Atlantic, and the Southeast regions, respectively, in 2015." The final EIS should consider these improvements as economically beneficial to the region.

Response to comments: BOEM agrees that future offshore wind projects included in the No-Action Alternative are likely to lead to development of additional industries and infrastructure in the U.S. Future offshore wind projects could also affect carbon dioxide and GHG emissions; in Appendix H, direct GHG emissions are quantified in tables 3.3.1-6 thru 3.3.1-9 and tables 3.3.1-11 and 3.3.1-12 and potential impacts of GHG emissions associated with the proposed Project are discussed in section 3.3.1.2.3. Section 3.3.1.2.3 in Appendix H estimates the total health benefit of the proposed Project in terms of avoided emissions in the geographic analysis area, including the saved costs of the avoided health events.

However, a comprehensive forecast of future industry and infrastructure that could develop as a result of future offshore wind projects under the no-action alternative is beyond the scope of the EIS. More specifically, a comprehensive forecast of impacts to energy supply and costs as well as the impacts to onshore energy suppliers and their carbon footprints under the proposed Project and alternatives depends on numerous variables beyond the scope of the EIS.

Comment theme: Local job creation.

Associated comments

Table I-281 provides the full list of comments received as part of this comment theme.

Table I-281. Local job creation comments.

Comment Number	Comment
363-140	U.S. commercial fishermen must adhere to federal maritime employment regulations, including the Jones Act. As all operations in the EEZ must abide by the Jones Act, this should apply equally to OSW development and operations. To date there are few to no installation or support vessels for OSW construction and maintenance available in the U.S., which creates a double standard for other on the water operators. In fact, the largest OSW trade association, the American Clean Power Association recently stated “[w]hile the Jones Act applies to the transportation of materials to offshore renewable energy, it does not apply to construction.” Since the submission of the SFWF COP, there have been notable developments with the interpretation of the Jones Act and its application to offshore development. The percentage of U.S-based jobs is predicted to be between 50 and 63% by 2022 based on one report cited in the DEIS. However, this report and consequently BOEM do not clarify assumptions for domestic versus international jobs. The analysis of jobs sourced in the U.S. utilized by the DEIS also happened prior to the January 1, 2021 passage of the National Defense Authorization Act, recent U.S. Customs and Border Protection ruling letters, and Executive Order 14005 “Ensuring the Future Is Made in All of America by All of America's Workers” and thus domestic jobs summarized by the DEIS should be updated in light of these updates. Further analysis and justification is needed to quantify the true number of domestic jobs created, including for marine operators. Until OSW jobs and materials are required to be sourced in the U.S., the promised economic benefits and jobs will not materialize.
169-32	The No-Action Alternative must also take into account the fact that American jobs and tax revenues to the United States would be lost if the Project is built. The Project will displace American jobs related to construction and operation of onshore renewable energy projects in the United States. The DEIS has not analyzed those economic impacts and the loss of American jobs and tax revenues if the Project is built.
363-138	As RODA has stated numerous times, the level U.S. job creation often quoted for offshore wind projects appears inflated and misleading. First, there is no information in the DEIS on jobs created for the O&M phase of the SFWF project. Long-term jobs, such as those for the O&M phase of the project, are particularly important for the local workforce and should be fully analyzed by BOEM. The DEIS analysis only examines FTE (full-time equivalent) jobs created during the development and construction phase. It assumes the development and construction phase will last three years meaning estimates in Table F-9 are ⅓ of the FTE jobs available. For example, this means the total jobs (direct and supply chain) would be from 403-529 in a year under the 90-180 MW capacity scenarios to the Beach Lane Landing Site. Additionally, Section 4.6.1.2 of the COP outlines that local hiring may be limited and “the size of the non-local construction workforce could be large relative to the construction workforce hired locally,” and “non-local construction personnel would typically include mariners, export cable manufacturing personnel, and other specialists.” While we are not experts on the types of jobs that will support OSW construction, we do understand that the huge majority of them require highly specialized certifications and eligibility criteria. There is no indication whatsoever, in the DEIS or elsewhere to our knowledge, of how many of these jobs would be sourced from local communities, or on what timeline. Not only are there simply not that many long-term jobs available, there is no guarantee that the local workforce will be hired.
171-3	The environmentalists advocate for saving the family farms, what about the individual fisherman and his family? The number of jobs forecast-ed for the wind farms are over calculated and will be going to foreigners.
307-3	We would also like to know how many of the stated wind energy jobs, the components for the turbines, and the the operating companies will be foreign based? How many jobs will there be after the turbines are installed and running. It seems logical that the jobs will drop dramatically?

Response to comments: Estimates of jobs and income supported by the construction phase and the operations and maintenance phase of the proposed action are reported in Section 3.5.3.2.3. Local jobs created during construction (including direct, indirect, and induced jobs) are estimated range to range from 1,226 to 1,610 FTE job-years. During operations and maintenance of the project local jobs (including direct, indirect, and induced jobs) are expected to range between 47 to 96 FTE jobs annually. Table F-10 in Appendix F summarizes the estimated economic impacts of the proposed action.

Appendix F also provides more information regarding how these estimates were developed. All jobs and income estimates reported in the FEIS were developed using the 2017 version of the Jobs and Economic Development Impacts Model for Offshore Wind (JEDI-OW) developed and maintained by the National Renewable Energy Laboratory (NREL), a government-owned contractor-operated facility funded and overseen by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy. All jobs and income reported in Section 3.5.3.2 for both the No-Action Alternative and for Action Alternatives are estimates of "local" jobs where "local" is defined as the state with which the project is associated. The estimates do not include jobs that could be generated in other U.S. locations, or in other countries. The reference guide for the offshore wind JEDI model, which is available at https://www.nrel.gov/docs/fy13osti/58389.pdf, does not refer to the Jones Act. Therefore the Congressional provision that eliminates Jones Act restrictions during construction of offshore wind farms would affect the results of the model.

Comment theme: Commercial fisherman mental health.

Associated comments

Table I-282 provides the full list of comments received as part of this comment theme.

Table I-282. Commercial fisherman mental health comment.

Comment Number	Comment
363-137	An often-overlooked issue in the commercial fishing industry is mental health. While there is little to no data on mental health illnesses amongst commercial fishermen, New England fisheries are cited as being one of the most dangerous civilian jobs in the country. As already an incredibly risky and dangerous job, we recommend more weight be given to how the SFWF and other offshore wind development areas will not only increase risk for fishermen, but will also add heightened stress to an already dangerous industry. Fishermen live with job insecurity on a regular basis due to external threats such as waterfront development, cost-of-doing business, changes in species abundance, climate change and now offshore wind development. Research shows that stress from job insecurity directly causes mental health impairment and negatively affects well-being Complete analysis of the social impacts from this wind project and others should consider contributions to job insecurity for industries that may be negatively affected by development.

Response to comments: BOEM acknowledges that commercial fishing can be a dangerous occupation, and that mental health issues among fishermen is a serious cause for concern. However, the impact analysis in Section 3.5.1.2.3 of the FEIS concludes that the majority of vessels engaged in commercial fisheries and for-hire recreational fishing would only have to adjust somewhat to account for disruptions due to impacts from the proposed Project. In addition, BOEM is open to working with state partners and the commercial and recreational fishing industries to investigate alternative strategies to negotiate compensatory mitigation agreements. South Fork Wind, LLC has negotiated with the State of New York, the State of Rhode Island and the Commonwealth of Massachusetts to determine compensation packages for fishermen.

Comment theme: Culture and heritage of fishing communities, coastal communities, and working waterfronts.

Associated comments

Table I-283 provides the full list of comments received as part of this comment theme.

Table I-283. Culture and heritage of fishing communities, coastal communities, and working waterfronts comment.

Comment Number	Comment
363-134	Many coastal communities along the eastern seaboard have rich maritime and fishing traditions that still exist today. The DEIS relies upon data from the National Marine Fisheries Service to characterize the commercial fishing industry and ocean economy GDP from the U.S. Bureau of Economic Analysis (2020) and National Ocean Economics Program (2020). While these can provide some insight to the GDP generated from harvesting and ocean-related activities, it must be noted that the DEIS fails to evaluate potential impacts to the culture and heritage of fishing communities, coastal communities, and working waterfronts. The unique and historic cultures of these communities, heavily dependent on fishing, provides a strong sense of community that spreads far and wide. Policies must be designed to protect and promote these irreplaceable and iconic communities, not supplant them with industrial development. Impacts to these traditionally vital, culturally rich populations must be included in the DEIS analysis beyond simple community descriptions.

Response to comments: BOEM acknowledges the importance of preserving the unique and historic cultures of fishing communities in the New England and Mid-Atlantic regions. However, the impact analysis in Section 3.5.1.2.3 of the FEIS concludes that the majority of vessels engaged in commercial fisheries and for-hire recreational fishing would only have to adjust somewhat to account for disruptions due to impacts from the proposed Project. In addition, BOEM is open to working with state partners and the commercial and recreational fishing industries to investigate alternative strategies to negotiate compensatory mitigation agreements. South Fork Wind, LLC has negotiated with the State of New York, the State of Rhode Island and the Commonwealth of Massachusetts to determine compensation packages for fishermen.

Comment theme: Transit alternative economic impacts.

Associated comments

Table I-284 provides the full list of comments received as part of this comment theme.

Table I-284. Transit alternative economic impacts comment.

Comment Number	Comment
299-13	D. Vessel Transit Lanes Reduce Area Available for WTGs, Thereby Reducing Economic Benefits and Undermining Public Investment The DEIS considers approximately 22 GW of U.S. Atlantic OSW capacity as reasonably foreseeable. A recent study by the American Wind Energy Association (now part of the American Clean Power Association) states U.S. OSW will support up to 83,000 jobs and $25 billion per year in economic output by 2030, while also delivering investment in critical coastal infrastructure. This pipeline of projects is considered sufficient to trigger large manufacturing investments; however, reducing the area with vessel transit lanes will reduce the overall economic benefit that will be realized.

Comment Number	Comment
	A reduction in the WEA jeopardizes the project's economic potential and undermines public sector investment. BOEM has entered long-term lease contracts with developers and received lease payments in return for material use of the defined areas in the ocean. Reducing the WEA in a substantial manner results in unstable public policy and creates market uncertainty. A substantial material change in the WEA could lead to re-evaluation of the private sector infrastructure investments. This could ultimately affect the United States or any state's (with an OSW policy commitment) ability to secure the supply chain and facilities required to create jobs and develop the OSW industry.

Response to comments: SFW has described their project as a ranging from 90 MW to 180 MW. Based on the analysis, BOEM believes the project can provide the energy levels within the proposed range under any of the Action Alternatives.

Comment theme: Port modification.

Associated comments

Table I-285 provides the full list of comments received as part of this comment theme.

Table I-285. Port modification comment.

Comment Number	Comment
363-93	The DEIS fails to consider economic, social, and environmental impacts to regional ports. BOEM does not provide justification for the following statement: "Modifications of these ports specifically for the Project are not anticipated." It is unclear why no port redevelopment would be needed at any of the ports associated with this project since other projects have required heavy port investments. In many ports, facilities, docks and infrastructure serving the fishing industry are made available at below market rates. There is a finite amount of waterfront space available for water dependent uses. Are there local protections which will preserve and protect those facilities, docks and infrastructure - and the cultural heritage of working waterfronts? The port of New London, Connecticut has been undergoing redevelopment to accommodate the offshore wind industry at the expense of other businesses. The socioeconomic impacts should analyze the number of jobs that could be lost as a result of these redevelopments adversely impacting other industries.

Response to comments: In the Construction and Operations Plan (COP) Table 3.1-5, SFW lists 13 different ports in seven states and Canada that could potentially serve the project for fabrication, assembly and deployment for windfarm components or for crew transfers, logistics, and storage. While they indicated that these ports were under consideration the COP did not indicate that any one of the ports was preferred, nor did the COP indicate that any additional development at the port or ports selected would be necessary.

Comment theme: Cost-benefit analysis.

Associated comments

Table I-286 provides the full list of comments received as part of this comment theme.

Table I-286. Cost-benefit analysis comments.

Comment Number	Comment
172-4	This project results in the highest cost power to rate payers anywhere in the state of New York and is only being paid by the rate payers of Suffolk County. Sunrise Wind is being paid by all the rate payers of the State of New York. Combining South Fork Wind with Sunrise Wind would result in a reduction in power cost to Suffolk County rate payers. It would also provide savings for the developer by eliminating the need to build and pay for a new onshore transmission route and the additional Sub Station adjacent to Cove Hollow.
294-13	The DEIS does not contain any cost-benefit analysis of the Proposed Project. This is inconsistent with current CEQ regulations. Recent revisions to NEPA analysis now require BOEM to include analysis of economic benefits of the Proposed Action. We do not see such an analysis in the DEIS. According to wind speed data from NOAA Buoy 44017 and compared to the power demand on the South Fork of Long Island, the proposed Project will deliver output during times of lowest energy demand during the winter months and will produce virtually no power at the peak energy consumption times during the summer months. This would not seem to produce an economic benefit. The DEIS does not compare the cost of that electricity to the cost of current electricity in the area or other energy available to the area. It also does not analyze these costs in light of costs to other ocean users, such as the fishing industry, through estimated gear loss or loss of fishery access, loss of seafood production, etc. This analysis should be completed cumulatively as well as on a Project specific scale. BOEM must include a factual cost benefit analysis, including economic benefits of the Project, as part of the DEIS, in accordance with NEPA.
152-1	Has anyone done harmful cost feasibility, meaning the cost to fishermen not being able to fish, the harm the wind project will do to the ocean and its inhabitants, the cost to maintain these turbines, the poison that will have to be sprayed on them to deice them, the cost of the lease, the cost to the electric companies that will charge customers more than they are paying now, can actually call this green energy?
307-2	Neither have we been able to find cost benefit analysis that has any conclusive evidence supporting offshore wind energy as the least costly of renewable energy options. In fact what little I have seen suggests that we should place the wind turbines on land if we are going to develop a commodity with the least cost to the consumer. I concur. The only reason that there is resistance to land base.is many people who own property do not want to see wind turbines from their houses.
307-5	Provide transparent information an analysis on the cost benefit of offshore wind energy vs. land based wind energy and other forms of sustainable energy.
169-26	The DEIS's and BOEM's assumption that the No Action will have no net effect on onshore renewable energy generation, economic benefits or climate benefits contradicts fundamental economic principles. Significant changes in renewable energy supply will affect renewable energy's price and, therefore, consumption and emission levels. The DEIS and BOEM fail to analyze how electricity from the Project directly competes with other renewable energy resources in electricity generation, such that increasing the supply of offshore wind results in less American renewable energy generation on-shore, particularly solar electric generation. The DEIS and BOEM also ignore how overall greenhouse gas emissions and climate impacts will vary among substitute sources of renewable energy generation. The DEIS and BOEM should have—and easily could have—evaluated the No-Action Alternative's climate effects. i. Basic Economic Principles Provide That Any Significant Change in Supply Will Change Price and Demand and, Therefore, Total Generation and Emissions. The basic economic principles of supply and demand provide that significant changes in renewable energy supply will affect renewable energy's price and, therefore, consumption levels. Increasing the supply of any normal good (including renewable energy) puts downward pressure on that good's market price; this is a basic tenant of the law of supply and demand. N. Gregory Mankiw, Principles of Economics 74–78, 80–81 (5th ed. 2008). Lower renewable energy prices can result in lower electricity costs, which in turn encourages higher levels of electricity consumption, while higher renewable energy and electricity prices discourage consumption. See id. at 67–68. [Footnote: A court may take notice of basic economic principles of supply and demand, as well as classic economic textbooks and peer reviewed articles. See Citizens for Alternatives to Radioactive Dumping v. U.S. Dep't of Energy, 485 F.3d 1091, 1096 (10th Cir. 2007) ("In dealing with scientific and technical evidence, extra- record evidence 'may illuminate whether an [environmental impact statement] has neglected to mention a serious environmental consequence, failed adequately to discuss some reasonable alternative, or otherwise swept stubborn problems or serious criticism . . . under the rug.'") (alterations in original).] Approving the proposed Project increases the supply of offshore wind generated electricity, lowering demand for U.S.-based onshore renewable energy generation. Alternatively, in the No-Action Alternative, the demand for U.S.-based onshore renewable energy generation would be higher; and unlike the proposed Project's effects in the first ten or longer years, U.S-based onshore solar electric generation would reduce greenhouse gas emissions and overall climate effects.

Comment Number	Comment
	Similarly, in the No-Action Alternative, the higher demand for U.S.-based onshore renewable energy generation would result in increased economic benefits for the United States, as compared to the proposed Project's economic benefits. The Project is one of many projects in process of approval through which offshore wind energy producers intend to decimate U.S. onshore renewable energy producers and other generators in the United States, including Allco.... Electricity from the Project directly competes with other forms of renewable energy resources in the generation of electricity. Economists measure how coal, natural gas, and other fuels act as substitutes in the electricity market by analyzing "cross-price elasticity" (that is, how responsive producers are in swapping inputs when relative prices change). See Mankiw, supra at 99. For example, the United States Energy Information Administration ("EIA") found that for the U.S. market, a ten-percent increase in the ratio of the price of coal to the price of natural gas leads to a 1.4-percent increase in the use of natural gas over coal. EIA, Fuel Competition in Power Generation and Elasticities of Substitution 1 (2012). In other words, in that example, the cross- price elasticity of demand for natural gas is 0.14 with respect to coal's price. Id. Other economists reach similar conclusions. James Ko & Carol Dahl, Interfuel Substitution in U.S. Electricity Generation, 33 APPLIED ECONOMICS 1833, 1835 (2001) (analyzing "average" cross-price elasticity). See also Nate Blair et al., Long-Term National Impacts of State-Level Policies (Nat'l Renewable Energy Lab. Conf. Paper 620-40105, June 2006) (discussing how "higher coal prices would dramatically increase" use of renewable wind energy). These estimates represent short-run elasticities; over time, substitution effects become more pronounced as power plants make technological changes that facilitate fuel-switching, and as long-term investments favor renewable energy. See Mankiw, supra at 105–106. Changes in the relative amounts of coal, natural gas, renewable sources, and nuclear energy used to generate electricity—as well as changes in total energy demand—would, in turn, change total greenhouse gases emissions. In short, the DEIS' unexamined and unsupported assumption that the No-Action Alternative would have no effect on onshore solar energy is contradicted by fundamental economics and market analyses. The DEIS fails to meet NEPA's requirements, and should be revised. If the Project is not approved, utilities in the Northeastern US will acquire other renewable energy production to satisfy their respective renewable energy goals and standards, and therefore, lower greenhouse gas emissions. In the No-Action Alternative, any renewable energy substituting for the Project may provide a more positive impact on emissions and climate change. Yet, the DEIS does not analyze this environmental impact in its alternatives analysis.
169-11	The DEIS on page 3-130 is just one example of the No Action Alternative focuses being flawed. "The assessment of impacts of future activities on demographics, employment, and economics in the analysis area under the No Action alternative primarily focuses on the potential employment from reasonably foreseeable future offshore wind projects." Again, BOEM is missing the mark and only narrowly including reasonably foreseeable future offshore wind projects and ignoring other valid and foreseeable sources of renewable energy. If the proposed Project does not occur, it is foreseeable that the state demand for renewable energy would be met with onshore wind and solar, and that future off-shore wind facilities would not be approved.
316-6	While we understand the goals and timelines laid out by the BOEM process, there is still a lack of transparent information on power generation, pricing and economic impacts. The document states "DWSF's goal is to fulfill its contractual commitments to Long Island Power Authority pursuant to the power purchase agreement executed in 2017." This information appears to relevant to the range of alternatives being considered, but the total generation capacity of the project is nowhere in the document. This information would help identify the number of turbines necessary to meet the capacity goal. It also could impact cabling, site layout and many other possible issues including impacted habitat.
343-5	On March 29, 2017, the New York Office of the State Comptroller ("NYOSC") valued the South Fork PPA at $1,624,738,893. This valuation is based on total projected energy deliveries throughout the contract term (20 years) of 7,432,080 MWh (see Motion to Reopen Evidentiary Record – Supplemental Information (filed: January 29, 2021), Exhibit K - NYS Comptroller $1,625 Billion valuation). The price for energy from the Applicant's proposed facility, therefore, is $218.61/MWh or 21.9 cents per kilowatt-hour (c/kWh). This is 34% greater than what ratepayers have been told (LIPA has publicly advertised a price of 16.3 c/kWh (for its 90 MW facility). The price of 21.9 c/kWh is also nearly three times the price of energy (8.1 c/kWh) from Sunrise Wind. This extremely high price for the Applicant's energy has been concealed from ratepayers who, in the end, will pay the price, in more ways than one. By comparison (on October 23, 2019), Ørsted A/S announced a power purchase agreement for Sunrise Wind with a price of only $80.64/MWh. If the same amount of energy (i.e. 7,432,080 MWh) was purchased from Sunrise Wind instead of South Fork Wind, it would cost only $599,322,931, which is $1,025,415,958 less expensive.
343-6	Furthermore, the NYSPSC refused to address how the Applicant came by securing its power purchase agreement ("PPA"). Astonishingly, the New York Office of the State Comptroller ("NYOSC") approved the PPA pursuant to a non-competitive opaque procurement process where the company administering the procurement, PSEG Long Island, awarded the PPA to its (undisclosed) New-Jersey-based business partner (indirectly through wholly-owned subsidiaries of its parent company), Deepwater Wind. It just happens that the contract award is more than two-and-a-half-times more expensive ($1.025 billion) than the same amount of renewable energy from an offshore lease area (Sunrise Wind lease area OSC-A 0487) only three miles away from the South Fork Wind lease (OSC-A 0517). This situation is offensive to all ratepayers, taxpayers, and law-abiding residents.

Comment Number	Comment
360-24	The DEIS also fails to directly connect the benefits of planned offshore wind projects to the challenges many coastal states face due to the imminent retirement of aging fossil-fueled and nuclear-fired generation facilities. For instance, Independent System Operator-New England (ISO-NE) data shows that from 2013 to 2022, 5,000 MW of thermal (fossil and nuclear) generation will have retired; and another 5,000 MW of fossil generation is at-risk. The New York Independent System Operator indicates that by 2028, over 8,300 MW of thermal capacity in New York will be at or past the retirement age for 95% of similar units. At that point, nearly 5,000 MW of New York steam turbine capacity will be over 62.5 years old, while over 3,000 MW of gas turbines will be at least 46 years old—well past retirement age. The planned offshore wind projects covered in the DEIS are well-suited to replace these conventional resources as they retire. The capacity factor for offshore wind has steadily increased over time. Offshore wind is readily deliverable to coastal states with retiring fossil or nuclear generation and can be deployed at a scale comparable to the retiring resources. While offshore wind is an intermittent resource dependent upon daily and seasonal changes in wind speed, modern turbine designs and forecasting methods allow output to be reasonably predicted hours or days in advance, and grid operators have the tools to efficiently balance offshore wind with other resources when necessary. Large-scale offshore wind farms are today approaching a 50% capacity factor, and next-generation projects will surpass this threshold. Planning, procurement, and deployment of offshore wind will ensure that electric reliability is maintained as older thermal units retire. Finally, wind strength in any given hour will vary among the identified lease areas, resulting in regional energy diversity benefits as additional offshore wind projects are added (i.e., geographic diversity mitigates intermittency). Additionally, because wind is a zero-marginal cost resource, development of the projects covered in the DEIS (particularly the replacement of older, higher-marginal cost units) will tend to reduce energy prices in the New England and Mid-Atlantic regions—which are the highest in the lower 48 states. As a zero marginal-cost resource, offshore wind bids into the market close to or at zero dollars. This allows offshore wind to almost always clear, and to displace higher cost generation resources, lowering the market-wide clearing price. For example, an evaluation of the US Wind and Skipjack offshore wind projects proposed in Maryland found the projects would lower wholesale energy prices by $0.64-$0.71 per megawatt-hour (MWh) and lower capacity prices by $0.93-$1.26/MWh. These price effects result in lower electricity prices for consumers across the region, and would be the case for other offshore wind projects in other regions as well. For instance, the April 2018 Lawrence Berkeley National Laboratory (LBNL) report found: “Similarly, low-marginal-cost offshore wind also reduces wholesale electricity prices by displacing the highest-cost marginal generating units from the bid stack. When translated to an equivalent consumer benefit per-MWh of offshore wind, we estimate this ‘merit order effect’ to be more than $25/MWh averaged over 2007–2016 in all three ISO regions, and significantly lower in the states south of the PJM [the Mid-Atlantic electric grid operator] region.” In addition, a January 2020 technical report by the National Renewable Energy Lab found deployment of 7 GW of offshore wind in New England would result in “a reduction in locational marginal price of 11%, with production cost savings of up to 18% compared to the 0 GW scenario.” December 2018 analysis published by ISO-NE found that if offshore wind been available during the preceding cold snap in New England, it could have reduced system costs by up to $85 million, locational marginal prices by up to 13%, and carbon emissions by 11% over that period. Moreover, the Commonwealth of Massachusetts has determined that the South Fork Project will save ratepayers around $1.4 billion in energy costs over its lifetime. Providing businesses and citizens with lower-cost energy will be a key to economic recovery.
363-86	Finally, fishing companies require stable and affordable electricity to provide food security. Like all food production facilities, fish processor businesses in particular rely on refrigeration and mechanical operations to store and produce food products. Lack of information regarding OSW’s potential impacts on the stability and price of energy prevents the opportunity to generate informed comments as to the full impact of OSW to these fish processing businesses.
363-87	There is little peer-reviewed information regarding the costs and benefits of OSW. Most of the information in the public domain is generated by OSW developers or trade associations and based upon information deemed confidential so that it cannot be verified. Rather than provide unbiased evaluations of project costs, the DEIS includes no details whatsoever of project price or overall economic considerations, in violation of 40 C.F.R. § 1502.16(a)(10). The true ecological cost of OSW is site specific. The DEIS appears to treat the overall SFWF project cost and the contract price for the power purchase agreement as confidential (presuming that is the reason they are not included in the DEIS). However, without knowing these factors, the amount of federal, state, or local taxpayer subsidies devoted to the project, projections of the full cost to ratepayers (including the contract price in addition to any predictions of project contingencies or overages), and portion of project costs that will accrue to foreign markets, the public cannot make even a basic informed evaluation of the project’s desirability or whether any adverse and irreversible environmental impacts are worth the overall project benefits.

Comment Number	Comment
363-88	OSW appears to have widely different costs and benefits as compared to other renewable power sources. A comparison of costs of OSW to onshore wind back in 2009 concluded that onshore wind was more cost effective at that time, although improving technology may change that in the future. A more recent review of the cost of alternative energy sources to fossil fuels identified onshore wind as one of the cheapest options; OSW remained one of the most expensive. Consideration of alternative renewable energy sources instead of OSW is, strangely, readily dismissed in the DEIS as “not technologically and commercially feasible at this time.” In fact, multiple technologies exist at commercial scales that may have relative benefits in comparison to OSW. Depending on site-specific conditions, technology that may be inappropriate in one area due to unreasonable conflicts or environmental conditions may be the most desirable in another. For example, in California, the State Groundwater Management Act required certain farmland to be fallowed during drought conditions, leading to a potential opportunity for location of agrivoltaic solar projects. We do not know if similar examples exist to meet renewable energy goals in New York; regardless, a comparison of relative costs and environmental impacts of alternative technologies should be included in the DEIS.

Response to comments: Section 3.5.3.2.2 of the FEIS describes energy generation of future offshore wind activities under the No Action Alternative. Table 3.7-1 in Attachment 3 of Appendix E describes energy generation of future non-offshore wind activities under the No Action Alternative. Table 2.1.1-1 in Section 2.1.1 describes the potential electrical generation range of the proposed Project. A comprehensive forecast of impacts to energy supply and ratepayer costs under the proposed Project and alternatives depends on numerous variables beyond the scope of the EIS.

Comment theme: Impact to local tourism.

Associated comments

Table I-287 provides the full list of comments received as part of this comment theme.

Table I-287. Impact to local tourism comment.

Comment Number	Comment
363-141	Finally, the DEIS must evaluate whether the local tourism industry and associated jobs would be impacted by OSW. Working waterfronts and associated touristic activities include watching offloading of fish catch, eating at local fresh fish restaurants, watching fishing gear being mended, and interacting with memorable commercial fishermen. BOEM should consider changes to the working waterfront that may occur with the loss of these activities, whether or not these areas would lose their draw to tourists, and any associated or cascading economic losses to the town(s) impacted by OSW vessels replacing fishing boats.

Response to comments: Section 3.5.8 describes the impacts of the Proposed Action and alternatives on tourism in the geographic area of analysis.

Comment theme: Availability of the local workforce.

Associated comments

Table I-288 provides the full list of comments received as part of this comment theme.

Table I-288. Availability of the local workforce comments.

Comment Number	Comment
287-5	Some may argue that this facility will bring jobs into Montauk. As a business owner I will attest that I, and a lot of other local businesses, have plenty of jobs to offer but unfortunately there is a limited workforce due to the lack of affordable housing to fill those job opportunities.
281-2	Ørsted/Eversource and Long Island Labor Outreach and Engagement Deepwater Wind South Fork, LLC, also referred to as Ørsted/Eversource, has committed to working with Long Island Labor by using contractors who have Project Labor Agreements with the Building and Construction Trades Council of Nassau and Suffolk Counties and investing in our local workforce with a $10 million Offshore Wind Training Center. In addition, Ørsted/Eversource is investing in Port Jefferson and East Setauket with operations and maintenance facilities that will create hundreds of long-term jobs for Long Islanders. This project has set the stage for offshore wind developers to work in conjunction with organized labor. Labor unions offer world-class training programs through apprenticeships. By coordinating with industry, we will continue to lead and train the offshore wind workforce of the very near future.

Response to comments: Thank you for your comment. The Construction and Operations Plan (COP) provided by SFW indicates it is considering either Quonset Point in North Kingstown, Rhode Island, or Montauk/East Hampton, New York as its base for Operations and Maintenance. Both options are considered in estimates of operations and maintenance jobs that could be expected with the project. Additional assumptions regarding the estimates of jobs and income used in the FEIS are found in Appendix F in the section labelled "Assumptions Regarding Local Hiring Practices." Further, it is noted in Section 3.5.3.2.3 of the FEIS that estimates of jobs expected to be generated by the project are "local” jobs in the state (or states) associated with the project.

Comment theme: Economic impact to the fishing industry.

Associated comments

Table I-289 provides the full list of comments received as part of this comment theme.

Table I-289. Economic impact to the fishing industry comment.

Comment Number	Comment
363-139	Furthermore, the analysis of the input/output models, such as the JEDI-OWM used in the DEIS, does not account for gross employment impacts, including the displacement of other industries. The DEIS does not attempt to predict how many fishing jobs will be lost or otherwise impacted due to this new ocean use, which may occur based on a number of reasons including resource impacts, displacement, induced management changes, insurance cost and availability, increased operational costs from factors such as transit time, market impacts, fuel and so on. In previously submitted comment letters, RODA has also referenced several items that were not considered at the time, such as calculations of shoreside impacts to fisheries, and these remain unaddressed. We maintain that the economic importance of fishing, and economic losses associated with loss of fishing grounds and indirect effects have been systematically underrepresented, both in this DEIS and throughout the OSW development process.

Response to comments: The impact analysis in Section 3.5.1.2.3 of the FEIS concludes that the majority of vessels engaged in commercial fisheries and for-hire recreational fishing would only have to adjust somewhat to account for disruptions due to impacts from the proposed Project. Few, if any, fishing jobs are expected to be lost or otherwise adversely affected due to the proposed Project. In addition, BOEM is open to working with state partners and the commercial and recreational fishing industries to investigate alternative strategies to negotiate compensatory mitigation agreements. South Fork Wind, LLC has negotiated with the State of New York, the State of Rhode Island and the Commonwealth of Massachusetts to determine compensation packages for fishermen.

Commercial Fishing

Comment theme: Cox Ledge.

Associated comments

Table I-290 provides the full list of comments received as part of this comment theme.

Table I-290. Cox Ledge comments.

Comment Number	Comment
132-1	My comments today are in reference to the EIS of just one of those locations, the South Fork site, to be developed by Orsted in an area known as Cox (Coxes) Ledge. Cox Ledge is an important area of ecological activity. The Cox Ledge sea bed comprises a glacial moraine and as such is the most unique and important habitat in all of the wind farm development areas. It is an area of known spawning activity for Atlantic codfish, squid (Doryteuthis pealeii), surf clams, sea scallops and other marine life. In the words of the EIS: “The SFWF overlaps Cox Ledge, an area of concern for fishery managers because it provides important habitat for commercially important species, including spawning habitat for Atlantic cod (Gadus morhua).” The area is recognized as essential fish habitat for a number of federally managed fish species. The Cox area is undoubtedly a significant commercial and recreational fishing area. However, I believe it is more important outside its physical boundaries than within. Because Cox is an area of unique habitat and is a spawning site for numerous commercially and recreationally important species Coxs has importance that spreads beyond the Ledge. It is because Cox Ledge is such a regionally important area of habitat that I have concern that this area is being developed for wind energy. The disruption to this habitat caused by construction (noise and sediment disruption from both pre construction surveying as well as construction), operation and dismantling will have an adverse impact on numerous species that inhabit the area for any stage of their life cycle. Construction itself is supposed to take approximately two years. According to the EIS: “Atlantic cod and squid are known to spawn in the area of direct effects. Recent studies on the behavioral impacts of pile-driving noise on black sea bass and longfin squid have shown behavioral responses to elevated underwater noise, but behavior returns to a pre-exposure state after the cessation of the underwater noise”. Additionally, there is expected to be sediment disruption during construction which will also impact animal behavior. This disruption will translate into reduced landings activity by fishing vessels in the area. More importantly, what happens when two years of spawning activity of any species are lost? Not only does that species sever its productivity in an area but so do all the species, predator and prey, that rely on it. There is a cascade effect to the regions ecological and economic webs that cannot be calculated here save that it will be adverse. This reduction will impact the economic activity of shoreside processors like Sea Fresh. This means reduced purchases and sales, reduced staffing and ultimately reduced value of the firm itself. Cox Ledge as an area of essential fish habitat has a biological and hence economic impact that spreads well beyond its relatively small geographic footprint. As such, disruption of this area through construction, operation and dismantling of the Orsted South Fork wind farm will have an ecological and hence economic impact far greater than is outlined in this EIS. It is for this reason that I am in opposition to construction of a wind farm on or around Cox Ledge.
144-18	Section 3.5 Socioeconomic and Cultural Resources includes a lengthy discussion of Commercial Fisheries in the general area and the potential for impacts to commercial fisheries operations by the Proposed Action. It even includes a brief discussion of For Hire recreational fishing in the form of Charter and Party boat operations, but does not even mention Private Recreational Fishing or the impacts that the Proposed Action will have on this sector. Cox Ledge is an area that is of critical importance to recreational fishing for boats from RI, MA, CT and NY. The failure to even consider the extreme harm that the Proposed Action may have on this major fishing industry is a flaw that requires rewriting of the DEIS.

Comment Number	Comment
154-4	Inadequate Information: Assessment of Impacts on Recreational Fishing RIFAB members are disappointed to see that the DEIS essentially follows Orsted's approach of omitting any effective outreach to the recreational fishing industry in the process of evaluating recreational fishing impacts. Contrary to statements in the COP and in the DEIS, the building of a wind farm on Cox's Ledge is likely to be quite harmful. Minor beneficial effects that are modeled off of Block Island experience are extremely unlikely to replicate here. The DWSF area (Cox's Ledge) is a key fishing area for both charter and party boats and for private recreational anglers, and is arguably the most important such area for RI recreational fishing in all of Rhode Island Sound. People travel from all over to fish this particular area for Atlantic cod and other bottom fish, and to engage in sport-fishing of highly migratory predator species such as sharks, tuna and mahi-mahi. Charter companies advertise this particular area to attract customers, and there is a 60-year history of charter fishing here. The area is fished year-round by charter boats, but with approximately 75% of trips occurring between Memorial Day and Labor Day, and an even higher percentage of summer trips for private anglers. Orsted takes the position that the absence of records for private recreational fishing in the area of DWSF is a valid reason to totally eliminate this fishing community from consideration. This position will devastate the private recreational fishing industry. The developer needs to include an evaluation of this very significant existing use of the area. The New England Fisheries Management Council (NEFMC) Atlantic Cod Stock Structure Working Group has recently concluded that there is a distinct New England stock of cod that has essential habitat and spawning grounds on Cox's Ledge and aggressive management efforts from the early 2000's are causing a resurgence of cod. The most productive way to fish for Atlantic cod is to drift across the area picking fish from the various bottom structure in this area. Charter vessels range in size from 30 to 110 feet and the presence of WTG structures will impede the ability to drift through the area. This is especially true for the 100-foot party vessels that do the majority of fishing on Cox's Ledge. Drift-style fishing cannot likely co-exist with the presence of wind turbines, and this extends not only to the immediate project lease area but to a number of productive fishing areas surrounding the DWSF lease. As an alternative to drifting, when the weather is more severe, charter boats will anchor on a particular spot and try to draw the fish to their boats. This is an exact science and a slight miss will result in low catches. Trying to navigate around large structures to find the right place to anchor will be difficult. It is not clear we will even be able to anchor charter boats close to the structures which means that we will be losing some ground permanently. In addition to navigation issues preventing productive cod fishing, there is also a concern about structural habitat changes induced by the turbines. Recent academic articles have stated that recreational fishing has benefited on Block Island due to artificial reef structures forming on the turbine foundations and increased colonization of the area by blue mussels and black sea bass. Those articles' findings do not extend to Cox's Ledge because black sea bass is an inshore fishery. Recreational anglers and charters go far offshore to Cox's Ledge because of cod, and no one is willing to make the trip for black sea bass, which can be caught much more cheaply and much closer to home. In the case of recreational anglers, this has substantial implications for shoreside gear expenditures, because a sea-worthy vessel is not needed to catch black sea bass the way it is for cod. Colonization by black sea bass would destroy recreational fishing in the area. Outside of Atlantic cod, one of the primary reasons Cox's Ledge is so important for fishing is that it attracts and feeds many baitfish. This occurs because Cox's Ledge rises up from about 160 feet in the surrounding area to about 110 feet on top. Since the tidal currents run primarily east and west, when they hit the Ledge, nutrient rich bottom water is pushed up closer to the surface where phytoplankton grow from these nutrients and the food chain starts to "bloom." The baitfish eat the plankton and the highly migratory predator species then move into the area to eat the bait. This cycle occurs all season long but disturbance of the ecosystem on Cox's Ledge will change this balance, at least based on observations from the area around the BIWF during their 2-year construction period. It is not known when or if this natural balance will return once construction is complete. Like cod fishing, sport-fishing for predator species relies on drifting, but it relies on even longer uninterrupted drifts with a scent trail lasting for miles. Once a fish is hooked, substantial maneuvering room is required to chase and fight the fish without obstructions. It is very common to end up 3 to 5 miles or more from the point where you hooked a tuna before it is brought to the boat to be gaffed. The presence of a grid of wind turbines will prevent this type of fishing entirely.

Comment Number	Comment
379-4	David Monti: Research in the area now includes gill net, fish trap, beam trawl, pot surveys, acoustic telemetry, and biological cod and collegiate fish studies. It is a robust fisheries research and monitoring plan, the kind every wind farm should have to measure positive and negative impacts. And yes, I said positive impacts, because I and other anglers believe offshore wind farms will have a major positive impact on habitat and fish. A peer-reviewed study in European wind farm relates greater fish abundance inside wind farms, than outside the wind farm areas in controlled areas. And at the Block Island Wind Farm, which I know something about because I fish it, recreational fishing there is good, perhaps even a bit better than before the wind farm, even though fishing pressure in the area has increased 200%. There is now even striped bass, and bluefish are being targeted at the wind farms, in as well as Scott black sea bass, tautog and nearby fluke and cod is caught there, as well as in many other areas outside Cox's Ledge. Spear fisherman dive on the pylons, and rod-and-reel anglers are now using eels to target large striped bass. At the Block Island Wind Farm, commercial gillnets, pots, trawlers, and recreational fishermen all fish in the area, as it should be. In my opinion, fishing should be enhanced at Cox's Ledge too, with this enhanced reef effect. Another deficiency related to this in the DEIS that it relates the reef effect of foundations and associated scour protection is expected to have a quote, negligible-to-minor beneficial impact, unquote. Based on studies in Europe in the Block Island Wind Farm the reef effect will have a major positive impact. This should be changed. In fact, colleagues have recommended adding scour protection to enhance habitat in fish at the pylons, pylons, excuse me.
283-2	New leases should only be granted in areas where there will be little to zero conflict with fishing and shipping. The decision to site the South Fork Wind Farm on Cox's Ledge is incredibly irresponsible and will be damaging to an area that is Southern New Englands most vital ground for Cod and many other important recreational and commercial species. It's a fact that area in the English Channel and North Sea have seen their Cod fishery adversely affected by wind farms. Damage to our nations ability to harvest a food source should not to supplanted by what is a short lived, expensive, and unreliable energy source.

Response to comments: As described in Section 3.5.1 of the FEIS, after BOEM held a lengthy stakeholder and scientific review process a large portion of Cox Ledge was excluded from leasing, thereby helping protect these fishing grounds from future offshore wind energy development. Given the distance of the proposed Project from shore and its small offshore footprint, BOEM concluded that the impact to recreational fisheries would be negligible to minor.

Private recreational fishing is addressed in Section 3.5.8 of the FEIS, which refers the reader to Table 2.3.1-1 of the FEIS and Section 3.5.8 of Appendix H.

Comment theme: Fishing industry outreach.

Associated comments

Table I-291 provides the full list of comments received as part of this comment theme.

Table I-291. Fishing industry outreach comments.

Comment Number	Comment
310-31	Coordination with the fishing industry is required if any fixed gear will be removed along the cable route as part of the process of removing obstructions and debris prior to cable laying.
310-33	The final method for cable installation is not fully described, and we presume could include a period of time when cable is exposed on the seafloor. Such cable exposure will impact fishermen who will be unable to fish the area while the cable is exposed. Additional information clarifying the potential size and length of closure periods for the various cable laying methods (e.g., simultaneous lay and burial versus laying and then burying the cable), as well as how they will be communicated with fishermen, is needed.

Response to comments: As described in Section 3.5.2.2.3 of the FEIS, SFW would communicate in advance where and when construction activities for the proposed Project would be scheduled to take place. In addition, Table G-1 in Appendix G states that a comprehensive communication plan would be implemented during offshore construction to inform all mariners, including commercial and recreational fishermen, and recreational boaters of construction activities and vessel movements. Communication would be facilitated through a Fisheries Liaison, a Project website, and public notices to mariners and vessel float plans (in coordination with USCG).

Comment theme: Cable placement, scour protection, and boulder relocation.

Associated comments

Table I-292 provides the full list of comments received as part of this comment theme.

Table I-292. Cable placement, scour protection, and boulder relocation comments.

Comment Number	Comment
380-27	Meghan Lapp: One of the examples of that is the impact to commercial fishing that is going to result from cables. There's going to be a cable that is extremely long that's going to go from offshore Rhode Island to New York as a result of this project, but when you read the analysis on the cable section, it talks about that there's, I believe it was up to 5%, armoring necessary on the cable, but that didn't include the seven cable crossings, where the cable would probably need to be armored on the way from offshore Rhode Island into New York. Those areas are fished by my commercial fishing vessels, which will not be able to fish on top of cable armoring because it will destroy their gear. And so the fact that the DEIS doesn't even have an analysis of, if it's going to require how much cable armoring it's going to require on seven cable crossings is, is, is seriously inadequate. It's very inadequate analysis.
338-48	59. The analysis should clarify how access to the SFEC during O&M activities would be negligible, even with the addition of cable protection measures that could potentially make areas along the SFEC unfishable to bottom-tending gear, as exampled with the Block Island Wind Farm project. Secondary cable protection measures are also mentioned as a mitigation measure that would improve fishing access. However, this statement is incongruous with feedback from the fishing community."
294-7	One of our major concerns is virtually unaddressed. Seafreeze vessels, as small mesh bottom trawl vessels, must avoid any type of bottom structure, boulders, concrete, etc., that would damage or destroy our nets/gear and potentially cause dangerous hangs from which the vessel may be unable to disentangle safely. The DEIS acknowledges the potential economic loss associated with offshore cables, but the 2020 revised COP itself does not even have an estimate for how much of the 139-mile export cable itself will be armored. Our vessels and customer vessels fish with bottom trawls in the area of the 139-mile export cable. Therefore, this impact is important to our business. The DEIS states that 2% of the offshore South Fork export cable will be covered with “articulated concrete mattresses or rock placement” and that of 7 cable crossings. However, the COP states that up to 5% of the South Fork export cable will be covered with concrete or rock placement, and that this 5% does not include the 7 identified cable crossings or any sensitive cultural or archeological areas where cable burial will not be able to occur. The COP also includes areas where “boulder relocation may occur and/or where secondary cable protection may be needed.” Clearly there is discrepancy between the COP and the DEIS. It is also clear that there is no total or final number of how many miles or what locations of the cable will require cable matting/rock placement. Therefore, fisheries impacts cannot be analyzed. We have asked developer representatives for numerous years which cable crossings of this export cable would require armoring. If the project is now requesting final permitting approval and this aspect is still unknown, the project should not move forward. This is a basic project parameter that should be known after years of surveying. Additionally, “boulder relocation” is a terrifying term for bottom trawl vessels for the reasons stated above. Any boulders that are necessary to relocate must be removed entirely by the developer rather than indiscriminately scattered on what may be valuable fishing grounds. The developer should not be permitted to cause additional hardship on vessels already negatively impacted by the project simply for project convenience. BOEM must obtain final numbers and locations of cable armoring prior to any permitting approval. The COP cannot say one thing and the DEIS another. Boulder relocation should not be permitted and any permit holder should be required as a permit condition to permanently remove, not relocate, any problematic boulders. This provision should also be enforced, subject to fines or disciplinary action on any permitted entity.
166-30	The occurrence of complex, hard bottom habitats underlies the project area’s importance to recreational fishing. Appendix H mentions the relocation of approximately 255 acres of boulders that are encountered along the inter-array and export cable routes (page H-75). This process is described in the COP as involving a “dragging technique that would have similar impacts as trenching” (page 3-19). Relocation of boulders for cable laying will cause disruptions in recreational fishing activity (private and for-hire), as it could take several trips to find their new locations. While the relocated boulders may continue to attract recreational fishery species, relocation is not a negligible impact. Detailed reporting on where boulders are moved to, as described in Appendix G, Table G-2, should be required as a mitigation strategy.

Comment Number	Comment
157-10	OUTTER [sic] CONTINENTAL SHELF LANDS ACT SUBSECTION 8(p), ALTERNATE ENERGY-RELATED USES ON THE OUTER CONTINENTAL SHELF – REQUIREMENTS OF SUBSECTION (4) In addition to providing the authority to issue leases, easements, and rights-of way, the EPAct includes requirements that any activity authorized under this authority must be: carried out in a manner that provides for- (I) prevention of interference with reasonable uses (as determined by the Secretary) of the exclusive economic zone, the high seas, and the territorial seas; Determining the spatial operational needs of the fisheries that operate within and around the WEA is a complex endeavor that must be undertaken in order to determine if the operation of a WEA will interfere with commercial fishing. Simply allowing commercial fishing is not enough. Those in the commercial fishing industry know all too well that the advancement of the offshore wind industry, to the scale being proposed and is now reasonably foreseeable will devastate many fishing industry companies and result in many job losses. Analysis of the impacts from added scour protection has not been analyzed. Additional scour protection will further limit commercial fishing using bottom tending mobile gear. The possibility of gear hanging up on scour protection, or cable protection (rock or concrete) that ends up being used for sections of the interarray cables, will further preclude fishing operations.
294-8	Cables and fishing safety, as well as economic losses are a concern for our vessels. The DEIS acknowledges the “entanglement and damage or loss” of commercial fishing gear, but does not discuss the impacts to fishing vessel safety should a vessel become hung up or snagged on underwater infrastructure, including cables. In such cases, the vessel can become virtually disabled and/or capsize under certain conditions. While the DEIS discusses the disproportionate affect on bottom trawl vessels and the potential to interact with cables, it still only estimates that long term impacts will be only minor to moderate “due to the potential for gear damage or loss from the Project” due to the “small offshore footprint of the SFWF and offshore SFEC”. A 139-mile export cable is not small. Furthermore, it does not assess the Project impacts or cumulative impacts from all potential buildout, particularly in the region of the South Fork Wind Farm lease area, from a safety perspective. This is particularly important for bottom tending gear vessels, and is in line with the Department of Interior legal memo dated December 14, 2020, which states that interference with fisheries must be interpreted based on the perspective of the fishing user and based on cumulative interference. In the U.K., the only European country which allows commercial fishing inside of wind farms, mobile gear fishing does not occur where cables are present. This is due to potentially fatal interactions with the cables themselves. The below notice to U.K. fishermen from offshore wind developer DONG Energy (now Orsted, the developer requesting a permit for the South Fork Wind Farm) and the Kingfisher Information Service, a fisheries information service providing fishermen the location of subsurface and subsea hazards around the U.K., reads, “The closer to the surface a subsea cable is lifted when fouled by fishing gear, the more damage there is to the fishing vessel. In the interests of fishing safety and to prevent damage to subsea structures fishermen are advised to exercise caution when fishing in the vicinity of subsea cables and renewable energy structures. Loss of gear, fishing time, and catch can result if a trawler snags a subsea structure and there is serious risk of loss of life.” Another notice to U.K. fishermen, below, as part of the KIS-ORCA (Kingfisher Information Service-Offshore Renewable & Cable Awareness project) states, “Renewable Energy Structures and Subsea Cables are a hazard and fishing over them should be avoided at all times…. Most modern subsea cables carry high voltages which could prove lethal if attempts are made to cut them.” Another notice, below, reads “Due to the nature of some areas of seabed where mobile sediments are found, cables that were buried at the time of installation may become exposed over time, therefore it should not be assumed that all submarine cables are completely protected by burial, as they may become exposed and on the surface.” This contradicts the DEIS assumption that cables buried 4 to 6 feet will remain buried over time. These safety statements made to fishermen in the U.K. are in direct contradiction to the South Fork Wind Farm DEIS, which maintains that the “navigational safety risk assessment prepared for the Project indicates that it is technically possible to fish and transit through the SFWF (DNV-GL 2018).” The ability to fish in and around wind farms and/or export cables is gear specific, and clearly bottom trawl vessels cannot safely fish in the wind farm or over the export cables, even according to material promoted by the developer itself. The DEIS has not calculated this safety risk and merely notes the economic risk, which it asserts is “moderate”. When risk of loss of life is incorporated into this assessment, it is likely to become a “major” impact from the Project alone. As stated earlier, cumulative impacts for all currently leased buildout, was already determined as “major” according to the Vineyard Wind SEIS. As areas where cable burial is possible are soft and therefore mobile sediments, it is reasonable to assume that even cables which are buried at the time of construction will become exposed over time. This is a common occurrence in the U.K., leading to fishery exclusions. Again, the DEIS ignores this dynamic.

Comment Number	Comment
	For example, one Kingfisher Bulletin “Offshore News” 16 November 2017, attached as a part of our comment, includes “Notice to Fishermen” sections where new “Fishing Hazards” areas are highlighted to alert fishermen to newly exposed cables. Such notices include warnings such as “Cable Spans Along Greater Gabbard WF Export Cable; Recent results from the export cable surveys at Greater Gabbard show that there are 8 free-spans which are listed below. Whilst the results continue to be processed, Balfour Beatty have asked that in the interest of safety and the integrity of the cable, extreme caution be used when Fishing near the export cables and that Fishermen refrain from using towed gear across the export cables whenever possible.” Another “Notice to Fishermen” from the same Kingfisher Bulletin states “Fishing Hazard- Gunfleet Sands WF Export Cable (Exposure Update); Recent surveys at the Gunfleet Sands offshore wind farm have illustrated that some array/in field cables are lying exposed on the seabed and are no longer buried and there is one freespan.” Yet another states, “Inter Array Cables- exposed sections; There are some sections of the installed inter array cables that are currently either shallow buried or exposed on the seabed. The shallow buried/exposed sections of cable could represent a significant hazard to fishing vessels and their gear (if fishing gear is deployed over them) and any vessels anchoring over them. Cable hazards will remain until completion of cable protection works planned for Q4 2017 and Q1 2018.” This particular notice to fishermen was first published on December 3, 2015. This means that the exposed cables and associated fishing hazards would be in place for 3 years before remedy was taken. This is similar to the timing of repair of the currently exposed Block Island Wind Farm cables. As such, the area would represent a life-threatening hazard to fishermen for consecutive years in a row. During the entire life of the Proposed Action and all other cumulative actions, inter-array and export cables will present a default exclusion zone for mobile bottom tending gear vessels. Unless the vessel is willing to risk “loss of life.” We believe this is a major impact. The DEIS and all BOEM analysis must therefore consider all inter array cable areas within the wind farm as well as export cable routes a permanent and complete loss of trawl fishing activity and revenue, for both the Proposed Action and cumulative impacts analysis. The DEIS must also acknowledge and analyze the safety issues associated with subsea electrical cables and adjust its impacts analysis accordingly.

Response to comments: As described in Section 3.5.2.2.3 of the FEIS, SFW would reduce the occurrence of accidental snagging of fishing gear by burying all cables to a target depth of 4 to 6 feet beneath the seabed. In areas where seabed conditions might not allow for cable burial, other methods of cable protection would be employed, such as articulated concrete mattresses or rock placement. This additional cable protection would be used for up to 2% of the offshore SFEC, where burial depth may be less than 4 feet, and for seven locations where the offshore SFEC would cross utility crossings. Although it is possible that cables could become uncovered during extreme storm events or other natural occurrences, burial to target depth would minimize the risk of exposure and potential damage. SFW would also conduct remote surveys of cable placements to confirm cables remain buried and that rock placement and concrete mattresses remain secured and undamaged. Surveys would be conducted by SFW annually along all cable placements for the first 3 years and biennially thereafter. This survey would identify the need for any remedial action by SFW to re-secure cables. SFW would provide BOEM with cable monitoring reports within 45 calendar days following inspection as well as after major storm events. As stated in Table G-2 in Appendix G, a copy of the submarine cable system burial plan shall be submitted by SFW as part of their Facility Design Report and Fabrication and Installation Report that depicts precise planned locations and burial depths of the entire cable system. This plan would be reviewed by the USCG and BOEM.

WTGs would be laid out in rows that run from east to west in order to 1) avoid gear conflict between fishermen who use mobile gear and those who use fixed gear and 2) create predictable lanes within which boats with mobile gear can fish. In addition, as described in Appendix B [South Fork Wind Farm Fisheries Communication and Outreach Plan] of Jacobs (2021), SFW has also developed a financial compensation policy for use when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing gear.

As described in Section 3.4.2.2.3, boulder relocation would be carefully executed to minimize damage to colonizing organisms. The disturbed boulder surfaces would recolonize over time, likely regaining full habitat function.

Comment theme: Seafood supply chains.

Associated comments

Table I-293 provides the full list of comments received as part of this comment theme.

Table I-293. Seafood supply chains comment.

Comment Number	Comment
307-6	Full study with NEPA analysis on environmental and economic impacts that include seafood supply chains, not just vessels. Include community impacts and make us understand how fishermen and processors will find "shovel ready' jobs in the offshore wind industry to replace what they have lost.

Response to comments: As described in Section 3.5.1.2.3 of the FEIS, considering the small amount of fishing activity that would be affected during Project O&M, the impacts to other fishing industry sectors, including seafood processors and distributors and shoreside support services, would be negligible to minor. The beneficial impacts of the proposed Project and alternatives are described in Section 3.5.3.2.3.

Comment theme: Kirkpatrick et al. (2017) study.

Associated comments

Table I-294 provides the full list of comments received as part of this comment theme.

Table I-294. Kirkpatrick et al. (2017) study comment.

Comment Number	Comment
310-32	The DEIS does not include descriptions or examples of how positional data are linked to landings and revenue. A further description of the Kirkpatrick et al. (2017) study in the FEIS would be beneficial.

Response to comments: As described in the FEIS, most of the data shown in the tables in Section 3.5.1 with respect to commercial fisheries are based on data provided by NMFS on its Socioeconomic Impacts of Atlantic Offshore Wind Development website available at https://www.fisheries.noaa.gov/resource/data/socioeconomic-impacts-atlantic-offshore-wind-development. This website includes a link to the methods used to determine area fished for each trip from logbook data. Figure C-7 through Figure C-28 in Appendix C were developed using the methodology described in Kirkpatrick (2017).

Comment theme: Commercial fishing impact determinations.

Associated comments

Table I-295 provides the full list of comments received as part of this comment theme.

Table I-295. Commercial fishing impact determinations comments.

Comment Number	Comment
301-21	SFW has shown its commitment to minimizing impacts to commercial and for-hire recreational fishing industries by modifying the Project layout to a 1-NM x 1-NM grid that is aligned with adjacent planned offshore wind projects. As indicated by the USCG, this layout supports safe navigation and maritime operations. SFW has also implemented other modifications in the Project design to reduce operational impacts to these industries and the natural resources they thrive on including export cable route adjustments to avoid areas of high mobile gear fishing, sufficient cable burial depth to avoid gear conflicts, a robust claims process for fishing gear loss, use of noise reduction systems during offshore pile driving, and turbine micrositing to avoid sensitive fisheries habitat. In addition, SFW promotes and supports coexistence with the fishing industry through continued outreach, engagement, and communication. Most, if not all, impacts have been mitigated for in the Proposed Action Alternative. Based on the Project modifications and commitments discussed above and further comments below, SFW recommends that the impact ratings for commercial fisheries and the for hire recreational industry across all phases of the project be negligible to minor. Specifically, the finding that the Proposed Action may cause moderate impacts during operation of the Project must be reconsidered, as supported by the following points from the DEIS: • In Section 3.5.1.1.2 For Hire Recreational Fishing, the DEIS notes a relatively small amount of commercial and for-hire fishing occurs in the project area. According to the DEIS, charter fishing trips are “fairly low.” While the DEIS does not provide a figure for for-hire activity occurring in the Project area, it does note a total of only six for-hire permits from 2012 to 2014 for fishing in the “important” 70 square miles of Cox Ledge excluded from the lease area and not part of the Project area (pg. 3-88). As for commercial fishing, the DEIS notes that 75% of commercial vessels fishing the Project area derived less than 0.2% of their total annual revenue from the area, an extremely low number (pg. 3-79). A NOAA report states median revenue derived per permit in the area at 0.04%. This statement makes clear the Project area is fished to a very limited extent, by the vast majority of the commercial fleet. • The impacts to commercial fisheries during operations would only be realized if fishing did not occur in the Project area (i.e., it becomes a permanent exclusion zone). However, since fishing access will not be restricted during the Project’s operational life and the 1-NM x 1- NM grid layout supports safe navigation and maritime operations, impacts to revenue will be limited. Overall, impacts from the Project would be primarily attributable to temporary construction activities.
363-72	The DEIS incorrectly identifies adverse project impacts to commercial fisheries due to damage to or loss of fishing gear as “negligible to moderate.” The appropriate significance criterion for damage or loss of fishing gear is “moderate to major,” and the DEIS should be revised to correct this error. According to the DEIS significance criteria definitions for impacts to commercial fisheries, moderate impacts are impacts that are “unavoidable, but [environmental protection measures] EPMs would reduce impacts substantially during the life of the project” and this category is generally appropriate for impacts that are “eliminated” during the lifetime of the project, at which time “the affected activity or community would return to a condition with no measurable effects if proper remedial action is taken;” a major impact includes “substantial disruptions” where “measurable effects” are felt “indefinitely, even if remedial action is taken.” The DEIS, and common sense, make it clear that impacts to fishing activity in the form of damage to or loss of fishing gear would be “substantial” and “indefinite.” The DEIS states that “some individual operators of commercial fishing or for-hire recreational fishing businesses could experience long-term, minor to moderate adverse economic impacts during Project O&M as a result of reduced fishing access, damage to or loss of fishing gear, and decreases in target species abundance or availability.” The adverse economic impacts experienced by commercial fishermen operating around the project area and in areas transited by vessels engaging in O&M activity would be “indefinite” over the long lifetime of the project and are indeed “substantial,” not “minor to moderate.” BOEM should correct this categorization. In any case, the DEIS does not categorically define the term “substantial” in the context of level of impact of proposed activities. Nonetheless, given the common definitions of the words “minor,” “moderate,” and “substantial,” it would be inappropriate to state that the gear loss reasonably expected to be experienced by commercial fishermen over the lifetime of this project will be “minor to moderate.” Commercial fishermen on the East Coast already experience the loss of thousands to tens of thousands of dollars of fishing gear during OSW site characterization and other activities, and they would experience such losses indefinitely over the course of this and other projects. Additionally, fishermen must necessarily avoid placement of gear in areas regularly transited by vessels engaging in OSW activity, because these vessels regularly travel through fishing grounds and often destroy fishing gear. The DEIS does not propose remedial action for the indefinite impacts that would necessarily be experienced by commercial fishermen from these activities, therefore there is no remedy preventing these impacts and resultant injuries from occurring indefinitely. Such impacts, whether correctly classified as “substantial” or (as in the DEIS) incorrectly as “minor to moderate,” being reasonably foreseeable to be “indefinite” over the lifetime of the project, clearly necessitate the appropriate impact classification of “major” because any “indefinite” impact requires the assignment of this classification. Again, we ask BOEM to make this adjustment accordingly.

Comment Number	Comment
360-28	In the DEIS, BOEM determines that the cumulative impacts of the Proposed Action and any alternative would be moderate if joined with past, present, and reasonably foreseeable activities on commercial and for-hire recreational fishing. Commercial and for-hire fisheries could be moderately impacted, or these resources could recover completely with mitigation. This is due to the anticipation that some for-hire recreational and commercial fisheries may need to adjust to account for local or regional disruptions. Increased monitoring of the SFEC cable and cable protection would reduce the commercial and for-hire fisheries impacts even further. Fisheries activity is spread across a large area of ocean, with the Proposed Action and other foreseeable projects within a small area of the total operations of fisheries. Thus, fisheries can not only continue to operate within wind farms. The vast majority of fisheries activity would be unaffected by wind farms. BOEM also appears to imply that wind energy would have a negative impact on climate change and fisheries-caused fish mortality when the opposite is the case. To remove this implication, BOEM should clarify in the final EIS that these impacts are from sources other than offshore wind energy and are being accrued as part of the baseline for its impact analysis. The final EIS should also account for real-world examples in assessing its impact rating regarding commercial fishing. For instance, for static fishing, in the U.K., offshore wind farm arrays and buried export cables experience various forms of fishing, including potting and beam trawling. According to one study, turbine construction lends itself to net positive effects on crustacean stock levels. As another example, up to 90% of Danish and 40% of German annual gillnet fleet landings of plaice 2010-2012 were caught in areas overlapping with offshore wind farms. Studies in the Block Island Wind Farm have included trawls (mobile gear studies) that found variation—but not reduction—in spatial and temporal distribution of seven flatfish species since pre-construction.
372-10	Similarly, the conclusions related to fisheries impacts are inconsistent with the definitions for significance criteria. Specifically, section 3.5.1.2.3 concludes that impacts associated with fishery access are “negligible” and “minor”, despite information in the document suggesting revenue would be impacted for certain fisheries. Fishing operations would need to adjust due to the project, and some individuals are heavily dependent on the area for annual fishing revenue. These impacts would be more accurately classified as overall “moderate” or up to “major” for some individuals based on the definition in Table 3.5.1-15 because members of the fishing community would be subject to substantial disruptions, would have to adjust to the project, and could be subject to indefinite effects depending on the response of fishery resources and access to the area. We recommend you review the fisheries sections to ensure the analysis in the FEIS is consistent with the significance criteria defined in the document. The analysis should clearly identify fishing impacts that are more than negligible, i.e., those found to be major, moderate, or minor, consistent with the impact definitions in the DEIS and FEIS.
166-25	Like our findings on EFH impact determinations, the analysis of impacts to commercial fishing do not match the definitions of potential adverse and beneficial impact levels listed in Table 3.1.1-1. It would be useful specify criteria for negligible, minor, moderate, or major impacts to commercial fishing in terms of loss of revenue, landings, and number of vessels, by species or FMP.
360-29	Evidence from wind farm studies suggests that fishing is compatible with wind farms, and strategies have been developed in collaboration with the fishing community to ensure compatibility with fishing and compensation mitigation in the event of gear damage in U.S. Atlantic wind farms. We agree that BOEM’s definition of “moderate,” which includes the fact that mitigation will substantially reduce impacts and that fisheries will have to somewhat adjust to the presence of structures, is supported for the potential direct and indirect impacts alternatives in the DEIS. But the cumulative impact of adding this effect on top of past, present, and reasonably foreseeable effects is not an increment that changes the level of cumulative impact to major; it is a small increment of a pre-existing impact level. Although the project would affect fisheries in the short-term, BOEM’s assertion that this impact may become neutral over time for the Proposed Action (because of beneficial impacts and adjustment by fisheries) suggests that the increment of impact may be insignificant relative to the baseline. The DEIS does not consider many examples from operational projects where commercial fishing has continued during operations within arrays. Specifically, the DEIS fails to include a discussion about operational projects in Europe and elsewhere where commercial fishing has continued within wind farms. As noted above, fisheries also operate outside of wind farms, and the bulk of commercial fishing activity off the coast of New England is not in the wind lease areas (see Figure 3.4.5-1 in the DEIS). The assertion in Section 3.11.2.4 of the DEIS that Proposed Action has incremental impacts that are “moderate” on commercial fisheries and for-hire recreational fishing is inconsistent with both the slight beneficial impact and the magnitude of other negative impacts unrelated to offshore wind. An increment of impact reflects the proportion of the impact attributable to the alternative relative to the other impacts. The total level of cumulative impact on fisheries by fisheries-caused fish mortality, climate change, and other factors is much greater than the impact of offshore wind. Thus, the increment of impact of an offshore wind project under consideration would be very slight compared to these effects, including very small effects to fish via minimal mortality and injury and temporary behavioral and displacement responses, mainly associated with pile driving and cable installation and maintenance, though mitigation measures will reduce noise from pile driving and thus reduce these impacts.

Comment Number	Comment
	The DEIS assigned levels of incremental impact using definitions provided in the DEIS Table 3-1-1. In evaluating cumulative impacts, it is not necessary to assign the increment of effect to an impact rating level. Incremental impact levels should be defined specifically. For example, a moderate “increment” of impact would need to be defined relative to something, which is not the way the definitions of impact are framed in Table 3-1-1 of the DEIS. The overarching cumulative impact can be determined via these definitions, but the increment of impact is a relative term. For example, the approximate percent of contribution to the overall impact could be used to define incremental impact levels, or generally accepted terminology like “small increment” or “large increment” could be qualitatively applied. In the case of incremental impact from structures, applying such an approach would result in a very small increment of impact relative to impacts unrelated to offshore wind, and this should be reflected in BOEM’s assessment. The Proposed Action and foreseeable offshore wind farms will slightly offset fisheries-related mortality via reef effects. This should be taken into better account in the impact increment. Additionally, the adverse effect of structures on fisheries in the case of Proposed Action, which incorporates Coast Guard supported orientation and spacing of turbines, would be incrementally even lower than other Alternatives (and ultimately may be neutral or beneficial to fish and invertebrates for this and other future offshore wind activities per BOEM’s analysis.

Response to comments: As described in the FEIS, the amount of fishing activity that could be affected during Project O&M is a small fraction of the amount of fishing activity in the New England and Mid-Atlantic regions as a whole. However, for those fishing vessels who choose to avoid the SFWF, historically derived a large percentage of their total revenue from the area, and are unable to find suitable alternative fishing locations, the adverse impacts would be long-term and major. While a small number of commercial fishing vessels fish heavily in the Lease Area, about 75% of the vessels fishing in the area derived less than 0.2% of their total revenue from the area during the 2008–2018 period (see description of SFWF Lease Area and Offshore SFEC in Section 3.5.1.1.1).

The overall impact levels used in the impact analysis for commercial fisheries and for-hire recreational fishing are consistent with the analysis approach described in Section 3.1. As stated in Section 3.5.1.2.3 of the FEIS, the impact rating takes into consideration that SFW has developed a financial compensation policy to be used when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing gear.

Text in the Conclusions discussion in Section 3.5.1.2.2 and Section 3.5.1.2.3 has been revised for clarity.

Comment theme: Commercial fishing mitigation measures.

Associated comments

Table I-296 provides the full list of comments received as part of this comment theme.

Table I-296. Commercial fishing mitigation measures comments.

Comment Number	Comment
12-2	A Concern: The commercial fishery concerns regarding the potential impact on their livelihood is real and valid, and receives appropriate attention in the Draft Environmental Statement. One area that needs clarification is this: A well-defined process should be established and published, with clear rules and standards, for compensation of losses suffered during the construction period due to damage to rigs, lost fishing time, or any other risks that can reasonably be due to the presence of South Fork Wind activity in the construction area. Such a process should also include standards for compensation of damages caused by South Fork during the maintenance of the turbines. The developers have expressed their willingness to do so, but if there is an agreement about the proposed process, the general public is not aware of it.

Comment Number	Comment
338-48	57. On p. 3-99, there is mention of a fisheries compensation plan that covers "undue interference with fishing access, transit or fishing gear." However, in other mentions throughout the DEIS, this plan is referred to as gear loss specific. More clarification and discussion, including with NYS, are needed on the terms of fisheries compensation being offered by the developer and how that compensation plan could mitigate the interference with fishing activities mentioned above. 58. More information is needed on fisheries compensation and why the Proposed Action would not lead to impacts on commercial and recreational fisheries businesses, including impacts to the cost of transit, fishing time, and fishing success. Further, the DEIS should include an explanation as to how vessel captains' compensation would benefit lower workers within the fishing community (e.g., deckhands, seafood processors, etc.).
154-12	Marine mammals and other protected species. While substantial attention is paid to environmental protection and mitigation for marine mammals and other protected species, not enough attention is paid in the proposed mitigation measures to the downstream regulatory impacts from incidental take. It is often said that NOAA regulates fishermen, not fish, and in the case of incidental take, the regulatory effects are often direct reductions of allowable catch for the fishing industry. We request that BOEM add a mitigation measure requiring the entire fishing industry to be compensated by the developer in the event that incidental take from pre-construction, construction or operations contributes to quota reductions imposed by NOAA.
378-18	Bonnie Brady: I'm Bonnie Brady, Long Island Commercial Fishing Association. We will be submitting comments, additionally written comments. I just had a couple of comments, based upon the comments that I was hearing before me. Some of these I've written down, so let's see, five minutes, yeah, we can do this. There have been many comments made regarding commercial fisheries and fishermen that have been made that are frankly patently false, as are many of the comments of the benefits of offshore wind. Talks of what is working in Europe until the creation of the Hornsea project, the majority the wind turbines in megawatts could fit inside the Equinor lease. The combined Rhode Island-Massachusetts wind energy area that exists, of which South Fork Wind Farm is a project in, and there's many others, is equal to two-thirds of the size of the Grand Canyon National Park with the windmills every one nautical mile in every direction. I'd like for as many of the people listening to kind of imagine what that might be like. Fishermen in Europe are routinely compensated for all components of a wind farm from survey through construction through actual construction through decommissioning. In Denmark, it is required by law if long-term losses are had, they must compensate each and every fisherman. Talks about the collapse of local fishing and fisheries, when in fact fish stocks are in the best shape they have been in 20 years. A fun fact, the National Marine Fisheries Service status of the stocks in 2019 tells us that 93% of 321 fish stocks are not over fished. These are those that are called commercially. 81% of 244 stocks overfishing isn't occurring and 47 fish stocks have been built, rebuilt since 2000. I was told by one of the former speakers today that the best way to fight blind environmentalism that plays upon people's feelings and not facts was to tell the truth, and tell the truth, and tell the truth, so I will try my best to do so today. Another speaker talked about how commercial fishermen and fishing will be protected. Due to the largesse of the developers and the process to date, nothing could be farther from the truth. I've been involved in the process since 2012. In Rhode Island, specific language of the Coastal Resource Management Council in Rhode Island law protects the fishermen from offshore wind, forcing negotiation with the developer with the Fishing Advisory Board, and the developer is forced to pay for all costs, including legal representation for fishermen. If they do not do so, they do not receive federal consistency approval. It is the condition of the approval for the offshore wind project. This should be the federal model. We cannot have where depending upon which state and which developer, it's a willy-nilly mess, where people do one for one state, because they have consistency review and for other states they leave us high and dry (think New York). In New York, the developers ran the transmission cable in such a way that it didn't even qualify for intervenor funding. There is no payment to fishermen to remove their gear in areas where surveys are being done while they're being done like they do in Europe so as to prevent gear loss. Gear loss only has a 30-day deadline to submit, and many fishermen on Long Island have already lost gear. Some, when they've submitted their claims, they were denied. There is no long-term fair and equitable compensation to fishermen if grounds become barren as a result of this project, because not every fish species likes hard substrate. As someone said regarding reef areas, not all fish species are reef species. Wide safe transit lanes as RODA has requested, four nautical miles in width must be included as part of the transit required for fishermen who are actively fishing or transiting to ports. The fact that someone that doesn't spend their time off shore would tell another when you're working in the most severe of conditions that we're not going to give you ample wide space to not only come home the most direct path, but it has been dealt with, for the multiple of developers working with, not only this project, but others in the Rhode Island-Massachusetts wind energy area, they would require New York fishermen to do a 50-nautical-mile jog around the wind energy area because fishermen are afraid to work inside of it for the fear of hitting one of the turbines. I could keep talking forever, but I only have 45 seconds. The reality also that has been requested in the past is a moratorium to make sure that the science is right. Everyone that proclaims "because of the science." We need to get a better handle on the science. National Marine Fisheries has told us they will lose the 70-year-old series fishing survey by the Bigelow. They cannot use the Bigelow to go in there without risking their crew and their lives. I will be submitting full comments later. Thank you very much.

Comment Number	Comment
363-69	There are several reasons any project approved by BOEM must require complete, science-based compensation to offset impacts to fisheries. As no OSW project has received a Record of Decision from BOEM to date, and BOEM has never engaged the fishing community in any dialogue regarding compensation on a project-specific or cumulative scale, there is significant uncertainty regarding BOEM's approach to this issue and whether such mitigation will be required. The only available information is BOEM's Best Management Practices, which describe several types of compensation measures a developer could consider, but on their own provide absolutely no incentive to do so. In contrast, three authorities do support BOEM imposing a compensatory mitigation requirement: NEPA, OCSLA, and customary practice in the U.S. and abroad. While NEPA does not provide a blanket substantive duty for an agency to mitigate all adverse environmental effects of a proposed action, it does require federal agencies to consider alternatives that include measures mitigating harm to the human and physical environment in order ensure procedural integrity and greater transparency. Mitigation measures may be separate alternatives or may be included directly in the proposed action. Specifically, such mitigation includes: (a) Avoiding the impact altogether by not taking a certain action or parts of an action; (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; (e) Compensating for the impact by replacing or providing substitute resources or environments." BOEM must consider alternatives that provide fair and complete compensatory mitigation before finalizing the DEIS.
363-70	So too does OCSLA indicate that it is BOEM's authority to ensure impacts to existing ocean uses are minimized and compensated. The Purpose and Need of the DEIS states "BOEM's action is needed to further the United States' policy to make [OCS] energy resources available for expeditious and orderly development, subject to environmental safeguards . . . including consideration of natural resources and existing ocean uses." It is not whether to simply approve an OSW project because a power purchase agreement is in place, as is the justification used in the DEIS, but to ensure that safeguards are in place to protect fishermen and the environment. To repeat, compensatory mitigation alone is not sufficient to meet NEPA requirements of avoiding, minimizing, and mitigating impacts to fisheries, nor does its implementation assure that an OSW project has been designed in a way that does not unreasonably interfere with fishing operations. As the December 2020 DOI legal memorandum notes "it is important to observe that any compensation system established by a lessee to make users of the lease area whole financially does not negate interference-- indeed the creation of such a system presumes interference. As such, any proposed compensation process should not be viewed as 'curing' any interference [to accessing historic fishing grounds under OCSLA] since the statute does not provide for such a cure." Customary practice supports compensatory mitigation for fisheries impacts after efforts to minimize and mitigate impacts have been fully employed. From an equity perspective, fishermen are by far the most impacted group with respect to OSW development. Despite this, financial offsets offered to fishermen pale in comparison to those invested by OSW developers, investors, and supporters to other interests. Although most of the details of these agreements remain confidential, it is known that SFWF has offered a "community benefits package" worth $29 million to the Town of East Hampton, NY, primarily for the use of its roadways. Why wouldn't fishermen be compensated at least with parity for the areas they rely on to feed our communities? BOEM must hold developers accountable for ensuring that such "benefits packages" are afforded to fishermen; it is insulting for them to be treated as any less important than town residents.
363-75	The piecemeal and elective approach for gear loss claims, varying from developer to developer is unreasonable. BOEM should provide oversight and work with both the fishing and OSW industries to develop a practical and equitable claims policy as outlined in BOEM's Best Management Practices. This claims policy should include mitigation of O&M activities, e.g. requirements for accessible and acceptable notices to mariners, gear avoidance measures for OSW vessels engaged in O&M activities, requirements to record transits and photograph all gear interactions, and plans and procedures for recovering impacted fishing gear and undertaking the full efforts required to return impacted gear to its rightful owner, and the provision of due compensation for lost fishing revenue associated with damage to the gear. The responsibility for undertaking these basic activities to mitigate and compensate for business interruptions coming from direct impacts resulting from such reasonably foreseeable project activities rests solely on the project developer and should be treated accordingly.

Comment Number	Comment
351-1	My interaction with Deepwater, now Orsted began in 2017 when we citizens were all invited to support Deepwater's renewable energy efforts. My background in environmental science made me supportive of their effort to blend renewables into the energy mix. But my concerns for how the project would alter Cox's Ledge and the juvenile fish that live there, how the cable would produce changes to the benthic community along the long route proposed and of course, the cable landing on expensive real estate near homes of my neighbors all took me on a deep dive in the science behind an industry that was being test driven on my family's profession and the economy of my home town. There is a lot to say about the lack of science based evidence and the lack of information provided by the applicant but the topic I would like to make BOEM aware of is the lack of consideration for the lives and livelihood of East End fishermen that is shown by this applicant. In the following references to the Fisheries Representative (FR) all refer to me. I have held and continue to hold this position in East Hampton, NY. My funding from Orsted ended in a surprise email on 12/29/2020. Fisheries Mitigation and Compensation: "Potential Impacts to Fishing Gear" found in Chapter 3 of the SFWF DEIS, on pgs. 3-101/2 states "DWSF has also developed a financial compensation policy for use when interactions between the fishing industries and Project activities or infrastructure cause undue interference with gear (Jacobs 2020). The use of this financial compensation program for damage to or loss of fishing gear during operation would reduce any moderate impacts to negligible or minor levels." Since 2017, the need for a comprehensive fisheries compensation and mitigation plan (CMP) as such that exists in Rhode Island was discussed among stakeholders. Stakeholders continually petitioned the EH Town Board and Deepwater Wind from 2016-18, and now Orsted, that the stakeholders be included in the development of any such Fisheries Mitigation plan for the last four years, without relief. The case is known in writing, during public testimony, in town hall meetings, at the public hearing with the SFWF in May of 2018, and repeatedly throughout this process. Requests have been ignored, consistently. BOEM must address the total lack of compensation and mitigation for New York's commercial fishermen through all stages of any offshore project from survey through decommissioning, because it is a major impact to New York for the SFWF, and any other WEA that is developed. As the FR I repeatedly tried to get answers to exactly what a fishermen needs to provide to Orsted in order to get a gear loss claim paid. My emails were ignored. The form Orsted provided to me which I provided to fishermen suffering claims loss changed without notice to me. There were no answers provided on gear loss or compensation or any of the other items listed. BOEM must perform a cumulative analysis of the entire Atlantic Ocean offshore wind lease areas and the cumulative economic impact to commercial fishermen as it related to the loss of commercial fishing grounds through BOEM leasing of the Atlantic Ocean EEZ. Past economic studies, and the one within the SFWF DEIS that uses Kirkpatrick's methodology to determine economic loss from areas is highly flawed regarding fishermen's landings data and income from associated fishing areas based on gear types, and needs to be gutted. BOEM should instead use a combination of VMS and plotter data, such as Windplot, along with working Rhode Island DEM's Julia Livermore with the Northeast Fisheries Science Center and the National Marine Fisheries Service's Cooperative Research division and the Responsible Offshore Development Alliance (RODA) to come to a more robust, peer reviewed, industry accepted standard for gauging commercial fishing industry losses due to economic displacement. The Fisheries Communication Plan presented initially by DWW and as assumed by Orsted, is purely a public relations document that only offers one-way communication from the developer. To date the FAC has not been given an opportunity by the developer to work with, create, or even weigh in on any CMP including the policy referenced above. There has been no willingness on Orsted's part to fairly and equitably compensate fishermen for the "unreasonable interference" that this project commits upon all commercial fishermen who work in or near the SFWF WEA or on the ocean bottom "cablepath" taken by SFEC, nor for those who must navigate through the SFWF, within the project envelope and overall Maximum Work Area (MWA) to access their fishing grounds to the south and east. The SFWF will create major negative impacts to the commercial fishing industry through loss of income, loss of catch, loss through "taking" of historic fishing grounds via armoring of benthic habitat and loss of safety at sea. Loss of income has already occurred through the loss of gear by Town of East Hampton fishermen while survey work has continued unabated since March of 2017. The SFWF-referenced "financial compensation policy" which only applies to gear loss, cannot be given serious consideration as a means to effectively mitigate financial losses that are related to the proposed project or any of the listed alternatives.

Comment Number	Comment
	These are not “de minimis” actions committed by then DWW/now Orsted since surveys began in March of 2017. In their own country of Denmark, Orsted compensates all fishermen affected by a project from survey work through decommissioning including long term compensation if fishing grounds are in effect taken by the wind turbine project. It is a requirement of Danish Fisheries Law. Offshore wind developers also compensate fishermen in England, though by contract with non-disclosure clauses. BOEM must create a national policy for fisheries mitigation and compensation with fishermen at the table, a full, equitable and fair policy that must be analyzed and industry approved, not only for the SFWF, but cumulatively for all WEA within the RI-MA WEA, and throughout the Atlantic from North Carolina through to Maine to mitigate and compensate for economic losses as a result of their Offshore Wind Energy Areas lease program in the EEZ and additionally for transmission cables that traverse federal waters to end sites in various states along the Eastern Seaboard. That is not, as the Solicitor stated in BOEM Memorandum 37059, pg. 12. “Further, it is important to observe that any compensation system established by the lessee to make users of the lease whole financially does not negate interference-indeed the creation of such a system presumes interference. As such, any proposed compensation should not be viewed as “curing” any 8 (p)(a(I) interference since the statute does not provide for such a cure.” There has been no willingness on Orsted’s part to fairly and equitably compensate fishermen for the “unreasonable interference” that this project commits upon all commercial fishermen who work in or near the SFWF WEA or on ocean bottom cable path taken by South Fork Energy Cable (SFEC) and/or must navigate through the SFWF, within the project envelope and overall work area MWA. The SFWF will create loss of income, loss of catch, taking of historic fishing grounds through ineffective transmission cable depths which will then unearth cables requiring bouldering and armoring of “cablepaths,” along with and loss of safety at sea. Loss of income has already occurred through the loss of gear while SFWF survey work has continued unabated since March of 2017. The referenced “financial compensation policy” which only applies to gear loss, cannot be given serious consideration as a means to effectively mitigate financial losses that are related to the proposed project or any of the listed alternatives. These are not “de minimis” actions perpetrated by Orsted since 2017. Gear losses have occurred and need to be mitigated by the developer, who pays the fisherman to not fish his gear for the length of time that he needs to survey an area. As they do in Denmark For comparison in their own country of Denmark, Orsted compensates all fishermen affected by a project from survey work through decommissioning including long term compensation if fishing grounds are in effect taken by the wind turbine project. They also do so in England, though by contract with non-disclosure clauses. The EHTFAC utilized BOEM’s November 2013 “Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessees/Grantees and Commercial Fishers on the Atlantic Outer Continental Shelf, Report on Best Management Practices and Mitigation Measures,” as the blueprint to create open communication and work to write a fisheries mitigation and compensation plan.
154-5	Mitigation Many of our comments here are based on experience with bad faith actions of Orsted, who has systematically ill-treated the fishing industry and in some cases has appeared to misrepresent the nature of mitigation actions in their reporting to BOEM. We expect that this treatment will only worsen once permits are issued, and so we request that additional safeguards be put in place to limit the harms caused. For example, the DEIS states on page 3-99 “DWSF has developed a financial compensation policy to be used when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing access, transit, or fishing gear (CH2M HILL 2018). The use of this policy for qualifying gear interactions that may occur during construction is considered part of the Proposed Action and would reduce any adverse impacts to temporary, negligible to minor.” Despite this statement, numerous claims for lost gear among RI fishermen remain unresolved, due to Orsted’s aggressive and dishonest handling of the gear claims process. The compensation policy is wholly inadequate, and Orsted has refused to engage in good faith discussions with RIFAB to bring this to a resolution. They went so far as to hire economic experts from Woods Hole Oceanographic Institute (WHOI) who questioned the RIFAB estimates of landings values and undertook obtaining data from NOAA as a “source of truth.” Then, after the NOAA data came back higher than the estimates provided by RIFAB, Orsted attempted to revert back to the lower estimates and refused to settle according to the numbers they had sought out. To this date, the process remains unresolved and it is inaccurate to state that the policy “would reduce any adverse impacts to temporary, negligible to minor.”

Comment Number	Comment
154-11	USCG reporting (page G-16). We ask that complaints and correspondence reporting be required for all pre-construction activities for this project and all future offshore wind developments. Orsted has a terrible track record with respect to fishing conflicts and in our estimation their pre-construction activities have already driven fishing out of the project area. If this tracking starts only when construction starts, then USCG and BOEM remain without clear avenues to observe the full, disruptive impacts of pre-construction activities. There have been numerous uncompensated gear losses to RI fishermen due to reckless action by Orsted survey vessels, including towing up gear in violation of the pilotage exemption obtained by the survey vessel, Deep Helder. A number of vessels have now been forced to abandon fishing in the area before construction has even started due to survey activities.
363-60	RODA has commented extensively on the serious deficiencies in current approaches to mitigation for fisheries impacts arising from OSW development. As projects and permitting authorities continue to support piecemeal, incomplete, unpredictable, and wholly inadequate processes, each of those previous comments are reiterated and incorporated here by reference. Namely, with respect to the Vineyard Wind project (from which we have seen no change, procedurally speaking, with SFWF), we stated: RODA strongly disagrees with the approach Vineyard Wind has taken to addressing the mitigation of impacts to fishing activities and resources, which . . . has primarily been approached through concurrent state-based methods that have been poorly integrated into the federal approval process. As we have expressed in the past, we believe that the development of a common framework for such “mitigation” must be done in a transparent, holistic, and well-structured manner that includes impacts from the wide variety of affected fishing businesses. Moreover, an appropriate mitigation plan must follow the principles of first avoiding conflicts, then minimizing those that are unavoidable, mitigating the impacts from new development through appropriate use of communications and technology, and finally—only once those have been adhered to—considering compensation for any residual losses. The single most important question underlying the responsible development of OSW—and whether it can be completed in a way that does not pose intolerable risk to fishing, food security, and marine ecosystems—is whether adequate mitigation has been incorporated into project design. Mitigation can take the form of avoiding, minimizing, or compensating for effects caused by a proposed action or its alternatives. The most important mitigation measures are the first two (avoiding and minimizing), as fishermen’s shared goal is to preserve healthy ecosystems and continue fishing, rather than be paid for damages. Unfortunately, due to segmentation in both regional and project-specific planning processes, means for avoiding and minimizing impacts are not prioritized. The DEIS includes a list in Table G-1 of mitigation measures that are considered in its analysis. For fisheries, these are: • Spacing of approximately one nm between turbines; • Burial of the inter-array cable and SFEC offshore to a target depth of 4-6 feet; • Installation of the SFEC sea-to-shore transition via HDD; • Implement Best Management Practices to minimize impacts on fisheries (“as appropriate and feasible”); • Siting of the SFWF and SFEC offshore were informed by site-specific benthic habitat assessments and Atlantic cod spawning surveys; • Commitment to collaborative science with the fishing industry; • Mark each WTG with both USCG and approved aviation lighting; • Require all project vessels to comply with regulatory requirements to prevent spills (and the details of SFWF’s particular oil spill response plan are, perplexingly, confidential according to BOEM’s project docket); • Manage accidental spills of oils or other hazardous materials through the project’s response plan; • Guide fishing industry communications by the Project-specific Fisheries Communications Plan; and • Implement a communication plan during offshore construction to inform all mariners of construction activities and vessel movements. These commitments largely have very little to do, in practice, with minimizing and avoiding impacts to fishing. Some are merely informative in nature or commit to following existing laws, others lack sufficient detail to know how they would be implemented or enforced, and the rest (such as burial depth and HDD installation) are not accompanied by any analysis or evidence to inform the public of their efficacy or desirability.
363-74	BOEM must revise the DEIS to include the “major” impacts to fishermen in the form of damage to or loss of fishing gear, and it must implement a standardized approach for gear loss claims related to conflict with OSW areas. Currently information is poorly communicated on how gear loss claims can be made, and what qualifies for a claim. Additionally, the required information for proof is inconsistent across developers, projects, and project phases. For example, the current SFWF instructions for gear loss claims (published Dec 2020) differ from the gear loss instructions BOEM put out for public comment (submitted May 2018) for the same project. For mariners who are already dealing with a loss of gear and catch, the process to file a claim should not be overly complicated and onerous. While some fishermen have experienced some success with gear claims, a standardized and unbiased policy should be implemented across all OSW projects in the region moving forward. To that point, information required in a claim should not differ if gear is lost in the SFWF project or in a lease area held by another developer. Due to the geographic proximity of multiple proposed projects and export cables, and the large number of such proposed projects, it would be unreasonable to expect fishermen to determine exactly which claim process applies if they are not coordinated. Similarly, the process for filing claims also cannot be different among varying states; these are federal waters and federally-permitted fishermen must be treated equally. Evaluation of gear loss claims should be independent of the payee of the claim; the SFWF gear claim instructions state that claims will be evaluated by Ørsted employees and representatives. This must be changed. An objective and impartial “jury” should be responsible for determining the validity of gear loss claims. Lastly, economic loss payouts should be for the full amount that is lost from being unable to fish, not 50 percent of the economic loss as stated in Ørsted’s gear loss instructions. Again, if Ørsted is willing to provide a $29 million dollar “community benefits package” to the town of East Hampton, NY, but only willing to compensate fishermen for half of their losses, this is not in line with the definition of acceptable, nevermind preferable, mitigation.

Comment Number	Comment
166-11	...[t]he financial compensation policy for the fishing industry for any lost or damaged gear is referenced in the DEIS as being included in the communications plan; however, we cannot find the communications plan through the DEIS or COP references. Please include a link to the communications plan in the FEIS.
294-9	Regarding economic/gear loss impacts from cables alone, the South Fork Wind Farm DEIS asserts that “DWSF has also developed a financial compensation policy for use when interactions between the fishing industries and Project activities of infrastructure cause undue interference with gear…. The use of this financial compensation program for damage to or loss of fishing gear during operation would reduce any moderate impacts to negligible or minor levels.” Currently, the only plan for gear loss compensation available from the current leaseholder, Orsted, is not adequate to compensate for potential losses. The Orsted gear loss claim process is lengthy, involved, and contains requirements that may be difficult for some fishermen to fulfill or prove, such as proof of purchase of all lost/damaged gear. This is not information that fishermen or even fishing companies have typically kept through years of gear work or purchasing. Incomplete submissions will be rejected by the developer. So, for example, if a vessel were to lose a set of trawl doors containing electronic door sensors, both items worth tens of thousands of dollars, but does not have the receipt from the door manufacturer and the receipt of from the marine electronics manufacturer, the claim will be rejected and the fishermen or fishing company will go uncompensated. Additionally, even if the claim is successfully submitted, lost fishing time and income associated with the loss of the gear and vessel downtime until the gear can be replaced, the developer will only pay 50% of the loss of gross income incurred by the applicant, as determined by the developer. This is not an adequate compensation framework to mitigate potential losses incurred as a result of the Project and gives the developer complete control over what is “reasonable” to pay or if any payment will be made at all. The DEIS incorrectly assumes that cable interactions causing economic harm would be mitigated by gear loss programs available from the current Project developer.
294-10	The DEIS claims that BOEM expects the overall impacts from the Project to be “moderate, as mitigation would substantially reduce adverse impacts on commercial fisheries” during the life of the Project, even though affected commercial fisheries would have to adjust to the “notable and measurable adverse impacts of the Project.” First, the gear loss “mitigation” assumed by the DEIS and discussed above, is not adequate or certain mitigation for actual economic losses. Secondly, the DEIS does not list any financial compensation or reparation for economic damages caused by loss of fishing access and related loss of product caused by the Project or cumulative projects. So we are unclear how BOEM can assume that “mitigation would substantially reduce adverse impacts”. The primary form of mitigation for commercial fisheries according to appendix G is “communications and outreach”, and a “comprehensive communication plan” that would be facilitated through a Fisheries Liaison, website, and notices. Receiving emails from a developer’s Fisheries Liaison detailing what types of surveys or construction may be taking place is not mitigation that will substantially reduce, or reduce at all, the adverse impacts on commercial fisheries during the life of the Project. Economic losses must be mitigated through economic compensation. Without actual any compensation system to mitigate incurred losses, the “notable and measurable adverse impacts of the Project” will not be mitigated. BOEM must adjust its impacts analysis to account for the fact that there is no form of economic compensation for fishing vessels or fishing companies to mitigate the loss of fishing access caused by the Project.
310-30	Compensatory mitigation plans and commitments to compensating for lost gear should be described in the FEIS.
339-5	Fisheries Mitigation and Compensation: “Potential Impacts to Fishing Gear" found in Chapter 3 of the SFWF DEIS, on pgs. 3-101/2 states "DWSF has also developed a financial compensation policy for use when interactions between the fishing industries and Project activities or infrastructure cause undue interference with gear (Jacobs 2020). The use of this financial compensation program for damage to or loss of fishing gear during operation would reduce any moderate impacts to negligible or minor levels." The EHTFAC has discussed at length, since 2017, the need for a comprehensive fisheries compensation and mitigation plan (CMP) as such that exists in Rhode Island. We have continually petitioned the EHT Board and Deepwater Wind from 2016-18, and now Orsted, that the FAC be included in the development of any such Fisheries Mitigation plan for the last four years, without relief. We have made that case known in writing, during public testimony, in town hall meetings, at the public hearing with the SFWF in May of 2018, and repeatedly throughout this process. Our requests have been ignored, consistently. BOEM must address the total lack of compensation and mitigation for New York’s commercial fishermen through all stages of any offshore project from survey through decommissioning, because it is a major impact to New York for the SFWF, and any other WEA that is developed.

Comment Number	Comment
	BOEM must also do a cumulative analysis of the entire Atlantic Ocean offshore wind lease areas and the cumulative economic impact to commercial fishermen as it related to the loss of commercial fishing grounds through BOEM leasing of the Atlantic Ocean EEZ. Past economic studies, and the one within the SFWF DEIS that uses Kirkpatrick's methodology to determine economic loss from areas is highly flawed regarding fishermen's landings data and income from associated fishing areas based on gear types, and needs to be gutted. BOEM should instead use a combination of VMS and plotter data, such as Windplot, along with working Rhode Island DEM's Julia Livermore with the Northeast Fisheries Science Center and the National Marine Fisheries Service's Cooperative Research division and the Responsible Offshore Development Alliance (RODA) to come to a more robust, peer reviewed, industry accepted standard for gauging commercial fishing industry losses due to economic displacement. The Fisheries Communication Plan presented initially by DWW and as assumed by Orsted, is purely a public relations document that only offers one-way communication from the developer. To date the FAC has not been given an opportunity by the developer to work with, create, or even weigh in on any CMP including the policy referenced above. There has been no willingness on Orsted's part to fairly and equitably compensate fishermen for the "unreasonable interference" that this project commits upon all commercial fishermen who work in or near the SFWF WEA or on the ocean bottom "cablepath" taken by SFEC, nor for those who must navigate through the SFWF, within the project envelope and overall Maximum Work Area (MWA) to access their fishing grounds to the south and east. The SFWF will create major negative impacts to the commercial fishing industry through loss of income, loss of catch, loss through "taking" of historic fishing grounds via armoring of benthic habitat and loss of safety at sea. Loss of income has already occurred through the loss of gear by Town of East Hampton fishermen while survey work has continued unabated since March of 2017. The SFWF-referenced "financial compensation policy" which only applies to gear loss, cannot be given serious consideration as a means to effectively mitigate financial losses that are related to the proposed project or any of the listed alternatives. These are not "de minimis" actions committed by then DWW/now Orsted since surveys began in March of 2017. In their own country of Denmark, Orsted compensates all fishermen affected by a project from survey work through decommissioning including long term compensation if fishing grounds are in effect taken by the wind turbine project. It is a requirement of Danish Fisheries Law. Offshore wind developers also compensate fishermen in England, though by contract with non-disclosure clauses. BOEM must create a national policy for fisheries mitigation and compensation with fishermen at the table, a full, equitable and fair policy that must be analyzed and industry approved, not only for the SFWF, but cumulatively for all WEA within the RI-MA WEA, and throughout the Atlantic from North Carolina through to Maine to mitigate and compensate for economic losses as a result of their Offshore Wind Energy Areas lease program in the EEZ and additionally for transmission cables that traverse federal waters to end sites in various states along the Eastern Seaboard. That is not, as the Solicitor stated in BOEM Memorandum 37059, pg. 12. "Further, it is important to observe that any compensation system established by the lessee to make users of the lease whole financially does not negate interference-indeed the creation of such a system presumes interference. As such, any proposed compensation should not be viewed as "curing" any 8 (p)(a(I) interference since the statute does not provide for such a cure." There has been no willingness on Orsted's part to fairly and equitably compensate fishermen for the "unreasonable interference" that this project commits upon all commercial fishermen who work in or near the SFWF WEA or on ocean bottom cable path taken by South Fork Energy Cable (SFEC) and/or must navigate through the SFWF, within the project envelope and overall work area MWA. The SFWF will create loss of income, loss of catch, taking of historic fishing grounds through ineffective transmission cable depths which will then unearth cables requiring bouldering and armoring of "cablepaths," along with and loss of safety at sea. Loss of income has already occurred through the loss of gear while SFWF survey work has continued unabated since March of 2017. The referenced "financial compensation policy" which only applies to gear loss, cannot be given serious consideration as a means to effectively mitigate financial losses that are related to the proposed project or any of the listed alternatives. These are not "de minimis" actions perpetrated by Orsted since 2017. Gear losses have occurred and need to be mitigated by the developer, who pays the fisherman to not fish his gear for the length of time that he needs to survey an area. As they do in Denmark For comparison in their own country of Denmark, Orsted compensates all fishermen affected by a project from survey work through decommissioning including long term compensation if fishing grounds are in effect taken by the wind turbine project. They also do so in England, though by contract with non-disclosure clauses.

Comment Number	Comment
351-3	Rhode Island (RI) fishermen through their Coastal Resource Mgt Council's (CRMC) Fisheries Advisory Board (FAB) received a mitigation and compensation plan that was required by law. via The RI Ocean Samp process, at a cost of $3.2 mil., was paid for by Deepwater Wind. The Ocean Samp worked in tandem with the RI-MA BOEM Offshore Wind Task force to choose a WEA for RI in state (BIWF) and federal (RI-WEA) waters. A negotiation fund paid for by the developer of any "large-scale" offshore wind project in RI state or federal WEA waters was created by the CRMC to include a mitigation and compensation plan that had to be approved by the FAB prior to the project receiving federal consistency. As such, RI fishermen were compensated for the negative economic effects of the Block Island Wind farm and will be for the South Fork Wind Project, (as will Massachusetts fishermen due to their Memorandum of Understanding signed with RI prior to final approval of the Ocean SAMP. To date, New York fishermen have received zero fair, equitable or just mitigation or compensation for the SFWF or the SFEC. BOEM must, as a condition of approval of any offshore wind farm lease and Construction and Operation Plan approval, work with fisheries stakeholders to create a national fisheries mitigation and compensation plan prior to approval of any wind farm project. The plan must be fair, transparent and hold OSW developers accountable for commercial fishing conflicts that arise as a result of BOEM's WEA leasing, before Construction and Operations plans are approved.
363-67	Due to the significant procedural shortcomings in OSW to date failing to minimize conflicts through project siting and design, compensatory mitigation has become a central focus of fishermen with regard to the project review. To date, we are only aware of two efforts to address compensatory (financial) mitigation to fisheries impacts from the SFWF project: • In Rhode Island, the Ocean Special Area Management Plan, which was developed through extensive public input and review to facilitate the Block Island Wind Farm in RI state waters, requires a developer to engage in direct negotiations with a state-convened Fishermen's Advisory Board. Earlier this month, news outlets reported that the process had reached an "impasse." Although details are sparse, these reports indicate that Ørsted proposed an offer which the fisheries representatives rejected based on different approaches to impacts valuation. • In New York, Article VII of the Public Service Law imposes a Certification Review Process for Major Electric and Fuel Gas Transmission Facilities administered by the state's Public Service Commission. Through this process for SFWF, an administrative law judge is in the process of drafting an advisory opinion regarding, among other items, mitigation measures required to receive a certification for plans to construct the project cable. Lacking other opportunities to secure compensatory mitigation, NY fishing interests advocated to include it through this process, at considerable time and effort. Although not originally included in the project application, a "Joint Proposal" from the signatory parties (SFWF, LIPA, and community groups but not including fisheries representatives) currently contemplates a "robust Fisheries Compensation Plan to offset the potential for any disruption to mariners during various phases of the Project." However, this plan lacks any specific details. Furthermore, PSC only has jurisdiction over state waters portions of the project, therefore any provisions for compensatory mitigation, even if they are ultimately required, would apply only to the portions of the export cable within 3 miles of shore. RODA asks that the plan be revised to include the full project area. • In Massachusetts, there is no publicly available information as to potential compensatory mitigation from SFWF to affected fishing communities. However, Massachusetts used its authority under the Coastal Zone Management Act to negotiate a settlement on behalf of fishermen and fishing businesses in the state. While it can be assumed that a similar process may occur for SFWF, there is no policy or process in place to understand whether or how this would occur, what would inform valuation, or for what purposes funds would be used. This situation is incomprehensible to fishermen (or anyone), contrary to public participation principles, and has been likened by our members to a game of "Whack-a-Mole" where they are left not knowing where to turn, what is coming next, or whether they are included at all.

Comment Number	Comment
363-71	Specific to fishing, most other countries that are implementing OSW development have explicit policies or laws directing such compensation to occur. Therefore, such requirements are both practical and expected by OSW investors and developers, who operate on global scales. The United States must, at a minimum, not afford lesser care to our historic, essential (and more heavily regulated) seafood sector than those constituents receive elsewhere. Some examples include: • In the United Kingdom, there is no legal requirement for compensatory mitigation. However, in practice, disruption payments are made for “demonstrable loss of fishery access or economic disadvantage caused directly to active fishing vessels by disturbance or displacement.” Best practices put forward in the public-private Fishing Liaison With Offshore Wind And Wet Renewables Group (FLOWW) (convened by the Crown Estate or BOEM’s approximate equivalent) detail the process for determining values. While there has been criticism of this structure in the UK, and it would merit significant changes before adoption in the U.S., the point remains that engagement with, and adequate compensation of, fishing communities with federal oversight is the norm. • In Denmark, a developer must contact commercial fishermen in the area to negotiate compensation for “documented loss of earnings” by law. • In India, compensation is required for disruption according to government policies on “rehabilitation and resettlement.” Affected fishing communities may also be able to seek constitutional recourse to protect their right to freedom of profession and right to life under Articles 19-21 of the Indian Constitution. • In China, if fishery facilities are located on a project site, the developer may need to negotiate compensation with the owner of these facilities on a case-by-case basis, or pay compensation based on the local compensation standards. • In Japan, OSW projects must not cause any adverse impacts on fishery activities. A developer must consult with the fisheries members of local councils (kyogikai) to determine whether a project could cause any adverse impacts--if any are identified the government will not designate the site as an OSW zone. In Korea, the law requires developers to obtain consent from “interested parties” (including persons with fishing rights) for the use of public waters and a developer is liable to compensate fishermen for losses, e.g., reduction in the revenues of fishing business, arising out of the use of those waters. • In Taiwan, as fishermen hold exclusive rights that may be impacted by OSW, obtaining an OSW permit requires a compensation agreement with the fishermen’s association. The government has promulgated a guidance document setting the standards for such negotiation. As noted earlier, the need for the DEIS to consider transparent approaches to compensatory mitigation was raised during the SFWF scoping process, and it is entirely unclear why it is not included in the range of alternatives.
363-73	The economic burden from losing fishing gear must be fully accounted for and compensated, in order to avoid unreasonable interference. To maximize catch, fishermen will use the ‘best’ gear available to them onboard, meaning that when gear is lost or damaged, any secondary or tertiary gear will be less efficient, if they are fortunate to even have backup gear. Furthermore, replacement for gear lost may not be readily available. Gear providers, such as net builders, may have other orders to fill or may only construct certain types of nets or mesh sizes twice a year. Given management and biological restrictions on fishing seasons, the impacts of delays can be substantial. These types of burdens should be accounted for and reflected in the compensation provided through claims. In fact, BOEM has already established a pattern and practice of permitting OSW project siting and construction activities without due consideration of impacts to commercial fishing in the form of loss to fishing gear, or requiring prerequisite site assessment information from G&G surveys that necessarily require the displacement of fishing activity, disrupt the normal placement of fishing gear, and result in the loss of fishing gear.
366-9	"Potential Impacts to Fishing Gear" found in Chapter 3 of the SFWF DEIS, on pgs. 3-101/2 states "DWSF has also developed a financial compensation policy for use when interactions between the fishing industries and Project activities or infrastructure cause undue interference with gear (Jacobs 2020). The use of this financial compensation program for damage to or loss of fishing gear during operation would reduce any moderate impacts to negligible or minor levels." Since 2016, local fishermen within the Town of East Hampton have requested that the SFWF and SFEC’s first owner Deepwater and second owner Orsted’s representatives work with the Town’s Fisheries Advisory committee to create a comprehensive fisheries compensation and mitigation plan (Fish-COMP) as such that exists in Rhode Island. The LICFA continually petitioned the EHT Board and Deepwater Wind that the FAC be included in the development of any such Fisheries Mitigation plan for the last five years, without relief. We have made that case known in writing, during public testimony, in town hall meetings, at the public hearing with the SFWF in May of 2018, and repeatedly throughout this process. Fishermen have been ignored, consistently. BOEM must address the total lack of compensation and mitigation for New York’s commercial fishermen through all stages of any offshore project from survey through decommissioning, because it is a major impact to New York for the SFWF/SFEC project, and any other WEA that is developed.

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366-13	There has been no willingness on Orsted's part to fairly and equitably compensate fishermen for the "unreasonable interference" that this project commits upon all commercial fishermen who work in or near the SFWF WEA or on the ocean bottomland taken by SFEC transmission cables, nor for those who must navigate through the SFWF, within the project envelope and overall Maximum Work Area (MWA) to access their fishing grounds to the south and east. The SFWF will create major negative impacts to the commercial fishing industry through loss of income, loss of catch, loss through "taking" of historic fishing grounds via armoring of benthic habitat and loss of safety at sea. Loss of income has already occurred through the loss of gear by several local fishermen while survey work has continued unabated since March of 2017. The SFWF-referenced "financial compensation policy" which only applies to gear loss, cannot be given serious consideration as a means to effectively mitigate financial losses that are related to the proposed project or any of the listed alternatives. These are not "de minimis" actions committed by then DWW/now Orsted since surveys began in March of 2017. In their own country of Denmark, Orsted compensates all fishermen affected by a project from survey work through decommissioning including long term compensation if fishing grounds are in effect taken by the wind turbine project. It is a requirement of Danish Fisheries Law. Offshore wind developers also compensate fishermen in England, though by contract with non-disclosure clauses.
366-14	BOEM must create a national policy for fisheries mitigation and compensation with fishermen at the table, a full, equitable and fair policy that must be analyzed and industry approved, not only for the SFWF, but cumulatively for all WEA within the RI-MA WEA, and throughout the Atlantic from North Carolina through to Maine to mitigate and compensate for economic losses as a result of their Offshore Wind Energy Areas lease program in the EEZ and additionally for transmission cables that traverse federal waters to end sites in various states along the Eastern Seaboard. That is not, as the Solicitor stated in BOEM Memorandum 37059, pg. 12. "Further, it is important to observe that any compensation system established by the lessee to make users of the lease whole financially does not negate interference-indeed the creation of such a system presumes interference. As such, any proposed compensation should not be viewed as "curing" any 8 (p)(a(I) interference since the statute does not provide for such a cure."
378-11	Judith Hope: You hear me? Yes. Thank you, my name is Judith Hope, that's J-U-D-I-T-H, last name Hope, H-O-P-E, a former town supervisor of East Hampton, Long Island, the community that will be most impacted by the South Fork Wind Energy project. The turbines will be located at 35 miles offshore of Montauk, as has been stated. Montauk, with its famous and historic fishing and tourism economy. Montauk is the most easterly community within the town of East Hampton. The transmission cable from the turbines to the compound distribution center are proposed to come ashore in Wainscott, a small, wealthy enclave of mostly second-home owners on the west end of East Hampton town, who have organized to oppose the project. The need for an additional energy source on eastern Long Island is urgent and must not be delayed. South Fork Wind would supply energy to approximately 70,000 homes in this area, which would greatly alleviate the strain on the system. Currently diesel-burning peaker plants provide electricity during high-demand periods. East Hampton is projected to greatly exceed our current energy supply due to two decades of steady growth now accelerated by the arrival of year-round COVID refugees from New York City. The noxious black emissions from these peaker plants are clearly visible during much of the year. The source of local air pollution would be dramatically reduced or eliminated entirely with the South Fork Wind project. Every fundamental change in establish systems involves tradeoffs. Usually, one side of economic and environmental interests sacrifices more than the other side. But remarkably that does not seem to be the case with the South Fork Wind project. The local economy of Montauk will benefit greatly if the Block Island Wind Farm is any guide. Tourism will not suffer at all. In fact, the Block Island Wind Farm is actually become a destination with visitors eager to see and learn about the technology that has long provided electricity to Europeans but is new to us. The local fishing industry, which has long suffered under enormous pressures both environmental and economic, would most certainly benefit in the long run. A major cause of decline in Montauk commercial fisheries is due to the deterioration of the marine environment and the impact on species migration caused by climate change. If we do not begin the long and difficult challenge of slowing, ceasing, and eventually reversing this environmental travesty, commercial fishing, as we have known it will cease to exist entirely. South Fork wind project would be an important part, an important first step toward realizing the ambitious clean energy goals of both New York State and East Hampton town. As for sports fishing, so important to the tourism industry of Eastern Long Island, the Block Island example is that the turbines have become the equivalent of artificial reefs, attracting great numbers and varieties of fish. The turbines have actually benefited this important marine economy. The commercial fishing industry, regarding concerns, regarding the potential impact on their livelihood, is real and valid and receives appropriate attention in the draft environmental impact statement. But one area that needs clarification is this. A well-defined process should be established and published with clear rules and standards for compensation of losses suffered during the construction period due to damage to rigs, lost fishing time, or any other risks that can be reasonably due to the presence of South Fork wind activity in the construction area. Such a process and also include standards or compensation of damages caused by South Fork during the maintenance of the turbines. The developers have agreed or expressed their willingness to do so, but if there's an agreement about the proposed process, the general public is not aware of it. I see I'm almost out my time, but I just want to conclude by urging of quick attention to approve the South Fork Wind Farm. We are already seeing the effects of climate change on the east end with devastating impacts. The Shelter Island ferry has applied to raise their docks because of rising sea levels, same with the docks in Montauk. We've lost thousands of old-growth pines in East Hampton due to the invasion of the

Comment Number	Comment
	southern pine beetle, again due to climate change. Please act favorably and expeditiously on this application. It is a wonderful first step towards a clean environment, a clean planet, and the clean energy that we all seek to realize. Thank you so much.
380-34	Julie Evans: Thank you, my name is Captain Julie Evans, E-V-A-N-S, and I function as the fisheries advisory committee for the town of East Hampton representative to offshore wind. And, of course, we're very concerned about this project. As the past few speakers have told you, the option of passing through a very narrow corridor in, in terrible weather as Dan Farnham said or economic restrictions as Bonnie or Meghan said. With aid to be close to their vessels is something that we're, we're opposed to here in East Hampton New York. We also have the cable landing coming on, so we are the epicenter for offshore wind development in the United States, and I'm really hoping that BOEM will work towards getting this right. And by getting it right, I mean doing right by our fishermen. I've had the experience of dealing with two cases where fishermen last year, due to no fault of their own, but due to the fault of Orsted's survey boats. Both fishermen were kind of just tossed aside by the company. We hear about jobs. We're going to get all these great jobs, so where, where, where are the jobs we already have, where are the fishing jobs going to go? It's, it's a question that I don't see any answers to, and I think BOEM needs to do a lot more investigation and I certainly would be happy to help since I've been working on this issue since April of 2018. There is no application set in stone that a fisherman knows that if he loses his gear to any kind of interaction with offshore wind survey boats, or any kind of boats, or any investigative measures, that they will be compensated for their losses. And I'm not just talking about their gear, I'm talking about their time, I'm talking about their lost fuel, lost bait. There's a lot that goes into fishing that I don't think many people really understand. So, my hope, and all I can do is hope at this point, is that BOEM will spend a lot more time looking at the mitigation and compensation to fishermen who lose gear, who lose their time, whose access to their species due the activities of offshore wind and I will supply comments before the 22nd as well. And I can supply you with case studies if you'd like. There's a lot more work that needs to be done here. I don't think people really dislike fishermen that much that they'd like to get rid of them, so I think if you like to eat seafood, you might want to spend a little bit more time on this. Thank you very much.
364-4	Essential elements to be evaluated within the scope of the project should include: The establishment of an ecological mitigation fund to guarantee the ability to successfully mitigate environmental harm and economic impact to commercial fisheries.
380-32	Bonnie Brady: As far as the other, the fisheries communication plan, is the primary mitigation measure, but it is not a mitigation measure. There is no compensatory mechanism for losses from displacement for survey work through decommissioning. I spent four hours recently with a fisherman who was trying to appeal being shot down because they drove through his gear, not once, not twice, but three times, in order to be able to put the forms together for him, so he could submit that. As far as in right whales, I mean if you read that DEIS, it has, they talked about up to 30 days of pile driving for that one small 15 turbine project. Now imagine the buildout in the steel forest of thousands, and all you have to do is look at the right whale slow zones that have appeared, and basically for the last year, right whales have spent the entire time in the Rhode Island/Massachusetts wind energy area. I don't understand how anyone can call themselves an environmentalist and allow something like that to happen. There's not any amount of slow-down, slow-start, stop the process that could have the effect of the amount of power behind that pile driving.
363-4	Develop and require a comprehensive, science-based, inclusive, and predictable plans for compensatory mitigation of impacts to fishing communities; • Work closely with the fishing industry to determine methods to improve the timeliness and utility of communications regarding OSW in culturally appropriate formats; • Implement a standardized process for gear loss claims;

Response to comments: Table 3.11-1 in Attachment 3 of Appendix E notes that reasonably foreseeable fishery management actions include measures to reduce the risk of interactions between fishing gear and the North Atlantic right whale. As stated in Table G-1 in Appendix G, SFW is committed to collaborative science with commercial and recreational fishing industries; agencies; non-governmental organizations; and marine mammal scientists to improve and expand the knowledge of this species and their interaction with offshore wind development. Per Section 3.5.1 of the FEIS, after BOEM held a lengthy stakeholder and scientific review process a large portion of Cox Ledge was excluded from leasing, thereby helping protect these fishing grounds from future offshore wind energy development.

As stated in Section 3.5.1.2.3 of the FEIS, SFW has developed a financial compensation policy to be used when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing gear. In addition, Appendix G of the Final EIS has been updated to include modifications and/or additional mitigation and monitoring measures that BOEM could consider for adoption in the Record of Decision and would be required as conditions of approval. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could also be considered by decision makers and incorporated into the Record of Decision. BOEM is open to working with state partners and the commercial and recreational fishing industries to investigate alternative strategies to negotiate compensatory mitigation agreements. South Fork Wind, LLC has negotiated agreements with the State of New York, the State of Rhode Island and the Commonwealth of Massachusetts to determine compensation packages for fishermen.

As stated in Table G-1 in Appendix G, during implementation of the proposed Project, communications and outreach with the commercial and recreational fishing industries would be guided by the Project-specific Fisheries Communications Plan (COP, Appendix B). This outreach would be led by the SFW Fisheries Liaisons. Fisheries Representatives from the ports of Montauk, Point Judith, and New Bedford represent the fishing community.

Comment theme: Collaboration with the commercial fishing industries and other agencies.

Associated comments

Table I-297 provides the full list of comments received as part of this comment theme.

Table I-297. Collaboration with the commercial fishing industries and other agencies comments.

Comment Number	Comment
363-109	Fisheries monitoring will be insufficient for the SFWF project and other near-term offshore development if approached on a project-by-project basis. OSW developers are required to develop fisheries monitoring plans; this is essential, however, their utility will be limited without appropriate study design and coordination. They are likely to have less than two years of baseline data making it difficult to understand true impacts to stocks with high interannual variability. It is imperative to be able to detect any changes in abundance and distribution of fish and invertebrate species resulting from OSW development. Ørsted has made recent improvements to its direct work with the fishing industry, including several webinars with federal, state, and industry experts to gain feedback on its draft fisheries monitoring plans. It has also hired a full-time Ph.D. fisheries scientist to further its work in this area and participated in the Interim Fisheries Monitoring Working Group organized by the Responsible Offshore Science Alliance (ROSA). RODA supports this proactive approach that Ørsted has taken to incorporate strong fisheries science upfront. With the revocation of the “One Federal Decision” policy, NOAA Fisheries should be authorized to formally approve the fisheries monitoring plans, as they are the national agency of fisheries experts. Currently, there are no rules for reviewing the monitoring plans, which has led to ad hoc reviews and no requirements for inclusion of any recommendations. RODA encourages Ørsted to incorporate the revisions proposed by NOAA Fisheries and Massachusetts Division of Marine Fisheries to its fisheries monitoring plan that would improve the utility and better our understanding of the impacts OSW developments have in U.S. waters. BOEM must require monitoring and research to extend from three to five years prior to construction (or as soon as there is reason to believe an area may be considered for OSW development) until three to five years after decommissioning. Too little is currently known regarding the impacts of OSW developments on local ecosystems, resulting in these long-term experiments. The Fisheries Communication Plan states that “DWSF is committed to collaborative science with the commercial and recreational fishing industries pre-, during, and post-construction.” This commitment should extend for more than two years to collect sufficient data for analysis of impacts. Since research wasn’t designed early enough in the leasing process it is unclear that standard scientific methods like control areas can be accommodated in the MA/RI WEAs. If control areas are required for sound study design, BOEM must consider that in its NEPA review. Additional funding must be allocated to federal agencies and research institutions in order to be able to address these uncertainties in order to supplement the research funds spent by developers. Priority for funding should be given to fisheries-related research, ideally through existing cooperative research programs, e.g. NMFS wind team, the regional fishery management councils and ROSA. Fishermen and developers have come together as part of ROSA to increase mutual understanding and this cooperative effort should be supported; research that directly involves fishermen would greatly benefit from fishermen’s expertise and would also have a higher acceptance from the fishing industry as a whole.

Comment Number	Comment
363-10	Require robust fisheries monitoring for the life of OSW projects, including during site characterization activities and past decommissioning, and utilize adaptive management to incorporate lessons learned into future OSW decisions;
363-11	Fully fund mitigation of impacts to National Marine Fisheries Service (NMFS) fishery-independent surveys, including likely replacement of survey effort through cooperative research with fishermen; • Perform thorough analyses on the cumulative impacts of OSW to right whales, particularly in the MA/RI WEAs, including all project phases and ensure that no take occurs for any reason;
338-46	50. The Agencies recommend that mitigation measures include research or other investments in fishing methods within wind farms. As stated on p. 3-104: "some commercial fisheries and for-hire recreational fishing would have to adjust somewhat to account for disruptions due to local or notable regional adverse impacts."
279-2	More broadly, we continue to be concerned by the fact that the pace of development is generally exceeding the pace of research, particularly in the gathering of baseline data. For example, siting discussions for the SFWF are occurring in the middle of a three-year BOEM-funded study to assess movements and habitat use of recreationally important species such as cod, weakfish, and black sea bass within BOEM lease areas—including the SFWF lease area.

Response to comments: As reflected in Table G-1 in Appendix G, SFW is committed to collaborative science with the commercial and recreational fishing industries pre-, during, and post-construction.

Comment theme: Cable monitoring.

Associated comments

Table I-298 provides the full list of comments received as part of this comment theme.

Table I-298. Cable monitoring comment.

Comment Number	Comment
310-19	There was no description of the required monitoring in areas where [cable] repairs are made. If repairs are made, monitoring should again be required on an annual basis for the first 3 years. Furthermore, the fisheries communication plan should include protocols for cable repairs. The fishing industry should be notified when areas of exposed cable are detected during the monitoring process but repair and burial cannot be accomplished immediately.

Response to comments: As stated in Table G-2 in Appendix G, BOEM could require that SFW provide BOEM with a cable monitoring report within 45 calendar days following each inter-array and export cable inspection to determine cable location, burial depths, state of the cable, and site conditions.

Comment theme: Decommissioning impacts to fishing grounds.

Associated comments

Table I-299 provides the full list of comments received as part of this comment theme.

Table I-299. Decommissioning impacts to fishing grounds comments.

Comment Number	Comment
363-77	The risk to safety for the fishing industry may remain even after an OSW project is decommissioned. The minimum depth at which monopile foundations will be cut is 1 meter. This is half the depth of the proposed cable burial depth. The fishing industry is highly concerned about gear hanging up on cable buried at 2 m. If full decommissioning is not possible or required then the EIS analysis should reflect this.
363-81	The fishing industry is at risk of permanently losing fishing grounds depending on the actual approach to decommissioning. If the developers cannot afford to decommission or posit that the turbines or associated structure are best left in place as an artificial reef, this could result in a permanent loss of fishing grounds, which is not analyzed within the DEIS.

Response to comments: As stated in the conceptual decommissioning discussion in Section 3.5.1.2.3 of the FEIS, within 2 years of cancellation, expiration, or other termination of the Lease, the lessee would remove or decommission all facilities, projects, cables, pipelines, and obstructions and clear the seabed of all obstructions created by activities on the leased area. Any cut and cleared cables would typically have the exposed ends weighted with clump anchors so that the cables cannot be snagged by fishing gear.

Comment theme: Alternative impacts to the squid fishery.

Associated comments

Table I-300 provides the full list of comments received as part of this comment theme.

Table I-300. Alternative impacts to the squid fishery comment.

Comment Number	Comment
366-20	Without the RODA Vessel Transit Lane configuration proposal chosen as a preferred alternative, New York vessels could see an additional 12 hours in transit time in each direction (24 hours round trip). In particular, the Illex squid fishery valued at $24 million annually could be decimated, as vessels must offload the ilex squid within 48 hours of catching it, an additional 12 hours in transit time would significantly decrease the viable fishing window for these vessels. Other million-dollar-fisheries to New York in that area that must be accessed include the loligo squid ($6 mil. annually), scup ($3 mil.) and whiting ($1.5 mil.) fisheries.

Response to comments: The adverse impacts to commercial fisheries and for-hire recreational fishing would be lower under the Vessel Transit Lane alternative in comparison to the Proposed Action. As described in Section 3.5.1.2.4, it is estimated that the revenue at risk under the Transit alternative across all FMP fisheries during the construction phase would be about 5% lower than under the Proposed Action. During O&M, the revenue at risk would be around 45% lower than under the Proposed Action.

Comment theme: Commercial fishing access.

Associated comments

Table I-301 provides the full list of comments received as part of this comment theme.

Table I-301. Commercial fishing access comment.

Comment Number	Comment
157-4	CONSIDERATION OF EXISTING OCEAN USES – COMMERCIAL FISHERIES AND NMFS SURVEYS In order to provide an example of use conflict, an analysis was performed by Azavea, a Philadelphia, Pa. firm specializing in geospatial analysis and visualization for environmental impact. The report of the resulting analysis looked at the spatial operational needs of Atlantic surfclam vessels; The report is attached and is to be considered as part of this submission. Azavea was given access to the vessel monitoring system (VMS) data of the five Atlantic surfclam vessels of LaMonica Fine Foods and Azavea performed a conflict analysis for NJ Lease OCS-A 0499, one of the lease areas that should be considered when determining cumulative impacts of offshore wind energy. The analysis of the VMS data determined that the median size of a polygon representative of fishing trips was 10.6 sq. nm. Half of the trips were smaller than 10 sq. nm and 47 trips or 32.6% were smaller than 5 sq. nm. The minimum operability thresholds for the operation of a surfclam vessel is much greater than that which is provided by a 1.15 nm x 1.15 nm grid turbine spacing with interarray cabling described in the COP. The South Fork Wind Farm COP has not shown that this project will not unreasonably interfere with commercial fishing by the large vessels using mobile bottom tending gear on the Outer Continental Shelf (OCS). The exact location, burial depths and method of the cable burial are critical to assessing its impacts to commercial fishing as well as its environmental impacts. These are not described adequately within the EIS, alternatives were not considered, and input from fishermen was not included. Fishing isn't allowed within any European wind energy areas outside of England because of the dangers of catching an interarray cable carrying 66,000 volts. Although these interarray cables will be buried between 5 – 8' deep, surfclam and ocean quahog vessels that fluidize the high energy sand of the OCS to harvest clams will not be able to fish where these cables are buried due to the extremely high risk to life and property if a cable is exposed and caught. The underwater turbine linkage maps show a poorly constructed plan if facilitation of fishing vessel operations is desired. (COP Figure 3.1-1) Mobile gear fishermen in Europe report that the frequency of cable exposure makes the cables even more restrictive to fishing than turbines. Between the turbine spacing and the interarray cables, wind energy areas will essentially become no fishing zones for the large mobile bottom tending gear fleet of vessels once construction starts for the life of the wind farm and potentially forever. The lack of information and requirements in the DEIS about decommissioning means this action will likely cause a permanent alteration of the marine environment and permanent zones that some fisheries find too risky to harvest within. Even if there is no regulatory restrictions from keeping a surfclam or ocean quahog vessel from fishing within a wind array the minimum operability thresholds for these vessel, along with the risk of catching a high voltage cable will unreasonably interfere with commercial fishing and prevent harvests within the array. The feedback of turbine emplacement on stock assessments is potentially the most important economic impact. An important issue is the degree to which adverse impacts would accrue to the science conducted by NMFS and the various states. This would include fisheries independent surveys, but also other science activities conducted by NMFS, such as endangered species monitoring and other physical and biological assessments including essential fish habitat assessments in the region. The DEIS broadly lists what these effects are likely to be and categorizes them as major. The logic used in the DEIS for major impact is that surveys will be impaired, uncertainty will increase, and quotas will be lowered (or eliminated). The DEIS notes that surveys within the turbine field are unlikely and that this will increase uncertainty in assessments, but without any estimates of effect. For some species, the actual impact would begin with a contraction of the total stock. Simply put, the only recourse in the assessment would be to assume that no stock exists in un-surveyed areas. The example of the region east of Nantucket and the clam survey is a good example. Here, the fishery has caught clams for many years, yet the region is not surveyed, and those clams are not, therefore, included in the stock estimate. The wind turbine field would also be debited from the stock footprint. Consequently, estimated stock carrying capacity would be reduced. As the target and threshold reference points are directly related to carrying capacity, these also would be reduced. This would reduce the Overfishing Limit (OFL) and ultimately the Allowable Biological Catch (ABC). Consequently, the possibility of an overfished state or that overfishing occurred would increase. Quota reductions would be a likely result. It is important to realize that any unknown generates additional uncertainty that ultimately favors a quota reduction. It is important to realize that this impact is perpetual. That is, the economic damage is realized each year that the turbine field exists and restricts survey completeness. It is also important to realize that long-term recovery after decommissioning might result in decadal and longer impacts on fishing of long-lived species, a timeline and effect level not contemplated in the current DEIS. Importantly, the DEIS does not show any estimates of effect of reductions in spatial footprint of monitoring on uncertainty in governance (quota calculations considering risk policy), even though simulations using Management Strategy Evaluation (MSE) technology are readily possible with today's software that would enable one to quantify the potential damage. As yet then, we do not know how assessment models may respond to changing survey (and landings) inputs relative to defined reference points. It is important to note that under the MAFMC risk policy, increases in uncertainty in estimates of stock status and factors affecting population and ecosystem dynamics result in more precautionary advice when deriving ABCs.

Comment Number	Comment
	In summary, the DEIS discusses impacts of wind energy areas to managed fisheries and notes these impacts will be among the greatest impacts of the project. The DEIS correctly indicates that impacts owing to inability of federal fisheries management agencies to conduct annual stock surveys within the wind area footprint will be major. However, the DEIS does not address the scale and scope of these impacts. Given the size and location of the cumulative wind leases, which overlap with important portions of many economically and culturally important stocks, the effect on scientific advice to inform management resulting from an inability to survey may be one of the biggest anticipated impacts of the wind project - but the scale of the consequences is not known. It is likely that the magnitude of the effect will vary by species, and that this uncertainty will be further compounded for fished species that are experiencing distribution shifts (both among and within years) due to climate change as the proportions of stocks being available/unavailable to monitoring will change as the spatial footprint of wind farm development changes (increases) over time during regional deployment, also exacerbating dynamic changes to biological reference points. Also discovered in the Azavea report is that looking at the years between 2007 and 2018 as little as 1.1%, but as much as 30.0% of the fleets fishing time, according to the VMS data, was spent in this one wind energy lease area (NJ Lease OCS-A 0499) during a given year. Fishery biomass shifts over time due to environmental factors. The Atlantic surfclam and ocean quahog fishery If we are to take thousands of square miles of historic fishing grounds and virtually make them off-limits to large mobile tending bottom fishing vessels in the mid- Atlantic bight, some of the United States' most productive fishing grounds, we risk making off limits grounds that will be vital to the survival of many fishing businesses. Allowing such expansive areas to be operated by wind energy companies w/ 1 nm x 1 nm turbine spacing such as is being considered, preventing fisheries to operate these historic fishing grounds, by not accommodating the spatial operational needs of the fisheries, by causing the removal of portions of the fishery quota due to inaccessibility of NMFS survey vessels and the resulting increased uncertainty this will cause, the fishing industry is sure to contract significantly and some businesses to will not survive the addition of wind energy as a user group to our waters at this scale. This is not consistent with the national need for food security and the national need to enable our fisheries to operate. For these considerations of existing use of the OCS and national needs, BOEM must disapprove of the South Fork Wind Farm and South Fork Export Cable Project.

Response to comments: As discussed in Section 3.5.1.2.3 of the FEIS, the navigational safety risk assessment prepared for the Project indicates that it is technically possible to fish and transit through the SFWF. BOEM believes it is possible to tow a net or dredge through a wind energy area. However, BOEM is cognizant that maneuverability within a wind farm may vary depending on factors such as vessel size, fishing gear or method used, and/or environmental conditions. Ultimately, fishing within a wind facility will be the decision of the vessel operator, based upon a variety of factors, including any arrangements, agreements, or mitigation measures adopted by the developer, or modification of fishing practices by vessel operators to reduce the risk of fishing within or nearby the area. The Final EIS analyzes the impacts on scientific surveys in Section 3.5.7.

Comment theme: General commercial fishing concerns.

Associated comments

Table I-302 provides the full list of comments received as part of this comment theme.

Table I-302. General commercial fishing concerns comments.

Comment Number	Comment
333-2	It is also imperative that we don't trade off one natural renewal resource (seafood) for another (electricity)

Comment Number	Comment
121-2	The fishing industry will undoubtedly be impacted by turbines especially when it comes to navigation whether maneuvering around while fishing or having to alter course to less favorable conditions in rough weather. As for the disruption of the seafloor and how that affects fish stocks I have little knowledge. What I do know is that draggers have been destroying the sea bed for as long as they've been deployed. Furthermore the fishing industry doesn't seem to have the same concerns to wildlife when it comes to lost and damaged gear that ends up in the water, and more and more frequently, on the beach where many people, myself included, spend a lot of time and energy picking up and removing the dangerous nets, hooks and lines not to mention plastic that washes up on our shores directly from fishing boats. What we see is a tiny percentage of what remains in the water and on the sea bed. Wildlife entanglement and death is horrific and unacceptable.
335-4	To conclude, the pursuit of offshore renewable energy projects cannot lose sight of the economic benefits and social importance that small family-owned fishing businesses bring to the fabric of our nation. Nor can it ignore the impacts to the marine environment.
307-1	I have been in the fishing industry for 51 years and have worked in Alaska, Canada, Washington, Oregon, California, and Mexico. Primarily I have managed production facilities but also spent a decade doing international sales and nearly two decades co-chairing a subpanel on the Pacific Fishery Management Council. Every fishermen and processor on the east and west coast I have discussed offshore wind energy with have reservations and concerns about the the scope of these wind farms, the size of the wind generators and the fact that we are moving at a "regulatory" lightening speed to install wind farms without properly vetting the impacts it will have on our livelihoods, our industry, and our fishing communities. The process is flawed in our view. This is not to say there may be ways to co-exist but this does not seem to be a priority amongst the wind energy proponents, investors and BOEM.
145-4	Impacts to recreational and commercial fishing must also continue to be assessed, including possible economic, cultural, and safety concerns. Turbines could potentially create dangerous situations for fishermen, as well as other ocean users such as pleasure boaters and divers.
347-1	CZM previously offered comments on the cooperating agency draft of the DEIS, the majority of which were addressed in the DEIS. The efforts that BOEM and DWSF have made to engage with resource agencies, commercial fishermen, non-governmental agencies, and the concerned public have resulted in a stronger document that is largely responsive to issues raised. However, one issue that remains a concern for the Commonwealth of Massachusetts is the impact of the construction and operation of the SFWF on the region's commercial and recreational fisheries.
157-1	The Bureau of Ocean Energy Management (BOEM) has chosen lease areas in the mid-Atlantic bight by considering the geographic sensitivity of demand in the mid-Atlantic/New England regions, the wind energy resource and the fewest apparent environmental and use conflicts. This process has deconflicted most all other ocean uses while the impacts of the areas chosen for wind energy leases falls heavily on the fishing industry and fisheries resources. This has been a multi-year exercise and BOEM must now consider the adverse environmental impacts and use conflicts to decide if the benefits of the project justify the cumulative adverse impacts.

Response to comments: BOEM will consider all impacts to the human environment when making its decision regarding the proposed Project and the alternatives.

The FEIS describes the impacts of the proposed Project and alternatives to commercial fisheries and for-hire recreational fishing in Section 3.5.1. Impacts to private recreational fishing are described in Section 3.5.8. Impacts to marine biological resources and their habitats are described in Section 3.4. Given the small offshore footprint of the proposed Project, the amount of lost and damaged fishing gear that ends up in the water is unlikely to appreciably increase. In addition, as described in the FEIS, SFW would reduce the occurrence of accidental snagging of fishing gear by burying all cables and conducting remote surveys of cable placements to confirm cables remain buried and that rock placement and concrete mattresses remain secured and undamaged. Additionally, the WTGs would be laid out in rows that run from east to west in order to 1) avoid gear conflict between fishermen who use mobile gear and those who use fixed gear and 2) create predictable lanes within which boats with mobile gear can fish.

The methodologies and sources of information used in the impact analysis, as detailed in Section 3.5 of the FEIS, are consistent with CEQ regulations demanding information of ''high quality'' and professional integrity.

Comment theme: Project impacts to safe navigation and maritime operations.

Associated comments

Table I-303 provides the full list of comments received as part of this comment theme.

Table I-303. Project impacts to safe navigation and maritime operations comment.

Comment Number	Comment
301-2	"• Commercial and Recreational Fisheries. BOEM should reconsider the impacts based on the evidence that supports safe navigation and maritime operations as well as the modifications to Project design that SFW has implemented to reduce operational impacts to the fishing industry."

Response to comments: The FEIS analyzes impacts to the safety of navigation and maritime operations, which BOEM will consider when making its decision regarding the proposed Project and the alternatives.

Comment theme: SFW Fisheries Communication Plan.

Associated comments

Table I-304 provides the full list of comments received as part of this comment theme.

Table I-304. SFW Fisheries Communication Plan comments.

Comment Number	Comment
363-63	RODA commends Ørsted for having the largest network of Fisheries Liaisons and Representatives of any OSW developer in the U.S. Even more laudable is its decision to employ well-regarded fisheries scientists coordinate its monitoring plans and other research efforts, which have led to noticeable improvements in its scientific portfolio. This collection of respected individuals could provide the basis of a communication, education, and collaboration powerhouse if the Fisheries Communication Plan (FCP) was improved and if these specialists were provided more opportunity to influence project design and direction. Just as Deepwater Wind was able to be more nimble in its approach to the Block Island Wind Farm because the Rhode Island SAMP supported such efforts, BOEM's adoption of a more clearly structured process for addressing fisheries interactions from federal projects could enable community-level solutions to again take precedence over lobbyists and attorneys. Again, the quality of communication between industries matters far more than the quantity. However, setting aside that a bottom-up and collaborative approach to mitigation would be far more effective than what currently occurs in OSW permitting, the informative elements of mitigation in the DEIS are critically flawed in light of the current reality. The DEIS repeatedly references SFWF's FCP as a core component of its mitigation strategy, as evidenced in multiple references to the prospect that the plan "would help ensure that fishing businesses could continue to operate with minimal disruption." Unfortunately, the Fisheries Communication Plan does not offer satisfactory mitigation in four regards: (1) it is extremely out of date; (2) several of its commitments for existing project phases in fact have not been implemented; (3) it does not evidence a full understanding of fishermen's communication styles; (4) it focuses too narrowly on one-way communications.

Comment Number	Comment
363-64	The FCP is described as a “living document that will expand and evolve as we continue to learn and move through different phases of the project.” However, the version provided with the DEIS, and referenced therein, has not been updated in nearly three years (since May 2018). Among other outdated information, it includes: • A commitment to “explore creating a Regional Fisheries Science Collaborative” (which was formed as ROSA in early 2019); • Information that it “currently envisions a North-South grid layout of the turbines in order to optimize access and navigation for fishing industry vessels. However, additional input is being gathered to inform the final turbine configuration and siting”; • An out of service website (dwwind.com) as a contact for reporting gear loss; • The wrong parent company (Deepwater Wind instead of Ørsted); and • Outdated names and contact information for fisheries representatives. The FCP states that Deepwater Wind would report on progress and concerns raised in its discussions with fishermen to BOEM periodically or every 6 months. If that occurred it should be part of the project record and subject to public comment. We were also able to locate a second version of the FCP, dated January 2021, on Ørsted’s website. This version has removed the language about turbine layout and updated some other elements but not others. For example, neither the SFWF website nor the FCP contain the names of Ørsted’s fisheries representatives.
363-65	The FCP commits to several actions in project phases leading up to the present that, to the best of our knowledge, have not been fulfilled. There are other items for which requests have been made to Ørsted to improve its implementation of the plan, which have not been met. These include, among other items: • The “[l]ist of fishing industry outreach” includes meetings through June 2018, but it is rather unclear whether most of them have any relationship to fishing. An accompanying graph appears to indicate that these meetings focused solely on recreational fishermen. Ørsted has, of course, met with fishing interests including RODA frequently since 2018 but it would be useful to have available a report on the quality of those meetings, concerns raised, and actions taken to address any concerns. • Several issues are noted as being raised by fishermen that are not addressed in the FCP or DEIS, including siting the cable route and turbines, insurance concerns, etc. • The list of Fisheries Representatives is outdated--at least the individuals listed in New Bedford and Montauk are no longer serving those roles. Ørsted’s website also does not include a list of Fisheries Representatives. The FCP also states that Ørsted will facilitate communication through a Fisheries Liaison, a project website, and public notices to mariners and vessel float plans in coordination with USCG. Developers currently circulate “Notices to Mariners” via emailed PDFs to inform fishermen of on-the-water activity on a weekly or otherwise regular basis. This is simply not an effective means of notifying fishing vessel captains and crews as they do not access PDFs either while preparing for a trip or while underway. Repeatedly, fishermen have requested Ørsted and other Atlantic leaseholding developers to improve the basic dissemination of project information--shoreside (as described in a previous section), and perhaps more importantly on the water. In Joint Industry Task Force meetings last year, fishermen and OSW developers jointly scoped a communications project that would have two core components: a website for those engaged in management and outreach discussions, and an app for mariners. The latter is a particularly urgent need given the difficulties in communicating with fishing vessel crews and safety ramifications. To be effective, this project must be a joint effort of the two industries, as it requires developers’ participation in designing usable input protocols and fishermen’s input on accessibility to ensure its utility. Unfortunately, while the fishing representatives on the Task Force prioritized development of this project, the OSW developer members did not. RODA urges BOEM to work with us to ensure that we can effectively get this critical information to fishermen, and we are happy to share details of the project scoping. We also respectfully request that timely provision of relevant project information for these purposes in a format determined by the fishing community be a condition of any OSW permit that BOEM may issue in the future.

Comment Number	Comment
363-66	The FCP largely follows BOEM's Best Management Practices for communication, but should be updated with direct input from the larger fishing community. Several items included in the action list do not align with our understanding of preferred communication styles among fishermen. • The FCP repeatedly references contact lists as a primary means of communication, but many members of the fishing community do not frequently use email or complain about receiving too many from the multitude of OSW developers; • The FCP emphasizes the use of surveys as a means to gather information, though many fishermen have voiced concern to us over providing information to OSW developers through surveys and they tend to suffer from low response rates; • The FCP appears to prioritize quantity over quality of meetings by referencing metrics of number of meetings, names on contact lists, etc. Again, Notices to Mariners in PDF format do not achieve their intended purpose; • The language in Appendix B should be wholly reconsidered or removed, as it reads condescendingly. It appears to present an approach focused on educating fishermen about a different worldview than viewing them as experts and partners in solving problems. Some of these inappropriate statements are: o "[T]he quality of the relationship is as important as the content of the presentation." o "DWSF staff and contractors are prepared to listen to concerns that may be coming from bad past experiences or fear and to answer questions without getting defensive." o "Communication should be a two-way dialogue whenever possible. Fishermen need accurate information to make informed decisions and provide informed input, but two-way dialogue is the best way (1) to ensure they understand the information, (2) to gather informed input, and (3) to increase credibility in the end product." o "Bad news doesn't get better with age. Delaying the release of information or decisions may raise questions among fishermen about the cause of the delay and spur rumors that information is being controlled or manipulated. Immediate release of all news, good or bad, is important to maintain transparency." BOEM and Ørsted should consider whether they would be satisfied with this language if on the receiving end, or whether it paints the subject as simply uninformed or naive, particularly when the authors are from such different cultural backgrounds. RODA urges a revisioning of how fisheries and OSW communications are approached between the two industries and urges BOEM to play an active role in such an effort.
366-12	The Fisheries Communication Plan presented initially by DWW and assumed by Orsted, is purely a public relations document that only offers one-way communication from the developer.

Response to comments: The FEIS's conclusions regarding impacts do not rely on SFW's Fisheries Communication Plan.

Comment theme: Vessel trip levels.

Associated comments

Table I-305 provides the full list of comments received as part of this comment theme.

Table I-305. Vessel trip levels comment.

Comment Number	Comment
310-37	Charter fishing effort is depicted as a heat map in Figure C-6 in only qualitative terms ("high" to "low" level of charter trips). This figure should define what "high" and "low" trip levels represent (e.g., number of trips per year).

Response to comments: Figure C-6 was adapted from Figure 3.4.5-10 of the Vineyard Wind Draft Environmental Impact Statement. (See Bureau of Ocean Energy Management, Office of Renewable Energy Programs. 2018. Vineyard Wind Offshore Wind Energy Project Draft Environmental Impact Statement. Washington, D.C. Available online at https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/MA/Vineyard-Wind/Vineyard_Wind_Draft_EIS.pdf.) The intent of the figure is to show the distribution of relative fishing effort by the for-hire recreational fishing fleet within the RI-MA WEAs and surrounding waters. Therefore, it is not necessary to define the figure legend terms “high” and “low” in quantitative terms.

Comment theme: Communication with fishers and the fishing industry.

Associated comments

Table I-306 provides the full list of comments received as part of this comment theme.

Table I-306. Communication with fishers and the fishing industry comments.

Comment Number	Comment
306-1	,my husband Chris and I own and operate a fishing vessel named Rock & Roll III that catches Sea Scallops in the vicinity of the proposed South Fork Windfarm and especially along the cable route to the south fork of Long Island . We're very concerned about our ability to support our family and our children's future if the windfarm and cable have a negative effect to our fishery. Orsted has shown no real inclination to justly compensate fishermen affected by their activities, even though they have done so in their own country. In fact they have refused to give fair compensation to fishermen whose gear has been damaged by their survey activities. We're asking that BOEM use its power as the lease granter to force Orsted to be held accountable in the event that their activities cost us our livelihoods. The financial scope of this and other projects is so enormous that financial compensation for damaged gear and displaced fishermen is a drop in the bucket and should be something that Orsted should be happy to do. Instead they've taken a secretive and adversarial approach towards stakeholders. This is not the kind of partner Americans should have. We're not asking for much, we just don't want our ability to provide a bright future to our children taken away.
154-7	"Communications and outreach with the commercial and recreational fishing industries would be guided by the Project-specific Fisheries Communications Plan. This outreach would be led by the DWSF Fisheries Liaisons. Fisheries Representatives from the ports of Montauk, Point Judith, and New Bedford represent the fishing community." Outreach efforts by Orsted have been conducted in name only. The DWSF Fisheries Liaisons have been selected as a group of yes-men who do not provide sincere feedback about fishing nor effective outreach to active commercial and recreational fishermen. In some cases, these liaisons have provided fishing industry public comments to BOEM without disclosing their substantial financial conflict of interest as an employee of Orsted.
310-29	The FEIS should include feedback from fisheries representatives and liaisons to further characterize commercial fishing effort in the project area.
310-36	The for-hire recreational fishing section begins with a description of how charter boat captains were consulted to develop information on fisheries. This same information should also be provided for the commercial fisheries.
337-2	Additionally, I would like to see better communications with mariners and more weight given to their concerns.
339-9	Fisheries Representative (FR): In 2018, the EHTFAC chose a fisheries representative (FR), Captain. Julie Evans, to the South Fork Wind Project, to come from within the fishing community to represent the fishermen affected by the SFWF in the hope that the EHTFAC could enter into negotiations with Deepwater Wind (DWW,) and then Orsted, to create a Fisheries Mitigation and Compensation plan, as had been done by DWW in Rhode Island as part of the fisheries mitigation plan approved by the Coastal Resources Management Council (CRMC). The regulatory language was included within the Ocean Samp process, and then codified into Rhode Island law. The EHTFAC utilized BOEM’s November 2013 “Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessees/Grantees and Commercial Fishers on the Atlantic Outer Continental Shelf, Report on Best Management Practices and Mitigation Measures,” as the blueprint to create open communication and work to write a fisheries mitigation and compensation plan. However, no matter what written comments or questions were submitted to DWW or Orsted by the EHTFAC, DWW never responded to any of the series of questions that the EHTFAC or other local fishermen that were asked during public hearings. Any attempt by the FR to garner answers from DWW to offshore wind questions that were outstanding, went unanswered. Despite public acknowledgments that answers would be forthcoming, at no point was communication between the EHTFAC and DWW open and accommodating. East Hampton Town was repeatedly notified of a lack of follow-up and true communication by Orsted to the FAC, or by Orsted to the FR. In direct discussions by the FR with DWW’s fisheries liaison and staff, documents were withheld from the FR, and time lapses between requests for notes or maps and delivery of maps sometimes took months. One full-sized nautical chart of the project area of the SFWF was not received by the FR for a full year.

Comment Number	Comment
	No attempt to cooperate and discuss meaningful forms of mitigation, or compensation have ever been discussed with the EHTFAC. No requests for fisheries economic data related to the SFWF or SFEC was ever made, instead VTR data was utilized which is inherently faulty. Gear loss application forms were repeatedly changed without notice, with a 30-day limit on claims, and a version not allowing for more than one claim in an area that was handed out to some fishermen. Fishermen who both had claims in the same week were handed two completely different forms, with differing rules. None of these rules were made by consensus with New York fishermen. All rules have been made by Orsted, and change without knowledge or consent. Orsted has since stated that the Gear Loss Compensation & Mitigation Application is updated periodically, yet there is no notice of an update on their website, nor past dated versions of forms. There are inconsistencies between their website, and what is being handed out via email, and what they are requiring when an actual claim is made. As an example, in 2020 the FR was asked by two commercial fishermen to help them work to submit gear-loss claims due to Orsted-hired survey boat interactions with their gear. Both are fixed-gear fishermen. The first fisherman has waited nine months and to date has not received an answer on his claim. The second, an offshore-lobsterman, Orsted denied his claim outright and then refused to provide proprietary information for the fisherman to prove his claim on appeal. After refusing to renew the contract of the EHTFAC's FR chosen by the FAC, a new FR hired by Orsted released the proprietary survey vessel track information to the lobsterman, so he could file his appeal, which is still pending. Capt. Evans remains the choice by the EHFAC as FR and was approved by the Town of East Hampton to represent the fishing interests re the SFWF. Orsted has repeatedly omitted or withheld information as proprietary from the FR that quite possibly could have brought EHT's fishermen's claims relief. If fishermen's proprietary information is required in order to begin a claim a developer must also supply the claim-related information when asked. Rhode Island (RI) fishermen through their Coastal Resource Mgt Council's (CRMC) Fisheries Advisory Board (FAB) received a mitigation and compensation plan that was required by law. via The RI Ocean Samp process, at a cost of $3.2 mil., was paid for by Deepwater Wind. The Ocean Samp worked in tandem with the RI-MA BOEM Offshore Wind Task force to choose a WEA for RI in state (BIWF) and federal (RI-WEA) waters. A negotiation fund paid for by the developer of any "large-scale" offshore wind project in RI state or federal WEA waters was created by the CRMC to include a mitigation and compensation plan that had to be approved by the FAB prior to the project receiving federal consistency. As such, RI fishermen were compensated for the negative economic effects of the Block Island Wind farm and will be for the South Fork Wind Project, (as will Massachusetts fishermen due to their Memorandum of Understanding signed with RI prior to final approval of the Ocean SAMP. To date, New York fishermen have received zero fair, equitable or just mitigation or compensation for the SFWF or the SFEC. BOEM we feel must, as a condition of approval of any offshore wind farm lease and Construction and Operation Plan approval, work with fisheries stakeholders to create a national fisheries mitigation and compensation plan prior to approval of any wind farm project. The plan must be fair, transparent and hold OSW developers accountable for commercial fishing conflicts that arise as a result of BOEM's WEA leasing, before Construction and Operations plans are approved. For the many reasons listed above, I and the other members of the EHTFAC on our sole behalf, request that BOEM approve the "No Action" alternative for the SFWF and the SFEC until additional analysis, science, mitigation, and compensation is created, reviewed, peer reviewed, and completed. Should BOEM issue an approval for the SFWF/SFEC, we support the RODA Transit Lane Alternative as the only transit alternative that provides for safe access for East Hampton Town's fishermen to and from their fishing grounds.
361-1	At the outset, we feel it important to state that we are not opposed to Offshore Wind (OSW), provided it is carefully planned, socially and economically viable, ecologically and environmentally sound and based on informed inputs and considerations. Engaging early, and often, with current users of the marine space could have resulted in siting decisions which avoided conflicts as much as possible. For those conflicts which were unavoidable, efforts could have been taken to minimized impacts to those users. Of course, for those impacts which could not have been minimized, collaborative, proper. and meaningful mitigation measures to account for those impacts. Such measures should include and require compensatory mitigation. Unfortunately, this has not been the approach; and fishermen and fishing communities are not at the table; but on the menu.
361-3	Fishermen and non-wind industry stakeholders have, by and large, been kept in the dark regarding efforts to develop OSW off the west coast. When the three Call Areas off the California coast were announced in the fall of 2018, fishermen and fishing communities were taken aback. There was no meaningful engagement prior to the announcement. Efforts of impacted fishermen and fishing communities to engage in the process were met with silence. Credit where credit is due, over the past six months the Federal and State Agencies have conducted pointed outreach to the fishing community; but we are left wondering if it is too little, too late. If, as expected, there is a significant ramping up of efforts to deploy OSW facilities on the outer continental shelf, we need to do better by our nation's fishermen and fishing communities. The same fishermen and fishing communities that fed the nation during the Covid-19 pandemic when beef, pork, and poultry processors had to temporarily cease (or significantly slow down) production.

Comment Number	Comment
363-68	We have repeatedly urged BOEM to coordinate, or at least require development of, an appropriate regional-scale fisheries compensatory mitigation plan. It still has not. We now perpetuate the bizarre outcome that individual states are, in practice, deputized to devise payment plans from the project developer through their Coastal Zone Management Act (CZMA) review or other state-specific legal authorities. Despite compensatory mitigation requirements not being an enforceable policy under CZMA, a series of political twists and turns has led to BOEM considering—as the primary fisheries mitigation tool for a federal waters project—payments made to one state. This process for direct negotiation with states made sense when originally envisioned in the Rhode Island Ocean Special Area Management Plan. However, leaving compensatory mitigation to individual states to negotiate through their widely varying policies for projects that span multiple states in both geography and impacts makes no logical—or legal—sense. Logically, a regulatory process that forces fishermen and family-owned fishing businesses to negotiate with multinational energy companies (many of which are oil and gas companies with well-known experience in such affairs) simply in order to avoid insolvency is ethically indefensible. The former do not have adequate resources, and the latter are incentivized to gloss over harms to fishing. If negotiations fail, there is no backstop. If they “succeed,” there is no telling whether they include all affected parties--or even the most affected parties--or whether they are structured in a way that provides relief in a way that is appropriate for the community in question. The approach to SFWF, and other projects, cannot be viewed in isolation, and fishermen cannot be expected to maneuver with each of the 15 or more projects anticipated across their grounds over the next ten years or less, while maintaining their livelihoods. Our fishing heritage must not depend on who may have more savvy or can devote more time and resources to outcompeting the other. Moreover, fishermen and OSW developers are not well-suited to argue what constitutes best available science in closed rooms, this should be done transparently and inclusively with science experts following best practices in modeling and peer review. Legally, as RODA has repeatedly pointed out, the Comity Clause of the U.S. Constitution prohibits discrimination based on state residency. It is unclear how BOEM’s enforcement of state-led policies that result in different outcomes for federally permitted fisheries participants based on their state of residence could be constitutionally defensible. In addition to these disparate outcomes, these payment schemes grossly undervalue likely fisheries losses because of a global lack of relevant socioeconomic research and an unwillingness from developers to assume responsibility on cumulative scales.
366-25	No attempt was ever made by Orsted to cooperate and discuss meaningful forms of mitigation, or compensation have ever been discussed with local commercial fishermen. No requests for fisheries economic data related to the SFWF or SFEC was ever made, instead VTR data was utilized which is inherently faulty. Gear loss application forms were repeatedly changed without notice, with a 30-day limit on claims, and a version not allowing for more than one claim in an area that was handed out to some fishermen. Fishermen who both had claims in the same week were handed two completely different forms, with differing rules. None of these rules were made by consensus with New York fishermen. All rules have been made by Orsted, and change without knowledge or consent. Orsted has since stated that the Gear Loss Compensation & Mitigation Application is updated periodically, yet there is no notice of an update on their website, nor past dated versions of forms. There are inconsistencies between their website, and what is being handed out via email, and what they are requiring when an actual claim is made. As an example, in 2020 the FR was asked by two commercial fishermen to help them work to submit gear-loss claims due to Orsted-hired survey boat interactions with their gear. Both are fixed-gear fishermen. The first fisherman has waited nine months and to date has not received an answer on his claim. The second, an offshore-lobsterman, Orsted denied his claim outright and then refused to provide proprietary information for the fisherman to prove his claim on appeal. . Orsted has repeatedly omitted or withheld information as proprietary from the FR that quite possibly could have brought EHT’s fishermen’s claims relief. If fishermen's proprietary information is required in order to begin a claim a developer must also supply the claim-related information when asked. Rhode Island (RI) fishermen through their Coastal Resource Mgt Council’s (CRMC) Fisheries Advisory Board (FAB) received a mitigation and compensation plan that was required by law. via The RI Ocean Samp process, at a cost of $3.2 mil., was paid for by Deepwater Wind . The Ocean Samp worked in tandem with the RI-MA BOEM Offshore Wind Task force to choose a WEA for RI in state (BIWF) and federal (RI-WEA) waters. A negotiation fund paid for by the developer of any “large-scale” offshore wind project in RI state or federal WEA waters was created by the CRMC to include a mitigation and compensation plan that had to be approved by the FAB prior to the project receiving federal consistency . As such, RI fishermen were compensated for the negative economic effects of the Block Island Wind farm and will be for the South Fork Wind Project, (as will Massachusetts fishermen due to their Memorandum of Understanding signed with RI prior to final approval of the Ocean SAMP. To date, New York fishermen have received zero fair, equitable or just mitigation or compensation for the SFWF or the SFEC.

Comment Number	Comment
	BOEM we feel must, as a condition of approval of any offshore wind farm lease and Construction and Operation Plan approval, work with fisheries stakeholders to create a national fisheries mitigation and compensation plan prior to approval of any wind farm project. The plan must be fair, transparent and hold OSW developers accountable for commercial fishing conflicts that arise as a result of BOEM's WEA leasing, before Construction and Operations plans are approved.
307-4	Improve communications with fishermen and fishing communities. I having heard nothing good to date. That has to change.
363-61	In contrast with considerations in the DEIS, several years ago the U.K.'s Crown Estate worked directly with fishermen who had experience with OSW to identify actions that would reduce at-sea impacts to fish and fishermen from OSW. Showing the benefit of direct communications between the regulatory community and fishermen, these actions are far more specific and plainly show their higher mitigation value: • Improved mapping of potential seabed hazards; • Timely provision of seabed maps showing precise location of potential hazards; • Proactive identification of clean and cable-free corridors between the turbines that could be suitable for mobile gear; • More effective cable burial beneath the seabed; • Fishing friendly methods of cable protection, such as the use of concrete mattresses as an alternative to rock dumping; • Where rock dumping is required, more accurate deposition of rocks over the cables; • Clearing debris left on the seabed following the construction of wind turbines; • Better communication and working relationships between fishermen and wind farm service vessel operators; • More regular monitoring and reporting of cable exposure; and • The removal of all seabed structures, material and debris following the decommissioning of wind farms. The DEIS fails to include or consider any of this known information. To fulfill the requirements of NEPA, BOEM must work directly with fishermen and fisheries experts to develop a full range of mitigation alternatives for consideration in this action.
366-24	In 2018, the EHTFAC chose a fisheries representative to the South Fork Wind Project, to come from within the fishing community to represent the fishermen affected by the SFWF in the hope that the EHTFAC could enter into negotiations with Deepwater Wind (DWW,) and then Orsted, to create a Fisheries Mitigation and Compensation plan, as had been done by DWW in Rhode Island as part of the fisheries mitigation plan approved by the Coastal Resources Management Council (CRMC). The regulatory language was included within the Ocean Samp process, and then codified into Rhode Island law. The EHTFAC utilized BOEM's November 2013 "Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessees/Grantees and Commercial Fishers on the Atlantic Outer Continental Shelf, Report on Best Management Practices and Mitigation Measures," as the blueprint to create open communication and work to write a fisheries mitigation and compensation plan. However, no matter what written comments or questions were submitted to DWW or Orsted by the EHTFAC, DWW never responded to any of the series of questions by local fishermen that were asked during public hearings. Despite public acknowledgments that answers would be forthcoming, at no point was any communication with DWW open and accommodating. In direct discussions by the FR with DWW's fisheries liaison and staff, documents were withheld from the FR, and time lapses between requests for notes or maps and delivery of maps sometimes took months. One full-sized nautical chart of the project area of the SFWF was not received by the FR for a full year.

Response to comments: Fishing is an important use of the Exclusive Economic Zone that BOEM must consider in its decision-making. BOEM regularly engages with commercial and recreational fishermen to understand their concerns from both a biological and socioeconomic impact perspective. This has been accomplished through focused engagement with Regional Fishery Management Councils, participation in state-led fishery advisory group meetings, and the convening of a National Academies Fisheries Steering Committee. BOEM incorporates fishing industry recommendations into the leasing process by: issuing guidelines to leaseholders or including lease stipulations to develop and implement a fisheries communication plan, developing a fishing industry webpage, and working closely with state partners to address regional fisheries monitoring associated with potential impacts from offshore wind development.

As stated in Table G-1 in Appendix G, during implementation of the proposed Project, communications and outreach with the commercial and recreational fishing industries would be guided by the Project-specific Fisheries Communications Plan. This outreach would be led by the SFW Fisheries Liaisons. Fisheries Representatives from the ports of Montauk, Point Judith, and New Bedford represent the fishing community. As stated in Section 3.5.1.2.3 of the FEIS, SFW has developed a financial compensation policy to be used when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing gear. In addition, BOEM is open to working with state partners and the commercial and recreational fishing industries to investigate alternative strategies to negotiate compensatory mitigation agreements. South Fork Wind, LLC has negotiated with the State of New York, the State of Rhode Island and the Commonwealth of Massachusetts to determine compensation packages for fishermen.

Comment theme: Updated fisheries data.

Associated comments

Table I-307 provides the full list of comments received as part of this comment theme.

Table I-307. Updated fisheries data comments.

Comment Number	Comment
347-2	Appendix Y of the February 2020 SFWF Construction and Operations Plan (COP) reported that the average annual landings revenue from within the entire RI-MA Wind Energy Area (WEA) via 17 Massachusetts ports is $640,065 per year. The analysis also reported that the port of New Bedford generates the most revenue from the WEA at $406,922 per year, while the ports of Chilmark and Westport generate the largest percentage of their total landings from the WEA. DWSF should coordinate with CZM and the Massachusetts Division of Marine Fisheries regarding potential economic exposure of Massachusetts fisheries to the SFWF project and proposed mitigation to offset anticipated losses to the Massachusetts fishing industry as a result of the proposed project. The Final Environmental Impact Statement (FEIS) should include an updated economic exposure analysis, as necessary, and detail proposed mitigation resulting from these conversations.
372-4	During our cooperating agency review, we highlighted areas where additional and updated fisheries data were needed to support the analysis. While some fisheries information and data in the document were updated and improved, some data are missing (e.g., commercial landings data), and updates are still needed (e.g., party/charter vessel logbook data through at least 2018) for the FEIS. We appreciate the supplemental information on data limitations and applicability provided in Appendix F, as it helps the reader more fully appreciate the analysis presented in this document. We are committed to continuing to work with you on fisheries data issues, including understanding data uses and limitations, as the FEIS is prepared.
163-17	Rhode Island is home to most of the for-hire boats fishing near the RI-MA WEAs according to the DEIS, and Cox Ledge represents one of the most important areas for targeting cod. On page 3-88 of the DEIS it states: "However, of the 16,569 average annual for-hire boat trips that left from ports in the four states [RI, NY, CT, and MA] each year during the 2007- 2012 period, only 0.9% occurred in or near the RI-MA WEAs (Kirkpatrick et al. 2017)." What proportion of the for-hire fleet had VTR coverage in each year from 2007-2012? Can we assume that the vessels with data are representative of those not submitting VTRs at the time?
166-23	The estimates of commercial fishing revenue exposed to offshore wind energy development by fishery are helpful to include, however, without corresponding landings information by species and stock area, the impacts on a particular fishery may be incomplete. Focusing on ex-vessel value can mask other important considerations such as the use of a low-value species as bait for a high-value species or the number of impacted fishery participants. For example, skates are typically a low revenue, high volume fishery with one fishery segment supplying bait to the lobster fishery; however, this level of fishery dependence and impacts on other fisheries are not readily apparent in the revenue tables. There is significant overlap of the lease area with the skate fishery and skate is one of a few fisheries most impacted by the proposed action (Figure C-12).
166-24	Appendix F provides a good overview of the commercial fisheries data used in the analysis, including associated caveats. Additional clarification should be added that although vessel monitoring system (VMS) data cover most landings in many fisheries, certain types of activity, potentially for many vessels, are not captured in VMS data. The document should also make it clearer that the number of vessels not covered by the VMS data is not quantified.
166-29	We recognize that data on private angling are very limited. In addition, we are concerned that data on the party/charter recreational fishing fleet are outdated; the 2006-2014 data are likely not representative of current fishing.

Comment Number	Comment
363-107	A glaring oversight in the analysis to commercial fisheries is the omission of landings data. The current analysis skews the conclusions of impacts to focus on high-revenue fisheries. There are other fisheries that have high volume landings but a low price per pound resulting in lower revenues by comparison. Monkfish and the Northeast Skate Complex fishery management plans (FMPs) are, overall, high volume and lower revenue fisheries. However, these species comprise the entirety of many individual fishing businesses. The most recent publicly available landings data on monkfish show landings in 2018 to be 11,736,000 lbs and associated revenues were $15,452,000. An important caveat when analyzing fisheries data in U.S. waters is the stringent fisheries management system, which sets an Acceptable Biological Catch (ABC) for each managed species and restricts effort to prevent exceeding the ABC. Both the monkfish and skate FMPs use effort controls, e.g. trip limits, to limit landings.
363-106	It is unclear why the DEIS restricts the fisheries socioeconomic analysis to 2008-2018; calendar year 2019 data should have had its quality control completed and be available. VTR data extends back to 1996, while VMS data only extends back to 2006. Fishermen are only required to report the statistical area they were fishing in on their VTRs; a new page for the VTR is required if the vessel moves to a new chart area. Statistical areas are relatively large areas, however, the data contained in them should not be dismissed because the fishery specific activity can't be displayed on a smaller spatial scale matching individual OSW projects. The entire east coast is being built out with WEAs and that larger scale may match more appropriately with VTRs. The added benefit being that the longer time series better captures natural variations in distributions of fish stocks that is missed in shorter data sets. It is unclear why the analyses were further restricted to shorter time periods, e.g. the for-hire data only extends to 2014 and Table 3.5.1-12 restricts commercial fisheries data to between 2008-2012. Perhaps, that second example contains a typo as the text appears to reference data from 2008-2018.

Response to comments: BOEM has requested the data from NMFS and has updated the FEIS appropriately.

Comment theme: Reef effect.

Associated comments

Table I-308 provides the full list of comments received as part of this comment theme.

Table I-308. Reef effect comments.

Comment Number	Comment
294-11	The DEIS incorrectly assumes that "hard bottom" or "structure" is a benefit, repeatedly using the term "reef effect". This is a theme carried throughout the document, to the point that "conceptual decommissioning" is painted as a potential negative because it would "reverse the artificial reef effect". The DEIS specifically mentions the "beneficial impacts for for-hire and recreational fisheries" and unequivocally states that "Removal of structures [through decommissioning] that produce an artificial reef effect would result in loss of any beneficial fishing impacts that could have occurred during O&M." This is incorrect for vessels such as Seafreeze owns and operates. We cannot operate our gear in, over or on structure. In every instance where the DEIS mentions the structural "reef effect" as a positive, it should also mention the structural reef as a negative. The structure caused by an operating wind farm is a permanent negative effect for the many bottom tending gear fisheries in the region including ours. These fisheries cannot tow gear through or on or over structure. To maintain a biased analysis is inappropriate. BOEM should correct its DEIS analysis to include the negative effects created by Project structure. A balanced and accurate description of impacts is necessary for a complete analysis.
166-31	Turbine foundations and their associated fouling communities will create artificial reefs throughout the project area, which are expected to attract certain fishery species (e.g., black sea bass). The benefits of this artificial reef effect will vary by target species. The negligible to minor beneficial impact from the increased production is species dependent as it is likely that only certain species will colonize on or aggregate near the reef, and these may or may not be the species of greatest value to anglers. For example, any benefit to anglers targeting highly migratory species (i.e., tunas and sharks) could be offset by the inability to anchor or to drift throughout the area. If operators shift their effort outside the wind farm, during construction or long-term operations, this will potentially put them in areas of higher vessel traffic and gear conflict. Also, depending on operating conditions at sea, recreational fishermen cannot always reap the benefits of any increased catchability of target species due to safety concerns of fishing in swells around the turbines. These safety considerations will be different than the existing artificial reefs in the region which, except for the Block Island Wind Farm turbine foundations, are all submerged structures.

Comment Number	Comment
363-130	A review by the Science Center for Marine Fisheries on the unfinalized Vineyard Wind SEIS also discusses the potential for the wind energy areas to serve as artificial reefs, which would be expected to have a positive impact on the density of fish that utilize structure. If a reef effect was realized and all possible leases were built out, it could result in the largest 'artificial reef' in U.S. waters. It is not known whether the lease areas will result in a larger reef complex with cascading or interaction effects, or what converting a large area of the Atlantic EEZ to "reef complex" will mean for the regional ecosystem. The "artificial reef" effect is frequently cited as a benefit for harvesting; wind energy areas can exclude fishing effort. Due to the potential increases in abundance or aggregation of certain mobile and demersal species in WEAs, the concept of feasible fishing around turbines is nuanced. It is important to ascertain whether it will be possible for fishermen to take advantage of any increase in (or aggregation of) stocks, or whether practical constraints (such as insurance costs, safety zones, gear compatibility) and/or perceived high risk by fishermen will prevent this from happening.

Response to comments: Additional text has been added to Section 3.5.1.2.2 to address concerns regarding the operation of fishing gear by vessels in a wind farm. As stated in the description of conceptual decommissioning of the SFWF and offshore SFEC in Section 3.5.1.2.3, within 2 years of cancellation, expiration, or other termination of the Lease, the lessee would remove or decommission all facilities, projects, cables, pipelines, and obstructions and clear the seabed of all obstructions created by activities on the leased area.

The potential for vessel congestion and gear conflict under the proposed Project and alternatives is described in Section 3.5.1.2.3. As stated in Table G-1 in Appendix G, SFW is committed to collaborative science with the commercial and recreational fishing industries pre-, during, and post-construction.

Comment theme: Exclusion zones, de facto exclusion zones, and prohibited areas.

Associated comments

Table I-309 provides the full list of comments received as part of this comment theme.

Table I-309. Exclusion zones, de facto exclusion zones, and prohibited areas comment.

Comment Number	Comment
301-25	In several sections of the DEIS, a USCG safety zone is used within the context of an “exclusionary zone.” Other language in the DEIS refers to vessels being “prohibited from entering into, transiting through, mooring in, or anchoring within (a) safety zone.” These statements are erroneous. A USCG safety zone is not an exclusionary zone and neither the word “exclusion” nor any of its derivatives appear in USCG guidance or regulations relative to safety zones. Technically, a USCG safety zone is a “Limited Access Area” as defined in 33 CFR 165: A Safety Zone is a water area, shore area, or water and shore area to which, for safety or environmental purposes, access is limited to authorized persons, vehicles, or vessels. Every safety zone established by the USCG includes a provision for vessels to secure permission to access the safety zone. In addition to USCG officers, authority to grant access to safety zones is frequently delegated to other Federal, state, and local law enforcement officials to grant access permission. Frequently, safety zones simply control access in a “positive” way, i.e., access is automatically granted provided the vessel exercises special caution, such as slowing down. The only safety zones created by the USCG for construction of an offshore wind facility have been for the Block Island Wind Farm (“BIWF”). Those safety zones included provisions, as discussed above, for vessels to enter the zones for any number of reasons. With respect to the Project, it is anticipated, except potentially for brief periods of time during certain construction activities, non-construction vessels will be able to enter the safety zone after securing USCG permission (which can be done in real-time via VHF radio or cell phone) should those vessels have a legitimate need (as determined by the USCG). The DEIS also states that fishermen could choose to not fish in the area because they might “perceive” the area as unsafe (pg. 3-100). The results of the navigational safety risk assessment, as well as the USCG MARIPARS report, make clear that all fishing vessels currently fishing the Project area will be able to continue to do so with more than adequate sea room and maneuverability. Additionally, SFW and its affiliates are currently assisting, and will continue to assist, vessel operators in becoming accustomed to navigating wind farms via simulators and training as well as through continued discussions with mariners through its network of fisheries liaisons and fisheries representatives. The roles of the fisheries liaisons and fisheries representatives are detailed in the Ørsted Fisheries Communication and Outreach Plan. Because of their on-the-water experience and trust of the fishing industry, fisheries representatives are in a unique position to understand concerns from a fisher’s perspective and respond appropriately. For example, they can explain why a 1-NM x 1-NM grid layout is safer than a transit lane alternative in fisher’s operational language. Even if only providing Project information, they are able to do so in areas or via means to which developers do not have access, such as private docks and company bulletin boards. This outreach and cooperation effort will continue through the construction and operational phases of the Project. Given the above, the FEIS should remove all references to exclusion zones, de facto exclusion zones and prohibited areas associated with USCG safety zones, or any other measures designed to control, not prohibit, vessel movements in furtherance of navigation safety.

Response to comments: Section 3.5.1 of the FEIS has been revised to remove references to exclusion zones, de facto exclusion zones and prohibited areas.

Comment theme: Private recreational fishing.

Associated comments

Table I-310 provides the full list of comments received as part of this comment theme.

Table I-310. Private recreational fishing comments.

Comment Number	Comment
379-10	Rich Hittinger: With Cox's Ledge being the best offshore fishing area for recreational fishing from Rhode Island and southeastern Massachusetts, I’m wondering how the draft EIS was produced, and it does not even mention that private recreational fishing exists at the site of the proposed action. Potential impacts of the proposed action on private recreational fishing need to be thoroughly evaluated.
338-48	55. For the For-Hire Recreational Fishing analysis on p. 3-87, the analysis done is primarily for the Rhode Island for-hire fishing vessels. As different states have different seasons for different species, analyzing only Rhode Island’s for-hire fishing activity does not accurately reflect New York’s for-hire fishing fleet. In addition, more analysis is needed relating to New York’s for-hire fleet because fishing for striped bass is closed in federal waters for both recreational and commercial fleets and takes place solely within New York waters. As such, construction of the SFEC may result in more extensive effects on this species in New York waters.

Comment Number	Comment
301-24	The DEIS does not include a robust evaluation of impacts to the private recreational fishing industry, which is very prevalent in Southern New England. SFW recommends that further evaluation be included as part of the socio-economic resources for the FEIS.
279-3	Similarly, as the DEIS demonstrates, information on recreational fishing effort, particularly by private anglers, within the SWFW area is sorely lacking. We are encouraged by the efforts of the Responsible Offshore Science Alliance (ROSA) to develop recreational and commercial fishery research priorities for both collecting baseline data and monitoring.
144-2	First, the DEIS fails to even consider impacts to private recreational fishing. The only recreational fishing mentioned in the DEIS is for hire, Charter and Party boat fishing, while in fact, private recreational fishing on Cox Ledge in the area of the SFWF is the most economically important fishery for that area when impacts are estimated using NOAA's report of "Fisheries Economics of the United States, 2016". Simply because there is little data available for Private Recreational Fishing is not a reason that it should not be considered. The DEIS is flawed by not including an analysis of potential impacts to Private Recreational Fishing and therefore needs to be rewritten.
360-30	With respect to recreational fishing, the DEIS reports that 97 percent or more of recreational vessels, including recreational fishing boats, do not go past 3 NM of the coastline into federal waters, where all future wind projects will be located. Thus, a portion of recreational fishing, potentially a large portion, does not extend into the wind farm leases. As there have been no such reported incidents at the Block Island Wind Farm and very few in Europe over the many years offshore wind has been operational there, it is safe to assume that there will be only a de minimis risk.
379-14	Adrienne Esposito: The second thing is about recreational fishing, and again, I'm so glad the last speaker raised the issue of acidification. I think it's very important for the public to understand that one of the things that's harming recreational fishing, particularly on Long Island, is climate change, and one aspect of climate change, ocean acidification. According to the School of Marine and Atmospheric Sciences at Stony Brook University, all three estuaries that touch Long Island, the Long Island Sound, the Peconic Estuary, and the South Shore Estuary, have increased acidification, increased acid levels in the marine environment. This is not good for our shellfish nor often fish production. Also, with the climate change, we have such decreased with fish populations, such as the winter flounder, in the Long Island Sound, and in particular the South Shore Estuary. In fact, it's so devastated that the charter boat fishermen have stopped looking in the South Shore Estuary for winter flounder because they can't find them any longer. So, the reason I'm saying that is a couple of, you know, comments want to include the impact to fish during installation, and that's correct, that's fair, and it should be. But we also have to talk about the impact of fish out long term because of climate change and ocean acidification, and so there might be a short-term impact for installation. But that would be fighting a long-term impact caused by climate change.
144-3	BOEM, NOAA, OWE Developers and angler groups need to immediately launch a study to determine the level of recreational fishing in each of the OWE areas including SFWF. This study would give an indication of the number and type of fishing trips to each OWE area so that NOAA economic data can be used to estimate the value of that activity. The American Saltwater Guides Association, the Rhode Island Saltwater Anglers Association and other industry groups would be willing to participate in and contribute to this type of study.
379-3	David Monti: My name is Dave Monti, that's M-O-N-T-I, and I'm a charter captain and fisherman from Rhode Island. I'm a board member of the American Saltwater Guides Association, the second vice president of the Rhode Island Saltwater Anglers, vice chair of the Rhode Island Marine Fisheries Council, and a member of the Rhode Island Party and Charter Boat Association. I thank BOEM and South Fork Wind for proposing this project. Without it, we would miss out on badly needed renewable energy. The fish I catch today as a charter captain is a vastly different type in abundance due to climate change impacts. So, the fishing industry needs renewable energy to help them stem the tide on climate impacts. One missing component of this DEIS is private recreational fishing. Yet it occurs in this wind farm area. South Fork has acknowledged the importance of private recreational fishing and has reached outside of this DEIS, actually, with surveys fishing out workshops, fishing representatives in meetings, but private angling is not covered in this DEIS. It's not the developer's job to report who is fishing in a wind farm area and, and what they catch, and I really wouldn't want them to, but it is rather, the job of NOAA and BOEM to make sure that this is covered. Recreational fishing surveys, like the collegiate study being done by the New England Aquarium and electronic recording used by the for-hire industry and private angler projects all present ways to capture private recreational fishing catch and effort in wind farm areas. Recreational anglers are supportive of offshore wind, as long as the wind farms that develop responsibly with research before, during, and after construction. I'm happy to say that the South Fork Wind Farm is being responsibly developed with an aggressive research and monitoring plan in place that recreational fishers like myself and commercial fishermen have developed.

Response to comments: Thank you for your comment. Section 3.5.1 of the FEIS describes the impacts of the proposed Project and alternatives to for-hire recreational fishing. Additional information regarding the importance of Cox Ledge to anglers is provided in Section 3.5.1.1.2.

Section 3.5.8 provides a description of impacts to private recreational fishing as a result of the proposed Project and alternatives.

Comment theme: Commercial fishing operational impacts.

Associated comments

Table I-311 provides the full list of comments received as part of this comment theme.

Table I-311. Commercial fishing operational impacts comment.

Comment Number	Comment
157-11	OUTTER [sic] CONTINENTAL SHELF LANDS ACT SUBSECTION 8(p), ALTERNATE ENERGY-RELATED USES ON THE OUTER CONTINENTAL SHELF – REQUIREMENTS OF SUBSECTION (4) In addition to providing the authority to issue leases, easements, and rights-of way, the EPAct includes requirements that any activity authorized under this authority must be: carried out in a manner that provides for- (J) consideration of – (ii) any other use of the sea or seabed, including use for a fishery, a sealane, a potential site of a deepwater port, or navigation; There cannot be consideration of the use of the sea or seabed by a fishery without analyzing the spatial operational needs of those fisheries. Spatial operational needs are complex because they are influenced by environmental conditions such as the tides and winds. Until these analyses are done industrial scale wind energy development should not be approved in U.S. federal waters and the No Action alternative should be chosen for the South Fork Wind Farm and South Fork Export Cable Project.

Response to comments: Section 3.5.1 of the FEIS describes the potential impacts of the proposed Project and alternatives to commercial fisheries and for-hire recreational fishing. Included in this impact analysis is a discussion of the effects of changes in fishing access such as increased operating costs (e.g., additional fuel to arrive at more distant locations); lower revenue (e.g., less-productive area; less-valuable species); increased conflict among fishermen; and avoidance of an area by fishermen because of safety concerns.

Comment theme: Sufficiency of commercial fishing analysis.

Associated comments

Table I-312 provides the full list of comments received as part of this comment theme.

Table I-312. Sufficiency of commercial fishing analysis.

Comment Number	Comment
366-11	BOEM should instead use a combination of VMS and plotter data, such as Windplot, along with working Rhode Island DEM’s Julia Livermore with the Northeast Fisheries Science Center and the National Marine Fisheries Service’s Cooperative Research division and the Responsible Offshore Development Alliance (RODA) to come to a more robust, peer reviewed, industry accepted standard for gauging commercial fishing industry losses due to economic displacement

Comment Number	Comment
157-6	ECONOMIC IMPACTS AND FISHING INDUSTRY JOB LOSS Surfside Foods is concerned with the economic and job losses that will occur as a direct result of displacement and as an indirect result from impacts to biological species from offshore wind development. The DEIS does not analyze these potentially catastrophic losses to the region. The jobs potentially to be created from offshore wind energy, outlined in the analysis, many of which are highly specialized, will not benefit organizations designed to bring seafood to our tables for consumption or are they likely to employ individuals from the commercial fishing sector that will be out of work after being displaced by the offshore wind energy sector. The DEIS barely touches upon the harms that the commercial fishing industry will suffer and does not address any plans to mitigate loss of access, catch, quota, gear, or any of the other downstream impacts. A dollars' worth of seafood landed at the dock is worth many times that to the U.S. economy. To only propose monitoring of the SFEC cable and cable protection as mitigation for fisheries is insulting. Foreign investment is entering the U.S. EEZ, displacing U.S. fishing industries that have used these waters for centuries; mitigation and financial compensation for those that will be severely impacted is hardly mentioned in the DEIS and COP. If the all the States, bordering on the mid-Atlantic Bight, goals from offshore wind energy are met, one of the biggest land grabs in U.S. history will take place with foreign investment displacing U.S. fisheries all the while providing little to no compensation to those U.S. businesses being displaced. All impacts to the fishing industry should be based on science and fully compensated. The fishing industry must not be made to negotiate compensation for each project, particularly in an area where the projects are all side by side. BOEM must ensure equitable and predictable compensatory mitigation if the offshore wind energy industry is to move forward at an industrial scale in the United States. Losses due to gear damage and loss need to be settled in a standardized and predictable way. Developers cannot be the ones to decide whether a claim is valid. This must be accomplished by an impartial party. BOEM must streamline this process to minimize any additional economic losses from a burdensome loss process. Surfside Foods and other New Jersey fishing industry companies have unsuccessfully requested in writing, on multiple occasions, that the New Jersey Department of Environmental Protection request from NOAA, geographic location descriptions (GLDs) for Lease Area OCS-A 0517 and the others where NJ fishing industry members rely to harvest. The states are the last line of protection for industries that operate in federal waters, but New Jersey has refused to engage in the federal consistency process. This is evidenced by the state not having a single GLD for an offshore wind energy lease area. Until the commercial fishing industry has a real seat at the table that prevents interference with reasonable use of these areas in federal waters none of these projects should be moving forward. The fishing industry has called for a five-year moratorium on all offshore wind power development in order for the issues raised by the fishermen to be addressed.

Response to comments: Section 3.5.1 of the FEIS describes the potential impacts of the proposed Project and alternatives to commercial fisheries and for-hire recreational fishing. While BOEM acknowledges that there are alternative methodologies for estimating impacts, it believes the methodologies and sources of information used in the FEIS are consistent with CEQ regulations demanding information of ''high quality'' and professional integrity.

As stated in Section 3.5.1.2.3 of the FEIS, SFW has developed a financial compensation policy to be used when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing gear. In addition, BOEM is open to working with state partners and the commercial and recreational fishing industries to investigate alternative strategies to negotiate compensatory mitigation agreements. South Fork Wind, LLC has negotiated with the State of New York, the State of Rhode Island and the Commonwealth of Massachusetts to determine compensation packages for fishermen.

Comment theme: Impacts of climate change on commercial fishing.

Associated comments

Table I-313 provides the full list of comments received as part of this comment theme.

Table I-313. Impacts of climate change on commercial fishing comments.

Comment Number	Comment
133-9	4. A section on the adverse impacts to fishing and shell fishing caused by climate change. Tb. Warmer waters have allowed invasive species to disrupt estuarine ecosystems. The DEIS should discuss the problem associated with invasive species and how fighting climate change can assist in this battle. Invasive species include the European rock shrimp, Asian Shore Crab, Green Crab and Sea Squirt, which are all invaders of the Long Island Sound. These species are extremely competitive and abundant populations have led to the displacement and reduction of native, coastal species. According to Stephan G. Bullard, Ph.D. “Invasive sea squirts pose a particular threat to Long Island Sound, its organisms, and people living near the Sound. In terms of people, the main problem is that sea squirts heavily foul man-made marine structures such as docks and pilings and boat hulls. During outbreaks, invasive sea squirts reach incredible densities, and there can be hundreds per square foot. Because sea squirts are water-filled and often large (a few inches long), they add a tremendous weight to the structures they cover. For example, Ciona intestinalis has become so abundant in parts of Maine that it can add more than 2.5 pounds of fouling to an area about the size of a This added weight dramatically increases the weight of lines and gear, human hand. and adds massive drag to ships and, subsequently, increases fuel costs. Invasive sea squirts are particularly nasty when they infest aquaculture facilities. They readily foul aquaculture gear and sometimes the aquaculture easil organism themselves (e.g., they y grow on bivalve shells). Their weight makes hauling gear much more difficult and it is very hard and time consuming to separate invasive sea squirts from animals like mussels and oysters.”his section should include: a. Long Island Sound and the South Shore Estuary have experienced a dramatic decline in key recreational and commercial fish species such as the Winter Founder due to warming waters. LIS lobster industry has decreased 90%. c. Warmer waters are creating favorable environments for harmful algae blooms including Red Tide, Rust Tide, Brown Tide, Mahogany Tide and Blue Green Algae blooms.
169-24	BOEM and the cooperating agencies fail to take a hard look at the direct, indirect, and cumulative impacts to commercial fisheries and for-hire recreational fishing climate from warming caused by the Project from their alteration of wind flow, from the virtual certainty that a hurricane of category 4 or 5 strength will directly hit the WEA and from the likelihood of a catastrophic oil spill from a category 4 and 5 hurricane and fail to discuss the severity of these impacts. The DEIS assumes, without analysis, that the Project will not have any such impacts because other offshore wind projects will take its place. Such an assumption does not pass the muster of informed decision making. The DEIS must make an informed decision, and it cannot ignore the adverse climatic impacts of the Project over the next ten or longer years. It cannot ignore the virtual certainty that a hurricane of category 4 or 5 strength will directly hit the WEA over the next 30 years. It cannot ignore the likelihood of a catastrophic oil spill from a category 4 and 5 hurricane over the next 30 years that could be the size of the Exxon Valdez’s spill. It cannot ignore the devastation and destruction of not only the WTGs that would occur but the devastation on the marine environment.
301-23	While the DEIS concludes that there are major cumulative impacts to commercial fisheries under all of the alternatives, this level of impact is not due to the presence of offshore wind alone, but rather a function of the existing and future impacts of climate change and reduced stock levels resulting from natural mortality (pg. E3-40). In addition, the DEIS notes that other impacts will exist regardless of the presence of offshore wind, such as fish management regimes, fishing pressure, and restrictions due to protection of habitat and species preservation (pg. 3-94). SFW recommends that this important and relevant conclusion be more clearly presented and provided in the summary of cumulative impacts.
301-17	In the No Action Alternative (pg. 3-94), climate change should be listed as a major negative impact for those species that are expected to be adversely impacted. Southern New England represents the southern extent of the geographic distribution for many arctic-boreal species, and species at the edges of their geographic distribution are expected to be most responsive to physical fluctuations. There are many adverse impacts of climate change beyond those listed in the DEIS, which are well documented in the peer-reviewed literature, including decreases in thermal habitat, reductions in individual body mass (which decreases fisheries yields), increases in natural mortality, reductions in recruitment, and changes to the ecosystem related to competition and predation. The negative impacts of climate change should be prominently highlighted in the FEIS.

Response to comments: Section 3.5.1.2.2 of the FEIS describes the impacts of climate change on commercial fisheries and for-hire recreational fishing. The text in Attachment 3 in Appendix E has been revised to provide more information on impacts of climate change on commercial fisheries and for-hire recreational fishing.

Text has also been added to the Conclusions discussion in Section 3.5.1.2.2 stating that the cumulative impact rating is primarily driven by ongoing non-offshore wind activities. The majority of offshore structures and new cable emplacement in the analysis area for commercial fisheries and for-hire recreational fishing would be attributable to the offshore wind industry. However, BOEM expects that regulated fishing effort and climate change will continue to be the most impactful IPFs controlling the sustainability of commercial and for-hire fisheries in the analysis area.

Comment theme: Cumulative impacts to the fishing industry.

Associated comments

Table I-314 provides the full list of comments received as part of this comment theme.

Table I-314. Cumulative impacts to the fishing industry comment.

Comment Number	Comment
307-8	Provide transparent information on the cumulative impacts of all planned wind projects and projected possible projects to our fishing industry and community, our nation's access to domestically produced seafood and the sum total of environmental impacts during the construction, operation and decommissioning of all wind energy projects,
366-10	BOEM must also do a cumulative analysis of the entire Atlantic Ocean offshore wind lease areas and the cumulative economic impact to commercial fishermen as it related to the loss of commercial fishing grounds through BOEM leasing of the Atlantic Ocean EEZ. Past economic studies, and the one within the SFWF DEIS that uses Kirkpatrick's methodology to determine economic loss from areas is highly flawed regarding fishermen's landings data and income from associated fishing areas based on gear types, and needs to be gutted.

Response to comments: Section 3.5.1.2.3 of the FEIS includes a discussion of the cumulative effects on the commercial fishing industry, that is, the incremental impact of the proposed Project when added to the impacts of other past, present, and reasonably foreseeable future actions.

Section 3.5.2.2.2 describes the potential impacts on commercial fisheries and for-hire recreational fishing resulting from future offshore wind facilities in the New England and Mid-Atlantic regions under the No Action alternative. The incremental impacts of the proposed Project are described in Section 3.5.2.2.3.

Comment theme: Construction schedule impact to the fishing industry.

Associated comments

Table I-315 provides the full list of comments received as part of this comment theme.

Table I-315. Construction schedule impact to the fishing industry comment.

Comment Number	Comment
154-8	"The SFEC onshore construction schedule has been designed to minimize impacts to the local community during the summer tourist season." Not so for the DWSF turbine array itself. With construction scheduled to start in May, this will maximize the harms to recreational anglers and for-hire charter fishing during construction.

Response to comments: As stated in Section 3.5.1.2.3 of the FEIS, the installation of offshore Project components and the presence of construction vessels could temporarily restrict vessel movement and thus transit and harvesting activities in the SFWF and along the offshore SFEC. The construction schedule is determined based on reducing impacts to the North Atlantic right whale.

Comment theme: Geophysical survey impacts on catch.

Associated comments

Table I-316 provides the full list of comments received as part of this comment theme.

Table I-316. Geophysical survey impacts on catch comment.

Comment Number	Comment
154-6	"DWSF is committed to collaborative science with the commercial and recreational fishing industries pre-, during, and post- construction." This commitment cannot be taken at face value. The Atlantic cod studies and pre-construction baselines have been affected by geophysical surveying activities since 2016. Members of the fishing industry continue to find that these surveys affect catch and will hence bias the research, but Orsted asserts that there is no such evidence. However, in their incidental harassment permits filed with NOAA, Orsted concedes that the prey of marine mammals will be caused to leave the area by these surveys. Who, then, are the prey?

Response to comments: See Table G-1 in Appendix G for a description of environmental protection measures proposed by SFW. These measures include exclusion and monitoring zones for marine mammals that would be established for pile driving and high resolution geophysical (HRG) survey activities.

Comment theme: Project impacts to herring, mackerel, and squid fisheries.

Associated comments

Table I-317 provides the full list of comments received as part of this comment theme.

Table I-317. Project impacts to herring, mackerel, and squid fisheries comments.

Comment Number	Comment
352-8	Finally, we were disappointed to see that the DEIS did not project impacts to the region’s herring, mackerel, and squid fisheries – all important fisheries to our company – or to other ecologically important forage fish resources including Atlantic menhaden.
294-6	Regarding fisheries impacts, the DEIS is plain wrong. For example, on page 3-90, the DEIS states that due to the displacement of fishing effort by offshore wind facilities and resulting conflict that, “The competition would be higher for fishermen engaged in fisheries that have regulations that constrain where fishermen can fish, such as the lobster fishery. The potential for conflict due to fishing displacement is lower among fishermen targeting mobile species such as Atlantic herring, Atlantic mackerel, squid, tuna, and groundfish.” This is an unbelievable statement. We do not know where BOEM gets its information, because this statement is blatantly false. The lobster fishery is in fact one of the most unregulated fisheries in the New England and Mid Atlantic regions. The Atlantic herring, mackerel, squid and groundfish fisheries are far more spatially regulated than the lobster fishery, with enforcement mechanisms for spatial regulations. The herring fishery is managed by area quotas, spawning closures, gear excluded areas, spatial exclusion zones, bycatch caps and slippage provisions, industry funded monitoring observer and at sea monitor coverage, VMS requirements enforce spatial management, etc. The squid fishery is regulated by mesh area restrictions, mesh size restrictions, gear restricted areas, observer coverage, VMS requirements, bycatch caps, seasonal trimesters, exclusions from Coral Zones, and more. The groundfish fishery is perhaps the most regulated fishery in the nation with more regulations spatial and otherwise than there is time to write here. The lobster fishery, by contrast, doesn’t even have simple VMS requirements since it is not federally managed. It is one of the least restricted fisheries in the region. BOEM needs to get its fisheries facts straight and revise its resulting analysis. All fisheries impact analysis will be incorrect if BOEM cannot correctly comprehend the basic facts about the entities it is purportedly analyzing.

Response to comments: Table 3.5.1-16 in Section 3.5.1.2.2 of the FEIS shows the estimated of revenue at risk in the Atlantic herring FMP fishery and Mackerel, Squid, and Butterfish FMP fishery as proposed offshore wind energy projects are constructed and come online. As stated in the FEIS, this revenue at risk estimate represents the fishing revenue that would be foregone if fishing vessel operators opt to no longer fish in these areas and cannot capture that revenue in a different location. Revenue exposure estimates should not be interpreted as measures of actual economic impact. Actual economic impact would depend on many factors—foremost, the potential for continued fishing to occur within the footprint of the wind farm, together with the ecological impact on target species residing within the project areas. Economic impacts also depend on a vessel's ability to adapt to changing where it fishes. For example, if alternative fishing grounds are available nearby and could be fished at no additional cost, the economic impact would be lower. As described in Section 3.5.2.2.3, based on data presented in Table 3.5.1-7 it is possible to calculate the amount of commercial fishing revenue in these fisheries that would be exposed as a result of O&M activities in the SFWF.

Text in Section 3.5.1.2.2 has been revised to discuss the potential for fishing displacement in more detail.

Comment theme: Jonah crab fishery.

Associated comments

Table I-318 provides the full list of comments received as part of this comment theme.

Table I-318. Jonah crab fishery comment.

Comment Number	Comment
310-9	Information on Jonah crabs is also lacking in the DEIS. Seventy percent of the U.S. Jonah crab fishery comes from offshore soft sediment areas in NMFS area 537, which is the region where this and other wind farm development is proposed.

Response to comments: Table 3.5.1-16 in Section 3.5.1.2.2 of the FEIS shows the estimated of revenue at risk in the Jonah crab fishery as proposed offshore wind energy projects are constructed and come online. As stated in the FEIS, this revenue at risk estimate represents the fishing revenue that would be foregone if fishing vessel operators opt to no longer fish in these areas and cannot capture that revenue in a different location. Revenue exposure estimates should not be interpreted as measures of actual economic impact. Actual economic impact would depend on many factors—foremost, the potential for continued fishing to occur within the footprint of the wind farm, together with the ecological impact on target species residing within the project areas. Economic impacts also depend on a vessel's ability to adapt to changing where it fishes. For example, if alternative fishing grounds are available nearby and could be fished at no additional cost, the economic impact would be lower.

Comment theme: Commercial fishing analysis area.

Associated comments

Table I-319 provides the full list of comments received as part of this comment theme.

Table I-319. Commercial fishing analysis area comment.

Comment Number	Comment
166-26	We are curious why fisheries information related to the larger RI-MA Wind Energy Area precedes the description of fishing activity in the South Fork Wind Farm Area (Section 3.5.1). Is the intention to better incorporate impacts on transiting and operational effects on fishing in the broader area and/or to inform the cumulative effects analysis? Without additional clarification, the inclusion of data from the broader regional area takes the focus away from the South Fork Wind Farm area of interest.

Response to comments: Text was added to Section 3.5.1.1.1 of the FEIS to clarify that the RI-MA WEA was included in the analysis to provide further context for the potential impacts of the proposed project and alternatives.

Comment theme: Radar interference.

Associated comments

Table I-320 provides the full list of comments received as part of this comment theme.

Table I-320. Radar interference comments.

Comment Number	Comment
310-34	The DEIS states, “Most instances of interference can be mitigated through the proper use of radar gain controls” (page 3-91). This statement needs to be supported with references, and also needs an explanation of how proper use would occur.
338-48	56. While turbines may be easily seen during the day due to their large size and height above the water, this is not true for days with inclement weather. This, along with a potential for radar interference or scatter within the turbine arrays, could pose a risk to fishermen, especially those with vessels that are hard to maneuver due to fishing gear

Response to comments: As described in Sections 3.5.1.2.2 and 3.5.1.2.3 of the FEIS, some fishing vessels operating in or near offshore wind facilities may experience radar clutter and shadowing. Most instances of interference can be mitigated through the proper use of radar gain controls. Text was added to Sections 3.5.2.2.3 and 3.5.2.2.3 referencing South Fork Wind, LLC. 2021. Navigation Safety Risk Assessment.

Comment theme: Reef effect benefits.

Associated comments

Table I-321 provides the full list of comments received as part of this comment theme.

Table I-321. Reef effect benefits comment.

Comment Number	Comment
301-22	The DEIS mentions the “reef effect” throughout the document and describes its impacts as “negligible to minor beneficial impacts to for-hire recreational fishing” only, with no mention of potential benefit to the commercial fishing industry (pg. 3-102). The Project will create fishing opportunities for everyone. The DEIS notes the “reef effect” will create better opportunities for the for-hire fleet because more fish will be drawn to the area. However, all fishing interests, including commercial fishers, will benefit from the “reef effect.” Success in fishing is finding and catching fish. It is illogical that having more fish in the Project area would only benefit one group of fishers. SFW recommends that the FEIS should consider beneficial impacts for all fishing and not just for-hire recreational fishing.

Response to comments: Text has been added stating that the scour protection and foundations of offshore wind structures could provide new opportunity for for-hire recreational fishing businesses and certain types of commercial fishing by attracting certain fish through the reef effect. However, as described in Section 3.5.1.2.3 of the FEIS, a study has shown that the influx of recreational fishermen into the BIWF caused some commercial fishermen to cease fishing in the area because of vessel congestion and gear conflict concerns.

Comment theme: Port dependence on commercial fishing.

Associated comments

Table I-322 provides the full list of comments received as part of this comment theme.

Table I-322. Port dependence on commercial fishing comment.

Comment Number	Comment
163-14	As noted in the DEIS, Rhode Island is home to the port most exposed to Southern New England Wind development. Little Compton, RI is the most exposed port in terms of revenue coming from commercial fishing within the RI/MA wind energy areas (16.6%) as compared to activity in the Mid-Atlantic and New England regions overall. With respect to the SFWF, Little Compton is also the most dependent port on fishing activity within the Lease Area, with 1.3% of total commercial fishing revenue in the Mid-Atlantic and New England regions derived from the area.

Response to comments: Thank you for your comment. Section 3.5.1.1.1 of the FEIS is revised with updated information about ports and Little Compton is identified as the most exposed. This revised analysis did not change conclusions regarding port dependence on commercial fishing.

Comment theme: Methodology and findings for commercial fishing exposure values.

Associated comments

Table I-323 provides the full list of comments received as part of this comment theme.

Table I-323. Methodology and findings for commercial fishing exposure values comments.

Comment Number	Comment
163-16	Has BOEM considered an ensemble approach to calculating potential commercial fishing exposure values? Given the limitations of VTR data, and all other fisheries-dependent datasets (e.g., coverage rates, location accuracy, resolution), an approach that combines results of different model outputs could address some of the shortcomings of an individual approach.

Comment Number	Comment
301-15	In Section 3.5.1.2.4, Vessel Transit Lane Alternative, the DEIS asserts that a vessel transit lane would reduce exposed fishing revenue but does not provide an explanation of how the data was interpreted. The DEIS states that if a transit lane were applied to a project, the revenue exposed to the project would decrease by 5% during construction and 45% during operations and maintenance; however, the DEIS does not provide a citation as to how those results were derived (pg. 3-105). The assumption that fishers could fish within the transit lanes directly conflicts with the intent of a transit lane, which is to support transit of marine traffic. Regardless of how the results were calculated, there appears to be a logical error in stating that any appreciable revenue exposure will decrease during any phase of the Project if transit lanes are employed. The DEIS (p 3-100) bases its conclusions on revenue exposure on the assumption that fishermen will not fish within the project area with a 1-NM x1-NM grid layout, which is an assumption not supported by the record. The MARIPARS report found that commercial fishing navigation can be conducted safely within a 1-NM x 1-NM grid layout and affirmed that finding in the response to RODA's "Request for Correction" to the MARIPARS report. There are no exclusion zones or other comparable restrictions on fishing activities during operations. The DEIS (p 3-105) appears to assume that fishing will occur within the transit lanes and does not appear to consider the more realistic assumption (as supported by the USCG finding) that the transit lanes are less safe and therefore fishers will not fish in them. By suggesting a transit lane should be used to reduce revenue exposure, the DEIS is effectively stating the purpose of the transit lane is not for transit but for fishing. SFW recommends that these assumptions should be revised in the FEIS.

Response to comments: Thank you for your comment. The assessment of reduced revenue impacts under the Vessel Transit Lane alternative was generated using GIS-based revenue estimates of affected areas in comparison to the proposed Project.

While alternative approaches to calculating potential commercial fishing exposure values may be available, BOEM believes the methodologies and sources of information used in the impact analysis, as detailed in the FEIS, are consistent with CEQ regulations demanding information of ‘‘high quality’’ and professional integrity. BOEM has also coordinated extensively with NMFS on the methodologies and sources of information used in the impact analysis.

Comment theme: Habitat impact determination.

Associated comments

Table I-324 provides the full list of comments received as part of this comment theme.

Table I-324. Habitat impact determination comment.

Comment Number	Comment
355-5	Layout and cables Whether the layout of the turbines is on complex or non-complex habitat there needs to be an acknowledgment that there WILL be a change in habitat in and around the turbine area. I keep reading and hearing all about the benefits to the recreational community but not hearing or reading about the concerns of habitat alternation when it comes to the commercial industry. When looking at the effects that construction and operation will have on the habitat and ecology, we must look at the whole area of development, which includes the development slated for construction to the east of the South Fork Wind Farm. Therefore, I do not agree with the "negligible to moderate" determination for the Commercial and For-Hire resource. In fact, in the Table 2.3.1.1 it only mentions how the recreational community might "benefit" due to construction. Nothing is mentioned about the potential harm to the commercial fishery. Perhaps convening with the industry to consider micro-siting might solve this issue. The meetings should be open to all industry members to encourage true collaboration and transparency.

Response to comments: The analysis of the impacts of habitat alteration on commercial fisheries and for-hire recreational fishing is based on the impact analysis presented in Section 3.4.2 of the FEIS, which concluded that the habitat alteration resulting from proposed Project would have negligible to minor long-term impacts (both beneficial and adverse) to invertebrates and finfish.

Comment theme: Air quality impacts to seafood availability.

Associated comments

Table I-325 provides the full list of comments received as part of this comment theme.

Table I-325. Air quality impacts to seafood availability comment.

Comment Number	Comment
363-91	A GHG analysis must also evaluate the effects of a loss of seafood availability. In a recent study comparing the GHG emissions of three sources of animal protein, wild-caught seafood had the lowest impact in each of the categories of GHG emissions, energy use, air pollution, and water pollution. It is estimated that just two people with high meat consumption replacing that meat with fish would save the emissions equivalent of about driving 6,000 miles over the course of a year. Carbon emissions associated with seafood production in countries with less stringent environmental regulations (i.e. essentially everywhere) are higher than those of domestic seafood; reduced availability or prohibitive pricing of products will drive consumers to replace sustainable U.S. seafood with higher-carbon proteins.

Response to comments: The beneficial impacts of the proposed Project with respect to climate change are discussed in Section 3.3.1 of Appendix H.

Comment theme: Editorial comments.

Associated comments

Table I-326 provides the full list of comments received as part of this comment theme.

Table I-326. Editorial comments.

Comment Number	Comment
166-39	In the first paragraph under “Regional Setting” on page 3-70, the Summer Flounder, Scup, and Black Sea Bass FMP should be listed with the other Mid-Atlantic Fishery Management Council FMPs with the citation of MAFMC 2019. Similarly, the Herring FMP should be listed with the other New England Fishery Management Council FMPs with the citation of NEFMC 2019. In both cases, these FMPs are jointly managed with the Atlantic States Marine Fisheries Commission. The associated footnote is sufficient to indicate this.
310-35	The description of the Northeast Multispecies (large-mesh) fishery (P. 3-70, Footnote 10, Section 3.5.1.1.1) does not include Atlantic wolffish (Anarhichas lupus), which is among the 13 species listed for this grouping (https://www.fisheries.noaa.gov/species/northeast- multispecies-groundfish). This should be revised in the FEIS.
301-96	There is a typo in Appendix B, pg. B-52. “For-hire commercial fishing” is not presented elsewhere in the document. This is likely supposed to be for-hire recreational fishing.

Response to comments: The first paragraph of the Regional Setting has been revised, with the FMPs listed as suggested. The fish species has been added to a footnote. The error on page B-52 has been changed to “for-hire recreational fishing.”

Comment theme: Lobster landings value estimates and VTR coverage rates.

Associated comments

Table I-327 provides the full list of comments received as part of this comment theme.

Table I-327. Lobster landings value estimates and VTR coverage rates comment.

Comment Number	Comment
163-15	The footnote on page 3-69 notes that VTRs cover approximately 63% of lobster vessels operating in Statistical Area 537. Have the lobster landings value estimates that follow been adjusted in any way to reflect the coverage rate or are the estimates only reflective of 63% of the fishery?

Response to comments: The lobster landings value estimates in Section 3.5.1.1.1 were not adjusted to reflect the VTR coverage rate. Data were not available to interpolate lobster landings of non-federally permitted vessel operating in federal waters.

Comment theme: Reported catch to state agencies.

Associated comments

Table I-328 provides the full list of comments received as part of this comment theme.

Table I-328. Reported catch to state agencies comment.

Comment Number	Comment
166-40	This statement on page 3-86 is misleading and inaccurate: “Nevertheless, state permit holders must report their catch to state agencies, including the statistical area within which fishing occurred.” It would be more accurate to say, “Of all the states considered in this document, only New York, Rhode Island, and Maryland require all for-hire vessels with state permits to submit trip-level information on catch and areas fished.”

Response to comments: The statement in the FEIS refers to the reporting requirements of state permit holders engaged in commercial fishing, not for-hire recreational fishing.

Comment theme: BOEM received a series of requested clarifications on the impacts to commercial fishing.

Associated comments

Table I-329 provides the full list of comments received as part of this comment theme.

Table I-329. BOEM received a series of requested clarifications on the impacts to commercial fishing comment.

Comment Number	Comment
338-48	53. The geographic range used to analyze impacts to Commercial Fisheries and For-Hire Recreational Fishing includes data from Maine to North Carolina even though the states that will be most affected by the project are NY, CT, RI and MA. While this geographic range makes sense in terms of regional fisheries management, using this broad dataset to evaluate a specific fishing area leads to a diluted assessment of the overall effect on fisheries that operate out of the project area and cable route. Including states with little to no fishing activity in the area such as NC, VA, MD, and ME diminishes the ability to determine an effect of the Project on the fishermen that actively fish in the area. 54. The maximum landings presented on p. 3-86 do not reflect New York’s numbers for the same timeframe. Please confirm what data sources were used for such information. In addition, in order to analyze cumulative fishing activity occurring within New York State waters, fishing activity in state waters should not be separated into federal and state fishermen.

Response to comments: It is correct that ports in NY, CT, RI, and MA account for the majority of the commercial fishing catch in the lease area and along the offshore and cable route. However, as shown in Table 3.5.1-9 and Table 3.5.1-12, catches in these areas are also landed in ports in NJ, NC, and VA According to CH2M HILL (2018) estimated catches of New York State–permitted fishermen in statistical areas 167 and 168 were obtained through a data request to the Atlantic Coastal Cooperative Statistics Program.

Comment theme: Data sources in the analysis of commercial and for-hire fishing.

Associated comments

Table I-330 provides the full list of comments received as part of this comment theme.

Table I-330. Data sources in the analysis of commercial and for-hire fishing comment.

Comment Number	Comment
338-47	51. For the analysis of commercial and for-hire fishing within the lease area, only Vessel Monitoring System (VMS) and vessel trip report (VTR) data were used to assess economic impacts. Automatic Identification System (AIS) data should also be included in this analysis because some vessels are not required to use VMS and many fisheries covered by VMS have only recently been required to do so. In addition, using VMS data from 2017-2019 to assess fishing activity within the lease area does not account for the fluctuations that can occur between fishing years. 52. Even though the Maximum Work Area encompasses both federal and New York State waters, revenue from New York State vessels in state waters is not included in this economic analysis. The Final EIS should include this information as there is extensive fishing with bottom-tending gear that occurs in New York State waters near the SFEC.

Response to comments: VTR data rather than VMS data were used to estimate economic impacts to commercial fisheries and for-recreational fishing in Section 3.5.1. AIS data for fishing vessels were used in the navigational safety risk assessment in Section 3.5.6 of Appendix H. The economic impacts analysis was based on NMFS VTR data which includes data from federally-permitted vessels fishing in state waters, but does not include data from vessels that are not federally permitted and which operate only in state waters.

Comment theme: Scoping mitigation measures.

Associated comments

Table I-331 provides the full list of comments received as part of this comment theme.

Table I-331. Scoping mitigation measures comment.

Comment Number	Comment
363-62	The DEIS also fails to analyze the mitigation measures identified in the scoping process. These include: • “Consideration of a range of cable burial depths to address potential for anchor strikes from tug/barge and fishing vessels. • Annual cash donation directly to affected fisheries • Alternatives to transit lanes, simulators, specific lighting schemes, and turbine spacing, as well as mechanisms for improved communications, including providing real-time construction information on systems fishermen are actively using, and “one-stop shopping” for reporting wind farm emergencies such as oil spills and interactions with fishing gear, such as snags.” There is no timeline identified in the scoping document to indicate when this may occur. It is unclear when the issues raised in the scoping period will be addressed. There are a number of other issues raised in the scoping comments that, if addressed in this DEIS, would have better informed the public and fishermen, whose livelihoods and way of life are at risk.

Response to comments: Appendix G of the Final EIS has been updated to include modifications and/or additional mitigation and monitoring measures that BOEM could choose to incorporate into the Record of Decision. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could also be considered by decision makers and incorporated into the Record of Decision. BOEM is open to working with state partners and the commercial and recreational fishing industries to investigate alternative strategies to negotiate compensatory mitigation agreements. South Fork Wind, LLC has negotiated with the State of New York, the State of Rhode Island and the Commonwealth of Massachusetts to determine compensation packages for fishermen.

Environmental Justice

Comment theme: Beneficial Project impacts and outreach to environmental justice populations.

Associated comments

Table I-332 provides the full list of comments received as part of this comment theme.

Table I-332. Beneficial Project impacts and outreach to environmental justice populations comments.

Comment Number	Comment
380-5	Caroline Hahn:One area which requires additional focus is in the DEIS, the environmental justice section, which should include the beneficial impacts of the project, including job for improvements, contributions to the local economy and climate change, climate change mitigation. The section also did not incorporate discussion of public input and feedback from local and Labor communities.
301-30	Furthermore, the environmental justice conclusions omitted discussion of several topics. It is important for the FEIS to consider the extensive public outreach that SFW conducted, as summarized in both Table 1.4-1 of the COP and Appendix A of the DEIS, and the valuable input provided by the community, Native American tribes, and local fishers. In addition, potential beneficial effects of the Project related to economics and employment should also be described.
346-2	One area which requires additional focus in the DEIS is the Environmental Justice section, which should include the beneficial impacts of the project including jobs, port improvements, contributions to the local economy, and climate change mitigation. This section also did not incorporate discussion of public input and feedback from local and labor communities.
192-2	I believe that the Environmental Justice Section in your statement does not pay due attention to these beneficial impacts and their potential to mitigate climate change. It should include discussion of public input and feedback from local and labor communities.
301-3	Environmental Justice Communities. Offshore wind development in the Northeast will provide substantial benefit to environmental justice communities, including jobs and associated economic activity arising from port operations. BOEM should reflect these benefits in the FEIS.
301-31	While the DEIS concludes that the Proposed Action could cause negligible to moderate direct or indirect impacts on environmental justice communities depending on the community, the DEIS appropriately acknowledges that these onshore and offshore projects provide benefits to lower income workers, including employment in the marine trades, vessel and port maintenance, and supporting industries. Port use and expansion necessary to support the offshore wind industry will provide substantial economic benefits to these communities, including new jobs and associated economic activity. While these benefits will be greatest during the construction period, they will continue at an economically meaningful level throughout the operational life of the offshore wind projects when these environmental justice communities would also share in the environmental benefits associated with clean, renewable energy. Based on the experience of SFW and its affiliates, BOEM (and the FEIS) should not underestimate or understate the importance of the benefits of the offshore wind industry for these communities.

Comment Number	Comment
349-16	While BOEM's discussion of the climate and air quality impacts of the proposed action is directionally correct, BOEM understates the magnitude of the benefits of building out the full 22 GW of offshore wind in the Atlantic and fails to identify the environmental justice implications of the avoided emissions impacts.
349-22	Air emissions present a similar story to climate emissions, but with the additional dimension of locational benefits to pollution impacts. Air quality impacts associated with offshore wind projects within the air quality Geographic Analysis Area are "anticipated to be small relative to larger emission sources such as fossil fuel facilities." The largest air quality impacts are anticipated during construction with smaller and more infrequent impacts anticipated during decommissioning, but the cumulative air quality impacts even during those periods are projected to be minor. Moreover, a "net improvement" in air quality is expected on a regional scale as projects come online and offset emissions from fossil fuel-type sources. Due to displacement of fossil fuel generation, the DEIS projects that once the Project is operational, it alone would result in annual avoided emissions of 97.39 tons of nitrogen oxides and 53.20 tons of sulfur dioxide. Although the DEIS helpfully quantifies the magnitude of project air emissions and notes the displacement effect of offshore wind, it fails to note the locational dimension of these emission benefits. Power plants are frequently located in or close to population centers and disproportionately located in or near environmental justice communities. The ability of offshore wind to displace fossil fuel generation thus has a potentially important environmental justice benefit. This is especially true for offshore wind facilities, whose generation often coincides with afternoon peak demand. Offshore wind may be especially helpful in displacing the dirtiest peaking units, providing especially large air quality benefits and benefits to environmental justice communities.
338-17	12. In Section 3.5.2.2 under Future Activities (without the Proposed Action), the DEIS states that EJ populations within the analysis areas would be expected to see long-term beneficial impact, although the impact is considered negligible. Unless this can be demonstrated locally, the DEIS should not characterize the project in this way. In particular, under the cumulative impact section there are several impacts facing EJ communities where the impact is described as moderate and BOEM expects the overall impact on EJ populations from the proposed action to be moderate.

Response to comments: An expanded description of impacts to minority and low-income populations resulting from Project impacts to employment and air quality has been added to the environmental justice impact analysis. Specifically, text has been added to the environmental justice impact analysis affirming that offshore wind energy development would likely create jobs for some shore-based and marine workers who are members of environmental justice populations. With specific regard to the proposed Project, local workers would be hired where possible to meet labor needs for Project construction, O&M, and conceptual decommissioning. However, these employment benefits would likely be no greater than those experienced by non-minority or non-low-income members of the general population who also reside in communities that would experience increased economic activity as a result of offshore wind energy development.

See Section 3.3.1 in Appendix H for a description of the beneficial impacts of the Project with respect to climate change. The cumulative changes in onshore emissions as estimated in the FEIS are general in nature and do not provide the level of detail that would enable a locationally specific assessment of environment justice impacts. However, it is expected that these benefits would accrue to environmental justice populations in addition to the general public. Further it is anticipated that any potential impacts to air quality and climate change will not differentially affect environmental justice populations identified in the FEIS. The text in Section 3.5.4.2.2 has been revised to state that the air quality improvements from offshore wind energy development would have a long-term, minor to moderate beneficial impact on environmental justice populations.

Public input during the scoping process was considered in the environment justice impact analysis.

Comment theme: Alternatives and mitigation measures to address the environmental justice impacts.

Associated comments

Table I-333 provides the full list of comments received as part of this comment theme.

Table I-333. Alternatives and mitigation measures to address the environmental justice impacts comments.

Comment Number	Comment
141-20	Environmental Justice Page 3-145 of the DEIS notes, "In the context of other reasonably foreseeable environmental trends and planned actions, the incremental adverse impacts to environmental justice populations under the Proposed Action resulting from individual IPFs would range from negligible to moderate. Considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in moderate adverse impacts to low income and minority individuals. BOEM made this call because the overall effect to environmental justice populations would be somewhat disruptive." Recommendation: •We encourage BOEM to develop mitigation measures to address EJ impacts identified in DEIS. Based on our review we could not identify any specific measures proposed to address the identified environmental justice impacts.
338-16	Environmental Justice 11. The DEIS identifies adverse impacts on the Environmental Justice (EJ) population; however, there is no discussion of avoiding those impacts.
338-18	13. On p. 3-145 Conclusions: "Proposed Action when combined with past, present, and reasonably foreseeable activities would result in moderate adverse impacts to low income and minority individuals. BOEM made this call because the overall effect to environmental justice populations would be somewhat disruptive." This statement should include a discussion of alternatives to avoid or minimize these impacts.
338-19	14. In Section 3.5.4.2.5, Fisheries Habitat Impact Minimization Alternative, the DEIS states that this proposed alternative would result in decreased impacts to air and water quality, and reduced noise levels if less trenching and time are needed to install a reduced number of WTGs and cables. The reduction of sites would reduce impacts to fisheries habitats and the commercial and recreational fisheries businesses. Therefore, this alternative would have a lower impact on EJ populations who rely on the fishing industry; however, BOEM has still identified the impacts as minor-moderate. The DEIS should identify mitigation options for the moderate adverse impacts identified, in particular the air quality impacts identified during construction.
338-13	On p. 3-142, the Proposed Action Alternative states, “With respect to air quality, state and local agencies would be responsible for minimizing and avoiding air quality impacts on nearby neighborhoods during Project construction. Therefore, potential adverse impacts to minority and low-income populations associated with changes in air or water quality as a result of Project construction would be temporary and minor to moderate and are not expected to appreciably exceed those experienced by other adjacent populations.” This statement places all of the burden on the State to mitigate construction emissions. Under general conformity, it is usually the responsibility of the project sponsor to minimize emissions during construction and if necessary, offset emissions when a general conformity threshold is exceeded. Similar language appears on pp. 3-144, 3-150, 3-154 and 3-155. These sections should be revised in accordance with the general conformity rule.

Response to comments: CEQ’s *Environmental Justice Guidance Under the National Environmental Policy Act* (1997), indicates that if an agency determines there is a disproportionately high and adverse impact to minority populations and low-income populations, an agency may wish to consider heightening its focus on meaningful public engagement regarding community preferences, considering an appropriate range of alternatives (including alternative sites), and mitigation and monitoring measures. However, BOEM determined that no disproportionately high and adverse impact to minority populations and low-income populations would occur under the Proposed Action or other action alternatives in the EIS.

Nevertheless, Applicant-committed avoidance and minimization measures have been identified for impacts to resource areas that would potentially affect environmental justice populations, and would be implemented if BOEM selects the Proposed Action or other action alternatives. In Table G-1 of Appendix G, please see the environmental protection measures proposed by South Fork Wind, LLC for air quality; water quality; commercial fisheries and for-hire recreational fishing; cultural resources; and demographics, employment, and economics.

Comment theme: Health impacts to environmental justice populations.

Associated comments

Table I-334 provides the full list of comments received as part of this comment theme.

Table I-334. Health impacts to environmental justice populations comments.

Comment Number	Comment
167-2	There were areas where BOEM did see the potential for more moderate impacts which we would like to discuss in more detail. For example, BOEM highlights the potential for Environmental Justice concerns on lower-income communities during construction. While any industrial activity has the potential to impact communities, BOEM is missing the “forest for the trees”. The electricity provided by South Fork—again, enough to power some 70,000 homes—will need to come from somewhere. If clean energy projects are not built, the likely result will be a higher capacity factor for existing plants or perhaps construction of new facilities. Individuals who live near certain powerplants have historically been lower-income individuals than the national average and have faced lower home values. The literature is also quite clear that living near (often older) power generating facilities with fewer controls has a direct-line relationship to negative health outcomes for the communities who live nearby them, with the journal Nature Energy actually demonstrating that in the worst cases a plant’s closure reduces the use of emergency inhalers and other signs of poor lung-health in nearby communities. This is not merely hypothetical on Long Island. If clean energy projects are not built, the likely result will be a higher capacity factor for existing plants or perhaps construction of new facilities. Individuals who live near certain powerplants have historically been lower-income individuals than the national average and have faced lower home values. The literature is also quite clear that living near (often older) power generating facilities with fewer controls has a direct-line relationship to negative health outcomes for the communities who live nearby them, with the journal Nature Energy actually demonstrating that in the worst cases a plant’s closure reduces the use of emergency inhalers and other signs of poor lung-health in nearby communities. This is not merely hypothetical on Long Island. Given this fact, while BOEM describes certain net-negative environmental justice impacts from the construction of South Fork, this seemingly is tied to the simple fact that any activity is occurring. If environmental justice is to be a credible discussion point around offshore wind construction, then BOEM should acknowledged the fundamental reality that the energy capacity of the project and the associated turbines will be located miles from communities thereby eliminating environmental justice issues. BOEM should also explore the fact that this is a region with a demand for power and somewhat limited options to secure it unless these communities instead welcome the construction of new, state-of-the-art fossil-fuel facilities. If offshore wind does not come to fruition in the region, it is entirely plausible that legacy fossil-fuel plants will fill that gap. We urge BOEM to consider the environmental justice implications of not building new renewable energy facilities like South Fork.

Comment Number	Comment
329-6	The most immediate environmental justice issues flow from the health benefits. Yet again, the DEIS does not calculate them. The bibliography does include one peer-reviewed, quantitative analyses of health impact on EJ populations (Thind et al 2019, Environ. Sci. Technol.). Why would such calculations not be provided in any EIS for these projects? With regard to EJ impacts, on page 3-140, the DEIS says: Minority and low-income populations in the United States may be at increased risk for exposure to, and health effects of, fine particulate matter air pollution from fossil fuelf ired power plants (Thind et al. 2019). Therefore, the air quality improvements from offshore wind energy development would have a long-term beneficial impact on environmental justice populations, although the impact would likely be negligible. Without any quantitative analysis, the DEIS concludes that the morbidity and mortality impact on minority and low-income population "would likely be negligible." Again, I here calculate health impact as a way of assessing the DEIS claim of "negligible" benefit to environmental justice populations. (I use data from Massachusetts, near the location of the Proposed Action, as those data were readily available as I write this comment.) Based on peer reviewed studies, black and hispanic populations in Massachusetts are exposed to significantly more air pollution from power plants (Levy et al). Also, nationally, blacks suffer significantly higher mortality from power plant emissions (Madinder et al 2019). Both studies show that race is a stronger predictor of exposure and health impact than is income, again confirming that this is an Environmental Justice issue. I here construct an approximate measure of Environmental Justice benefits. From the US Census, the Massachusetts population is 9% black and 12% hispanic, so 21% of population is minority, suffering above-average impact from power plant air emissions (Census 2019. QuickFacts. Massachusetts). As a rough estimate, from Madinder's Figure 1, blacks have 19% higher mortality than the general population. (I don't have similar data from NY, so this is only an approximation.) The DEIS, page ES-2, as noted above, says that the EJ "impact would likely be negligible." Based on the employment benefit alone, this impact description may or may not be correct. In this comment, I only address health, as the existing DEIS does no analysis of the health impact on EJ populations. Per 40 CFR §1508.8, health has to be included in impacts, whether positive or negative, as stated above. Per the last column in Table 1, the Proposed Action would save 11 minority lives, and reduce health impact on minority communities by $760,000. The cumulative impact of 22 GW would save 1,800 minority lives and reduce health impact on minority communities by $12 billion. The DEIS shamefully calls these EJ community health benefits "likely negligible". Both the Proposed Action, and the cumulative impact, should be described as a "Major Beneficial" impact on Environmental Justice communities.
329-9	Similarly the Environmental Justice health impact must be evaluated, both because minority populations comprise a portion of the populations and because they are disproportionally impacted by air pollution from power plants.

Response to comments: Section 3.3.1 of the FEIS has been revised to discuss the health impacts of fossil fuel consumption and resulting degraded air quality on different racial groups, as well as different income groups, as well as benefits from reduction of fossil fuel power generation displaced by offshore wind energy (including the proposed Project and other projects).

Comment theme: Electricity costs.

Associated comments

Table I-335 provides the full list of comments received as part of this comment theme.

Table I-335. Electricity costs comment.

Comment Number	Comment
363-136	Lastly, under the power purchase agreement with LIPA, the SFWF will cost an average residential customer on Long Island between $1.39 and $1.57 per month. While the average monthly rate provides some information of future energy costs, the DEIS fails to analyze which communities will pay more or less for the power provided, and consequential impacts to low-income households. BOEM falls short of a complete environmental justice review as required by NEPA, as higher energy rates from the SFWF will affect environmental justice communities.

Response to comments: Table 3.7-1 in Attachment 3 of Appendix E describes energy generation of future non-offshore wind activities under the No Action Alternative. Table 2.1.1-1 in Section 2.1.1 describes the potential electrical generation range of the proposed Project. A comprehensive forecast of impacts to energy supply and costs under the proposed Project and alternatives depends on numerous variables beyond the scope of the EIS. The cost of the lease to the applicant is outside the scope of the EIS.

Comment theme: Project impacts to commercial fishing employment for low income or minority individuals.

Associated comments

Table I-336 provides the full list of comments received as part of this comment theme.

Table I-336. Project impacts to commercial fishing employment for low income or minority individuals comments.

Comment Number	Comment
363-135	Under Executive Order 12898 and accompanying Presidential Memorandum, federal agencies must analyze environmental justice in minority and low-income populations in NEPA reviews. The DEIS nominally analyzes impacts of the proposed action and alternatives to environmental justice (EJ) populations but does not consider the EJ value of other employers and activities that will be impacted from the development of offshore wind. The fishing industry—for which BOEM can and should analyze existing workforce information—supplies significant employment, if not the majority of jobs, in EJ communities up and down the coast, including tens of thousands of jobs that are highly specialized but do not require formal training. Seafood processing, in particular, is heavily dependent on labor from first generation immigrants. If biological resources or fishing operations are negatively impacted from build out of wind energy areas, employment opportunities for EJ demographics are likely to be reduced. RODA's members report significant employment of EJ populations. For example, one large east coast processor that shared employment records with RODA reports 74% of its workforce of 500-1000 employees are people of color, immigrants, or English as a second language (ESL) learners. We estimate that other fishing companies have similar demographics. Therefore, jobs lost in the fishing industry will have EJ consequences and thus must be evaluated by the DEIS.
380-29	Meghan Lapp: And I'll conclude with the DEIS doesn't really add up the impacts to environmental justice communities. The commercial fishing industry, land-based facilities, employ a lot of first-generation immigrants. There are jobs for low-education workers, which are not going to be found in the wind industry. And if the commercial fishing jobs go away, those environmental justice communities are going to be negatively impacted, and that is not analyzed in the DEIS. Thank you.
301-29	In assessing impacts to environmental justice communities, BOEM's conclusions weight its evaluation towards socioeconomic impacts to low-income individuals employed in fishing industries rather than to the health and environmental impacts of at-risk environmental justice communities. SFW concurs with the approach BOEM used to designate potentially affected environmental justice populations. Using 5-km zones, BOEM identified the local demographics of communities surrounding proposed ports, landing sites, or other onshore facilities. In Section 3.5.4.2.3, BOEM found that potential impacts to environmental justice populations would range from negligible to moderate. SFW agrees that the majority of impacts would be temporary, and that these impacts would not appreciably exceed impacts from the Project experienced by other adjacent populations. However, with regard to commercial fisheries and for-hire recreational fishing, the DEIS does not provide information to substantiate the finding of an unavoidable moderate adverse impact to environmental justice populations (as described in Section 4.1.1, Table 4.1.1-1 and Section 3.5.4.2.3, pg. 3-143). For example, Section 3.5.1 includes extensive fisheries economic data on a regional scale; Section 3.5.3 includes employment characteristics on a county and city scale. However, such data is not provided at the same scale (5-km zones) considered in the environmental justice analysis. Therefore, it is difficult to determine if environmental justice populations within the 5-km zones predominantly work in these affected employment sectors. As a result, the DEIS does not indicate how the potential impact would be disproportionately borne by an environmental justice population versus a non-environmental justice population
294-21	The DEIS environmental justice section is incomplete. For example, on page 4-3, the analysis states that potential impacts would be short-term and localized. Section 3.5.4 of the DEIS analyzes various environmental justice communities in ports with commercial fishing revenue, but does not acknowledge that many of these environmental justice communities actually receive their employment from the commercial fishing industry via shoreside infrastructure including seafood processing plants, etc. The well being of many of these environmental justice communities is directly linked to the long-term health of the commercial fishing industry in those ports/regions. Should the commercial fishing and seafood industry be negatively impacted by offshore wind development, the any domestic jobs in the offshore wind construction industry would likely require skillsets and qualification not available to or found in the affected environmental justice communities. BOEM should include the related impacts to environmental justice communities arising from adverse impacts to the commercial fishing industry as a result of the proposed Project and cumulative impacts analysis.

Response to comments: Text has been added to the environmental justice impact analysis indicating that data are not available to identify the at-sea and shoreside participants in the potentially affected fisheries who are members of minority or low-income populations. Some of these participants likely reside in distant communities and have little direct connection to the ports where fishing vessels are based and fish are landed and processed. However, the FEIS cites a study (National Guestworker Alliance 2016) that reports that certain workers in the commercial fishing industry, such as factory floor seafood processor workers and fishing vessel deckhands, are often members of minority and/or low-income groups. Consequently, to the extent that Project impacts result in declines in the economic performance of commercial and for-hire recreational fisheries, members of environmental justice populations could be disproportionately affected, especially if employment in the seafood processing industry declines. However, financial compensation policies implemented by offshore wind developers, together with the ability of fishing vessel operators to adjust transit and fishing locations to avoid conflicts with construction and O&M activities related to the proposed Project, would help ensure that fishing businesses could continue to operate with minimal disruption.

Comment theme: Methodology for environmental justice analysis.

Associated comments

Table I-337 provides the full list of comments received as part of this comment theme.

Table I-337. Methodology for environmental justice analysis comment.

Comment Number	Comment
301-99	The approach to determining whether the EJ study area zone percent minority or low-income population was meaningfully greater than the reference population is unclear as presented in Appendix F (Table F-10). The FEIS should clarify methodology, specifically how the multipliers were incorporated, or provide the source data. It would be useful to see how many block groups exceeded 50% and how many block groups were meaningfully greater than the reference population. Table 3.5.3-4 includes some overall employment characteristics at the state and county level, but the same information should be included for the EJ study area zones, following the P60 series from the guidance, which is what should be used to define poverty, rather than a multiplier factor.

Response to comments: The Environmental Justice section of Appendix F provides additional details on the methodology used to determine whether the minority or low-income percentages in an individual census block group in the analysis area are meaningfully greater than the percentages in the reference populations of the county or state. The data source was U.S. Environmental Protection Agency (EPA). 2020. EJSCREEN: Environmental Justice Screening and Mapping Tool. Available at: https://www.epa.gov/ejscreen/download-ejscreen-data. Accessed April 22, 2020.

Cultural Resources

Comment theme: Avoidance and minimization of impacts to historic properties.

Associated comments

Table I-338 provides the full list of comments received as part of this comment theme.

Table I-338. Avoidance and minimization of impacts to historic properties comment.

Comment Number	Comment
388-3	In addition, we are supportive the BOEM further examining measures that would prioritize the avoidance and minimization of adverse effects to historic properties of religious and culture significance. In particular, the ACHP is supportive of the BOEM identifying and giving serious consideration to the utilization of common corridors for transfer cables between turbines as well as for offshore export cables. Given the South Fork Wind Farm's (SFWF) close proximity to other future Wind Development Areas and as one of the earliest of other similar undertakings in this region, design considerations for avoiding and minimizing effects to marine historic properties will likely have ramifications on the best practices and measures utilized for future consultations. To that end, we urge the BOEM to consider and prioritize methods to minimization of effects earlier in the process.

Response to comments: Avoidance and minimization of impacts to historic properties including those of religious and culture significance to Tribes is given first consideration and preference by BOEM throughout Section 3.5.2, Cultural Resources. This includes in consideration of marine cable routing. Scoping and consultation on these matters began in a timely manner, as early as possible in the process, with BOEM's overall scoping and consultation on the Project.

Comment theme: Scope of analysis

Associated comments

Table I-339 provides the full list of comments received as part of this comment theme.

Table I-339. Scope of analysis comment.

Comment Number	Comment
388-4	Cumulative Effects. The ACHP appreciates the BOEM's recognition and initial analysis of the SFWF potential to contribute to the cumulative visual effects on historic properties in combination with the potential effects of other offshore wind energy development activities proposed for in adjacent lease areas. As provided in 36 C.F.R. § 800.5(a)(1), adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative. The ACHP interprets this language in the Section 106 regulations to mean that a federal agency must consider the cumulative effects of the proposed undertaking when added to the context of other occurring and proposed actions in the area of potential effects, regardless of the actor. This analysis is critical for assessing the effects to historic properties identified within the area of potential of effect. Given that this analysis will also likely be considered when evaluating the cumulative effects of the other offshore wind energy development activities proposed for adjacent lease areas, it is imperative that the BOEM ensure this initial analysis establishes a consistent and logical method that can be carried forward to further consultations. We concur with the recommendations provided by SHPOs and other consulting parties that the BOEM should evaluate expanding the scope of its effects analysis for cumulative effects to include additional historic properties. It appears the initial analysis was too limited in scope and further there exists confusion on the BOEM's methodology, which resulted in the 3% figure. While the ACHP concurs with the rationale that the BOEM proposed to assess the cumulative effects, given the context provided above, we recommend seeking further consulting party input into refining this methodology. Further, we recommend BOEM consider mitigation approaches that can be supported by the consultative efforts of multiple undertakings given the likelihood of increasing cumulative effects from wind development in the region.

Response to comments: As a part of its review under the NHPA, BOEM is considering the comments received from all consulting parties and will evaluate expanding the scope of its effects analysis for cumulative effects to include additional historic properties and clarify analysis based on these comments and ACHP comments. BOEM remains in consultation with consulting parties under Section 106 of the National Historic Preservation Act (NHPA). As referenced in the FEIS, BOEM will prepare a Memorandum of Agreement to address mitigation of any adverse effects to historic properties, developed with consulting parties including ACHP, that will include cumulative effects. The analysis of impacts to cultural resources in the FEIS is consistent with the analysis of impacts performed in the NHPA review.

Comment theme: Tribal government-to-government consultation.

Associated comments

Table I-340 provides the full list of comments received as part of this comment theme.

Table I-340. Tribal government-to-government consultation comments.

Comment Number	Comment
388-1	Consultation with Indian Tribes. The ACHP is supportive of the concerns shared by Indian tribes in recent correspondence regarding the potential effects to historic properties and methods and technologies employed to avoid and minimize those effects. We encourage the BOEM to work in earnest to respond to these concerns and questions as it revised and updates the technical reports and be prepared to report on those measures during the next consulting parties meeting. Analogous with our comments on other adjacent wind development, the ACHP feels these concerns are further exacerbated by the intensity of concurrent Section 106 reviews occurring in this region and we recommend the BOEM consider pursuing, in consultation with Indian tribes, tools, such as regular meetings and data sharing agreements that might assist in assuaging the influx of materials
388-2	The ACHP is also supportive of the comments by Indian tribes regarding identification efforts and potential effects to marine and terrestrial resources of religious and cultural significance. We urge the BOEM to give particular attention to effectively and consistently incorporating comments provided by Indian tribes into revisions in the technical reports as well as informing its effect determination.
388-5	In addition to cumulative visual effects, the ACHP encourages the BOEM to consider and if appropriate evaluate the potential cumulative effects this undertaking will have on marine resources, particularly those of religious and cultural significance to Indian tribes. As noted above, the ACHP is supportive of recommendations by consulting Indian tribes to thoroughly assess those modifications to the undertaking that could avoid and minimize adverse effects to these historic properties. Such considerations and conditions would aid to minimize cumulative effects to these properties as well.
141-21	Tribal Coordination and Consultation We encourage BOEM to continue tribal coordination and consultation during the development of cultural resource assessments and mitigation measures to address identified impacts from construction or operation of the facility and transmission cable array. We also recommend that the scope of the tribal consultation include any environmental impacts from the proposed activity that may affect tribal interests. We recommend that ongoing and planned future tribal consultation be reported in the FEIS.

Response to comments: BOEM remains in consultation with Tribes under NHPA Section 106 and in accordance with Executive Order 13175 and, as stated in FEIS Section 3.5.2 and in Appendix A (at the Government-to-Government Consultation and Other Tribal Coordination subsection). Additional government-to-government consultations are planned for the future. This includes:

- earnestly evaluating the effects that the BOEM action could have on resources of Tribal concern,
- addressing Tribal comments,
- including Tribes in consideration and documentation of decisions regarding effects the federal action on resources of Tribal concern, and
- consultation on the cumulative effects that the BOEM action could have on resources of Tribal concern, including submerged landscapes in marine settings.

BOEM is open to additional approaches to ensure effective engagement with the Tribes.

Avoidance and minimization of impacts to historic properties including those of religious and cultural significance to Tribes is given first consideration and preference by BOEM throughout Section 3.5.2, Cultural Resources.

The FEIS addresses areas of environmental impact identified to date through Tribal consultation and that may affect Tribal interests. This address directly references Tribal interests where appropriate, including in regard to Environmental Justice (see Section 3.5.4), as well as in the Cultural Resources Section (3.5.2).

Comment theme: Public nighttime access for historic sites.

Associated comments

Table I-341 provides the full list of comments received as part of this comment theme.

Table I-341. Public nighttime access for historic sites comment.

Comment Number	Comment
301-98	In Section 3.5.2, the wording regarding public nighttime access should be reviewed. Some of this wording may have been used from the Vineyard Wind SEIS. The historic sites relevant for SFW are not publicly available at night.

Response to comments: FEIS Section 3.5.2 (see page 3-112, Viewshed Resources: Light) correctly considers accessibility and other consideration of nighttime views for historic properties, including those historic properties (e.g., Block Island Southeast Lighthouse) that may not be regularly open for public visitors between sunset and sunrise. All historic properties in the area of potential effects for the Project were considered for the impacts of nighttime lighting. The wording was reviewed and is revised in the FEIS to the extent appropriate.

Comment theme: Impacts on the Southeast Lighthouse and other cultural resources.

Associated comments

Table I-342 provides the full list of comments received as part of this comment theme.

Table I-342. Impacts on the Southeast Lighthouse and other cultural resources comments.

Comment Number	Comment
285-1	In addition to considering impacts on the natural environment, NEPA requires federal agencies to consider impacts on historic and cultural resources. Nevertheless, the DEIS does not adequately reflect the anticipated harm that the Southeast Lighthouse will experience. Our comments address three major deficiencies: (1) the DEIS is inadequate because it fails to assess cultural and historic resources in the Project area; (2) the DEIS is inadequate because it mischaracterizes impacts to Southeast Lighthouse and other cultural and historic resources; and (3) the DEIS is incomplete because it does not provide adequate measures to minimize cumulative impacts to Southeast Lighthouse and other cultural and historic resources.

Comment Number	Comment
285-8	III. The DEIS is incomplete because it does not provide adequate measures to minimize cumulative impacts to Southeast Lighthouse and other cultural and historic resources. Finally, the DEIS should consider cumulative impacts more closely, and require a set of best practices and minimum guidelines that would apply to all offshore wind developments near the Southeast Lighthouse. In specifically requiring cumulative impacts analyses, NEPA recognizes the significant effect that projects can have on the surrounding landscape beyond the scope of a single development. BOEM's methodology for assessing cumulative impacts is unclear. This project, and how it is evaluated and permitted, will set the precedent for all future projects in the area and along the entire Atlantic Coast. According to the DEIS, by 2030 there will be approximately 2,100 WTGs along the East Coast. It is concerning, then, to see the lack of minimum guidelines and best practice standards established for offshore wind projects in the United States, especially as they relate to adverse visual impacts upon National Historic Landmarks and historic properties, sites, and districts listed or eligible for listing in the National Register of Historic Places. It is essential to apply consistent criteria to this project and subsequent future sites. Due to the high cultural and historic sensitivity of the Lighthouse, SELF insists that best practice criteria be applied. These minimum standards should include: • Requiring the least impactful nighttime lighting, such as ADLS, as part of the COP Approval Process; • Requiring all windfarms in a specific region to use the same paint color, determined to be most effective in minimizing the visual impacts, per specific atmospheric/geographical conditions of the lease sites; • Establishing minimum set-back standards from land, with specific considerations for historic landmarks and areas with tourism-driven economies; • For communities with historical significance, BOEM should help ensure that local stakeholders receive fair and direct access to any state and federal agencies or resources, which may provide critical regulatory guidance on how best to avoid, minimize, and mitigate the local impacts of offshore windfarms. This support would be provided independent of the Section 106 process, and would, for example, identify and encourage dialogue between communities with their State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP); and • Requiring—to the extent to which harm to historic and cultural resources cannot be avoided or minimized—appropriate project mitigation measures to offset the impacts to communities, such as community benefit agreements, offshore wind mitigation trust funds, or other economic development arrangements, as are standard in the offshore wind industry globally. At this critical juncture in the development of the U.S. offshore wind industry, stakeholders are open minded, if not supportive, of a successful industry that shares benefits with local communities who will bear the brunt of adverse impacts.
285-6	a. The DEIS fails to address adequately visual impacts to the Southeast Lighthouse. The DEIS underestimates the visual impacts the WTGs will have on the Lighthouse, an error that could result in inadequate minimization measures. The DEIS characterizes impacts variably as "moderate", "minor to moderate", and, solely in regards to impacts at night, "major." The DEIS defines major impact as "A regional or population-level impact on the affected…resource(s) could occur; AND the affected resource would not fully recover, even after the impacting agent is gone and remedial or mitigating action is taken[.]" We disagree that daytime viewshed impacts would be minor or moderate. The size and scale of the project within the historic viewshed of the Lighthouse will negatively affect the Lighthouse's historic integrity as an NHL in a significant and permanent way. The constant daytime view alteration, coupled with the nighttime lights (particularly if ADLS is not implemented) will inexorably change the historic nature of the viewshed. Further, the DEIS does not adequately assess the significant visual impacts to the Lighthouse during construction. Prolonged, constant, and bright lights will be required to construct the WTGs, and this lighting will cause major impacts to the Lighthouse views for a significant period of time. BOEM must include construction impacts in its final analysis of impacts to historic properties. To preserve and protect the area's nighttime environment, BOEM should require the utilization of FAA-approved ADLS, the most environmentally-responsible and locally appropriate lighting option available. In selecting nighttime lighting systems for the WTGs, BOEM must balance the need for safety with the importance of protecting unique historical character of the surrounding area. Strobing or blinking nighttime lighting systems, as are standardly installed on WTGs, will negatively impact the area's cultural identity of historic and environmental preservation. Though the DEIS presents ADLS as a possible mitigation strategy, it is not currently planned for the South Fork Wind Farm. ADLS is necessary to preserve and protect the historic viewshed of the area, and BOEM should require its use as a way to minimize impacts and harm to historic resources.

Response to comments: The FEIS determines that the Project would result in significant visual impacts to the Southeast Lighthouse NHL under any action alternative. Impacts on historic and cultural resources, including Southeast Lighthouse, are fully assessed in the FEIS and these are the specific subject of Section 3.5.2, Cultural Resources. Significant impacts, including from daytime visibility of facilities and nighttime visibility of lighting from the Project, are concluded for the historic character of the Southeast Lighthouse and other historic properties in Section 3.5.2 (rising to the level of moderate to major adverse impacts, within daytime or nighttime viewshed resource assessment in the FEIS). The FEIS, Table 3.5.2-3, defines significant impacts under NEPA in relation to adverse effects under the NHPA Section 106 regulations.

Measures to minimize or mitigate unavoidable cumulative or other significant impacts to the Southeast Lighthouse and other cultural and historic resources will be addressed in consultation with parties participating in the NHPA Section 106 process and through preparation of a Memorandum of Agreement (MOA) for resolving adverse effects, or significant impacts, to these resources, as indicated in Cultural Resources Section 3.5.2.4, Mitigation. That Mitigation Section states that, if impacts on cultural resources determined eligible for listing in the NRHP cannot be avoided, additional mitigation measures will be developed through execution of an MOA by BOEM and required signatories to resolve adverse effects under Section 106 of the NHPA. That Mitigation Section also includes consideration of the ADLS (aircraft detection lighting systems) to minimize visual impacts to historic properties. BOEM will complete the NHPA Section 106 process for the Project prior to making a decision under NEPA. Appendix A states that the NEPA and NHPA process will be coordinated by BOEM as the evaluation of the COP proceeds, with a summary included in the ROD for the final EIS. The MOA will be incorporated into the ROD and within the terms and conditions for COP approval.

BOEM cannot, in reviewing and deciding on a single COP, set generally applicable requirements for other offshore wind developments. However, recommendations—including those provided in comment here—for best practices for the current project, including in address of cumulative impacts, will be considered in the development of any MOA and in consultation on a MOA.

Comment theme: Cultural resources impact conclusions.

Associated comments

Table I-343 provides the full list of comments received as part of this comment theme.

Table I-343. Cultural resources impact conclusions comment.

Comment Number	Comment
301-37	Table ES-1 - Key Environmental Impact Statement Findings for the Proposed Action, summarizes impacts to cultural resources as "Negligible to major adverse impacts to marine and terrestrial archaeological resources and to historic visual resources from Project construction and installation, O&M, and conceptual decommissioning activities.” This conflicts with the conclusions of BOEM's analyses of the Proposed Action presented in Section 3.5.2.2.3 (pg. 3-120), noting that "Major impacts would be limited to the portions of ancient submerged landform features that DWSF is unable to avoid and are disturbed by Proposed Action activities." The DEIS findings for viewshed resources include a range of minor to moderate impacts to the viewshed, depending on whether impacts could affect the setting and/or character of a site, as at the Southeast Lighthouse National Historic Landmark, the Capt. Mark L. Potter House, Gay Head Light and Aquinnah Shops (Section 3.5.2.2.3 (pg. 3-120). Potential "major" impacts to terrestrial resources, as summarized in Section 3.5.2.2.3 (pg. 3- 115), would only occur in the event of an unanticipated (post-review) discovery, further noting that an unanticipated discoveries plan would be implemented. With respect to marine resources, the DEIS notes three possible scenarios resulting in different impact ratings for Proposed Action construction activities: 1. All resources identified and avoided, 2. All resources identified and impacts/effects appropriately mitigated via measures made a condition of COP approval, and 3. An unanticipated discovery requiring Section 106 mitigation. Page 17 Only the third scenario could result in major impacts to marine resources (see Section 3.5.2.2.3: pg. 3-114). This does not clearly align with the DEIS conclusions quoted above, which note an inability to avoid portions of ancient submerged landform features leading to major impacts without reference to a post-review timeframe for the identification of such resources. It is SFW's position that unanticipated discoveries, alone, are an insufficient basis for a major impacts rating based on the results of surveys and assessments completed by SFW. Exhaustive survey is not feasible, nor is it required to appropriately inform BOEM's consideration of potential impacts or effects to cultural resources (e.g., ACHP 2011 - Meeting the ""Reasonable and Good Faith"" Identification Standard). Applying such a rationale would result in the "major impact" findings for all or nearly all BOEM actions with the potential to affect cultural resources and do little to inform the agency's decisions. In this case, it also inappropriately discounts the results of SFW reasonable and good faith efforts to identify cultural resources that may be affected by the Proposed Action Alternative. SFW requests the FEIS should clarify how BOEM is considering unanticipated discoveries in its impact ratings, whether such consideration factors the implementation of unanticipated discovery plans, and whether a "major" rating is appropriate for impacts to the identified cultural resources

Response to comments: FEIS Table ES-1 uses a four-level classification scheme to characterize the potential adverse or beneficial impacts as negligible, minor, moderate, or major and provides a summary of key findings for the Proposed Action. Table ES-1 does consider negligible to major adverse impacts to cultural resources (marine and terrestrial archaeological resources and historic visual resources) as group not individual. Table T3.5.2-3 in the Cultural Resources Section (3.5.2) of the FEIS defines what negligible, minor, moderate, or major impacts to cultural resources would be, regardless there of whether for marine resources, terrestrial resources, or viewshed resources. Analysis of potential impacts to cultural resources for each Project alternative under the Environmental Consequences Section for Cultural Resource (3.5.2.2), considers the condition under which impacts could range from negligible to major for each resource type. The Conclusions for the Proposed Action (3.5.2.2.3.)) do not only find the potential for major impacts to cultural resources in unanticipated discovery situations. Those Conclusions find the potential for major impacts to the portions of ancient submerged landform features that SFW is unable to avoid and are disturbed by Proposed Action activities; however, only should those impacts to ancient submerged landforms or impacts with unanticipated discoveries go unmitigated or make a historic property ineligible for the NRHP will they remain major. Impacts to viewshed resources as well as to ancient submerged landforms would be moderated through avoidance, minimization, or mitigation, but could also remain major under the conditions specified in TableT3.5.2-3. Significant impacts and adverse effects are assessed for the overall federal action or undertaking under the NEPA and NHPA processes. Cultural resources identification efforts as presented in the FEIS (Section 3.5.2) are sufficient to meet analysis needs.

Comment theme: Impacts to ancient submerged landforms.

Associated comments

Table I-344 provides the full list of comments received as part of this comment theme.

Table I-344. Impacts to ancient submerged landforms comments.

Comment Number	Comment
365-3	The THPO office second concern is for the major impact that will occur to submerged landscapes (SL). At the present time at the water depth where the construction will take place, underwater archeology is limited by the technology that is available. Once a SL is found, identified, mapped and then destroyed by construction, there can be no further research, it is gone forever. We expect that BOEM will have all proponents take measures that ensure as many SL will be avoided as possible. Additional comments will be made through Section 106 consultation.
338-45	Socioeconomic and Cultural Resources 49. DEIS states on p. 3-114 that there may be negligible to major adverse impacts to cultural resources because it may not be feasible to avoid impacts to all of the identified ancient submerged landform features. What studies and analyses are currently underway to refine the landform features that may be affected and identify measures to avoid a finding of major adverse impact?

Response to comments: Studies for potential for impacts to ancient submerged landforms (which comprise submerged landscapes in the FEIS assessment) are reported in the Marine Archaeological Resource Assessment and its addendum, provided in the COP appendices. As the FEIS notes in Section 3.5.2, for any unavoidable ancient submerged landform features corresponding to the time of human occupation, BOEM may require additional investigations or other measures to resolve adverse effects and, as required, mitigations to be stipulated in a MOA prepared pursuant to the NHPA Section 106 consultation process (36 CFR 800). The MOA would contain measures to reduce, avoid or mitigate adverse effects on unavoidable ancient submerged landform features. Implementation of an MOA and subsequent treatment plan, agreed to by all consulting parties participating under the NHPA Section 106 consultation process, would be expected to reduce the magnitude of impacts on ancient submerged landform features from moderate or major to minor or moderate impacts.

Comment theme: General correspondence.

Associated comments

Table I-345 provides the full list of comments received as part of this comment theme.

Table I-345. General correspondence comment.

Comment Number	Comment
365-5	The matters of view shed and related matters we will discuss under Section 106 consultation.

Response to comments: Thank you for your comment. BOEM appreciates your involvement and looks forward to further discussion as part of the Section 106 consultation process.

Comment theme: Impacts to State Pier in New London.

Associated comments

Table I-346 provides the full list of comments received as part of this comment theme.

Table I-346. Impacts to State Pier in New London comment.

Comment Number	Comment
378-8	Catherine Labadia: Yes, good afternoon, thank you. I am representing the Connecticut State Historic Preservation Office. And I will also submit my comments in writing, but I just wanted to take this opportunity to thank you for the presentation and to say that I did notice within the DEIS that you had listed the potential impacts to State Pier in New London as a reasonably foreseeable activity. And so I'm responding relative to Section 106 of the National Historic Preservation Act. And I just wanted to let you know that our office has already responded to an Army Corps permit related to activities at the pier and has made a finding of adverse effect. So I will put, give you copies of that prior correspondence, as well as a written response to the DEIS, but thank you for today.

Response to comments: Thank you for your comment. BOEM's jurisdiction begins at 3 miles offshore and extends to 200 miles offshore. Updates to the Port of New London are considered a non-connected action but a reasonably foreseeable activity in the geographic analysis area for the project, and the proposed upgrade of State Pier in New London falls outside of BOEM's permitting authority and jurisdictional area. Figure E-10 in Appendix E, titled Viewshed and Visual Affects Geographic Analysis Area, shows the location of Port of New London falling outside the analysis area. This analysis area contains the maximum extent of the project area of potential effects for historic properties under NRHPA Section 106.

Comment theme: Compliance with Section 106 process.

Associated comments

Table I-347 provides the full list of comments received as part of this comment theme.

Table I-347. Compliance with Section 106 process comments.

Comment Number	Comment
349-24	The construction of WTGs, offshore substation, installation of electrical support cables, operations and maintenance (O&M) facility, port facilities, and development of staging areas are ground- or seabed-disturbing activities that could directly affect archaeological resources. Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to "take into account the effects of their undertakings on historic properties." It also gives the Advisory Council on Historic Preservation an opportunity to comment. The section 106 process balances historic preservation concerns with the needs of federal agencies while involving interested parties. To comply with Section 106, BOEM requested that a Cumulative Historic Resources Visual Effects Analysis be prepared for the Project. Successful compliance with Section 106 involves identifying state, tribal, and private interests involved in historic preservation within the development areas. Relevant State or Tribal Historical Preservation officers (SHPO or THPO respectively) must be involved in the Section 106 process, along with any private preservation groups with appropriate legal or economic interests. BOEM must identify which historic properties are listed, or are eligible for listing, on the National Register of Historic Places that could be affected by the project. BOEM must assess the project's impact on these properties to determine if any adverse effects "diminish the characteristics qualifying a property for inclusion in the national register." Collaborative efforts between BOEM, SHPO, THPO, and any private preservation groups can result in agreed upon measures to minimize or mitigate known adverse effects. These collaborations should continue throughout project development in case any unknown cultural or archeologic resources are discovered during development.

Comment Number	Comment
	According to the DEIS, the Project has already taken several steps towards fulfilling the obligations set forth in Section 106. To start, Section 106 consultation is ongoing between BOEM, State Historic Preservation Officers (SHPOs), Native American tribes, local governments, and historical interest groups in compliance with section 106. BOEM met with and/or sent invitations for meetings to tribes near the development area in 2018, 2019, and 2020. BOEM stated it will provide draft copies of the EIS for the tribes' review and comment. The preliminary assessment identified four historic properties that South Fork will have an adverse effect on due to issues concerning the visibility of the Project. Of particular importance to tribal interests, the wind turbine construction could disturb archaeological resources and could also "introduce visual elements out of character with the historic setting of historic structures or landscapes." Robust consultation with states and tribes under Section 106 is paramount to ensuring the Project appropriately considers impacts on historic state and tribal resources. Additionally, it is necessary that during development proper precautions are taken in case unknown cultural resources are uncovered. If any additional or previously unidentified cultural resources are located during project implementation, the find must be protected from operations and reported immediately to the SHPO or THPO staff. All operations in the vicinity of the find will be suspended until the site is visited and appropriate recordation and evaluation is made by the SHPO or THPO staff.
285-2	a. BOEM must complete consultation in the Section 106 process to assess impacts to historic properties. BOEM must carry out proper consultation under Section 106 of the NHPA if it intends to use the DEIS to assess impacts to historic properties for NEPA purposes. To assess adverse effects under Section 106, agencies must properly consult with all relevant parties. Section 3.5.2.2.1 of the DEIS, however, states "the DEIS incorporates the criteria for assessing adverse effects under Section 106[.]" BOEM has not completed Section 106 consultation, much less any steps within the Section 106 process that would allow BOEM and the public to understand the full extent of adverse effects on historic properties or how to resolve those effects. Therefore, the DEIS is incomplete and inaccurate because it purports to assess impacts on historic resources without having adequately assessed those properties pursuant to Section 106.

Response to comments: Thank you for your review of the DEIS and the NHPA Section 106 process as it relates to the DEIS. As noted, consultation with Tribal governments and communities is on-going and will continue through the NEPA and NHPA processes, including for considering impacts on historic state and Tribal resources. Also, as noted in the COP, Native American Tribes were involved, and would continue to be involved, in interpretation of the results. An unanticipated discovery plan would be implemented that would include stop-work and notification procedures to be followed if a cultural resource is encountered during installation (FEIS).

The FEIS Appendix A provides a discussion of BOEM's determination that the approval of the Project COP is subject to the NHPA Section 106 consultation process. Mitigation measures documented in an MOA through the NHPA Section 106 process will be incorporated into the ROD and within the terms and conditions for COP approval. The NHPA Section 106 consultation process has been initiated and is ongoing at the time of this draft EIS. Appendix A summarizes Required Environmental Permits and Consultations. BOEM will complete the NHPA Section 106 process for the Project prior to making a decision under NEPA. Appendix A, states that the NEPA and NHPA process will be coordinated by BOEM as the evaluation of the COP proceeds, with a summary included in the ROD for the final EIS. The MOA will be incorporated into the ROD and within the terms and conditions for COP approval.

Comment theme: Evaluation of environmental impacts of the Block Island Wind Farm.

Associated comments

Table I-348 provides the full list of comments received as part of this comment theme.

Table I-348. Evaluation of environmental impacts of the Block Island Wind Farm comment.

Comment Number	Comment
285-5	The DEIS fails to consider the current and ongoing environmental impacts caused to the Southeast Lighthouse and surrounding area by the Block Island Wind Farm. Failure to consider the current and ongoing environmental impacts of the Block Island Wind Farm (BIWF) renders the DEIS incomplete. Except for fleeting references to ongoing monitoring of the BIWF and a handful of images in the HRVEA, the DEIS does not consider how the BIWF has affected its surrounding community. The DEIS does not analyze how South Fork will exacerbate the harm that the BIWF has already caused to the Southeast Lighthouse and Town of New Shoreham. For example, the BIWF—with its constant red blinking lights at the top of each turbine and non-blinking lots at each turbine's base—failed to incorporate an Aircraft Lighting Detection System (ADLS), thereby exacerbating any adverse effects that South Fork's lighting at night and during construction is expected to cause. In addition, electric cables for the BIWF, which were supposed to remain underground, have become exposed by waves and created a hazard for the entire community. Without this type of information, any conclusions reached by the DEIS are arbitrary and capricious.

Response to comments: The Block Island Wind Farm (BIWF) is an existing wind generation facility. The combined effects of the SFWF with other offshore wind developments, including the existing BIWF and other developments planned for the future, is addressed in the Cumulative Historic Resources Visual Effects Assessment (CHRVEA) report for the Project, that was posted by BOEM for public review during the DEIS public comment period, with link on the BOEM website for the South Fork Project (currently at https://www.boem.gov/renewable-energy/state-activities/south-fork). The CHRVEA and the FEIS determine that the cumulative effects from the SFWF would result in significant impacts to the Southeast Lighthouse and certain other historic properties, including from the combined visual effects of the BIWF to these properties. This includes significant impacts from both the daytime visibility of wind turbines generators and the nighttime visibility from Project lights.

Hazards, such as from cable exposure are addressed in FEIS Section 2.2, Non-Routine Activities and Low-Probability Events, which includes considerations for cable displacement or damage and for severe weather or natural events.

Comment theme: Cumulative HRVEA analysis.

Associated comments

Table I-349 provides the full list of comments received as part of this comment theme.

Table I-349. Cumulative HRVEA analysis comment.

Comment Number	Comment
301-36	The DEIS (p 3-109) includes Figure E-10, which depicts the study area emanating from a central point (centroid) within the Lease Area. This is not aligned with the Historic Resources Visual Effects Analysis ("HRVEA") or relevant COP section for the Project that considers the Maximum Work Area, or all areas within which WTGs are being considered. The discrepancy between the presentation of the study area in the DEIS and the HRVEA/COP sections presents a potential risk by introducing confusion regarding which onshore areas may be potentially affected. The FEIS should clearly depict a study area for the Maximum Work Area

Response to comments: The HRVEA authors analyzed three different turbine layouts within the Maximum Work Area for the SFWF, over the course of their assessment of visual effects and found no substantial differences in rating the potential for visual impacts with the changes in layout; see COP Appendix W. BOEM's impact assessment relies on its analysis of the results of the HRVEA. In that analysis, the use of a centroid versus the use of the Maximum Work Area boundary for representing the focus from which the study area radiates does not alter the outcomes of the assessment of visual effects any more than changes to turbine layouts within the Maximum Work Area did. However, to maintain more precise consistency with the HRVEA analysis, the FEIS Figure E-10 study area is revised to depict a 40-mile ring around the Maximum Work Area for the SFWF rather than around the center of the SFWF lease area.

Comment theme: Compliance with NHPA 110(f) to minimize harm to the Southeast Lighthouse.

Associated comments

Table I-350 provides the full list of comments received as part of this comment theme.

Table I-350. Compliance with NHPA 110(f) to minimize harm to the Southeast Lighthouse comment.

Comment Number	Comment
285-3	b. The DEIS not adequately consider all possible planning to minimize harm to the Southeast Lighthouse NHL. The DEIS fails to mention that in addition to its obligations under Section 106 of the NHPA, BOEM is required to address impacts to NHLs, such as Southeast Lighthouse, differently than it addresses other historic properties. To fulfill its legal obligations for permitting, BOEM must undertake all possible planning to minimize harm to the Southeast Light pursuant to Section 110(f) of the NHPA. Section 110(f) provides: Prior to the approval of any Federal undertaking which may directly and adversely affect any [NHL], the head of the responsible Federal agency shall, to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to such landmark, and shall afford the Advisory Council a reasonable opportunity to comment on the undertaking. The DEIS does not make clear whether BOEM has initiated the Section 110(f) process or whether and how BOEM has undertaken such planning and actions as would be necessary to minimize harm to the Southeast Light. In fact, the DEIS does not contain any information at all about how BOEM intends to demonstrate compliance with Section 110(f) of the NHPA. BOEM must address impacts to the Southeast Lighthouse differently than it addresses impacts to other historic properties in the Project area for Section 110(f) purposes, and we are concerned that BOEM is overlooking this requirement in its review.

Response to comments: The regulations for NHPA Section 106 compliance (at 36 CFR 800) include Special requirements for protecting National Historic Landmarks (NHLs). The Southeast Lighthouse and other NHLs are identified and assessed in the DEIS. With the NHPA Section 106 process initiated, compliance with NHPA Section 110(f) of the National Historic Preservation Act (NHPA) will proceed as the regulations for completing the NHPA Section 106 process require, at 36 CFR 800.10. These regulations require that the lead federal agency notify the Secretary of the Interior of any consultation involving a National Historic Landmark (NHL) and invite the Secretary to participate in the consultation where there may be an adverse effect. In this case, the National Park Service (NPS) National Historic Landmarks Program is the delegated entity for this, and it is represented as a consulting party in the NHPA Section 106 process. BOEM will formally notify the NPS of adverse effects to any NHL, along with all consulting parties and the public, of this finding. Additionally, the Council (Advisory Council on Historic Preservation [ACHP]) is a consulting party and will participate in any consultation to resolve adverse effects on NHLs conducted under Section 800.6 of the NHPA Section 106 regulations. Finally, NHPA Section 110(f), as implemented under the NHPA Section 106 regulations at 36 CFR 800.10(a), requires that BOEM, to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to any NHL that may be directly and adversely affected by an undertaking. Part of that planning and determination of means to minimize harm is being considered and contemplated during NHPA Section 106 consultation and the ongoing NHPA Section 106 review, which is coordinated with NEPA review as required at 36 CFR 800.8. BOEM will complete the NHPA Section 106 process and NHPA Section 106 consultation for the Project prior to making a decision under NEPA. FEIS Appendix A states that the NEPA and NHPA process will be coordinated by BOEM as the evaluation of the COP proceeds, with a summary included in the ROD for the final EIS.

Comment theme: Clarification of impact thresholds for cultural resources.

Associated comments

Table I-351 provides the full list of comments received as part of this comment theme.

Table I-351. Clarification of impact thresholds for cultural resources comment.

Comment Number	Comment
301-38	While recognizing the qualitative nature of impact thresholds for cultural resources, SFW believes clarifications are warranted to allow stakeholders to correlate the significance criteria provided in Table 3.5.2-3 with the DEIS findings throughout Section 3.5.2.2.3. The threshold between "moderate" and "major", as presented and applied, is ambiguous. SFW expects feasible measures to minimize impacts to marine resources to be conditions of COP approval and to be broadly applicable to marine resources that cannot be avoided. SFW therefore supports the finding that, "If all marine NRHP-eligible cultural resources are reliably identified and not avoided, but instead effects are considered through completion of the Section 106 process (and any subsequent measures to avoid, minimize, or mitigate adverse effects are made a condition of COP approval by BOEM), then impacts to marine cultural resources during construction of the Project could be long term and negligible to minor" (3.5.2.2.3 - Construction and Installation - Marine Resources). As noted above in respect to the DEIS conclusions for potential "major" impacts to ancient submerged landform features, such a rating assumes no feasible means of minimizing impacts will have been implemented. The basis for this assumption is not presented within the DEIS and is contrary to SFW's expectations. The DEIS appropriately notes the ongoing status of Section 106 consultations and the development of appropriate mitigation measures to resolve anticipated adverse effects to historic properties (36 CFR 800). SFW supports the DEIS findings for marine resources that explicitly consider mitigation measures developed via BOEM's Section 106 consultations (3.5.2.2.3 – Construction & Installation and Cumulative Impacts subsections). SFW recommends comparable narrative and analyses be provided for terrestrial and viewshed resources and that all such discussions be moved to the Conclusions subsection of 3.5.2.2.3. At a minimum, BOEM should be consistent in the consideration of mitigation measures for impact ratings to all cultural resources.

Response to comments: The threshold between moderate and major impacts for cultural resources in Table 3.5.2-3 FEIS) is whether EPMs (environmental protection measures) would minimize, but not fully resolve, significant impacts to make them moderate or whether those impacts would be fully unavoidable even with EPMs or make a historic property ineligible for the NRHP and thereby remain major. BOEM expects that EPMs are possible for the Project to reduce or minimize significant impacts to cultural resources to a moderate level, except where they make a historic property ineligible for the NRHP. The Conclusions for Section 3.5.2.2.3 in the FEIS already specify that, historic properties, if adversely affected, would be mitigated through the Section 106 process. Measures to minimize or mitigate unavoidable significant impacts (including significant cumulative impacts) to the cultural resources will be addressed in consultation with parties participating in the NHPA Section 106 process and through preparation of a MOA for resolving adverse effects or significant impacts to these resources, as indicated in Cultural Resources Section 3.5.2.4, Mitigation. BOEM will complete the NHPA Section 106 process for the Project prior to making a decision under NEPA. Appendix A states that the NEPA and NHPA process will be coordinated by BOEM as the evaluation of the COP proceeds, with a summary included in the ROD for the final EIS. The MOA will be incorporated into the ROD and within the terms and conditions for COP approval.

Other Uses

Comment theme: General analysis support.

Associated comments

Table I-352 provides the full list of comments received as part of this comment theme.

Table I-352. General analysis support comments.

Comment Number	Comment
301-27	Without question, military operations, national security, and SAR operations are critically important and should not be compromised. While the Department of Defense ("DoD") noted that site specific mitigation measures may be required, it concluded that the Proposed Action Alternative would have minor, but acceptable impacts on their operations (pg. 3-163). Based on the DoD's assessment, it is clear that military operations, national security and safety uses are compatible with the development of the offshore wind industry using the 1-NM x 1-NM grid layout set forth in the Proposed Action Alternative.
360-21	The DEIS finds that, if ground-based radar systems are located a sufficient distance from a wind development area, radar interference is not anticipated. In addition, the DEIS finds that "[a]ny impacts on long-range radar systems are anticipated to be mitigated by overlapping coverage and radar optimization."75 The BOEM, DoD and FAA evaluation processes described in detail above include consideration of radar issues (air defense, air traffic control, specialty defense, and weather radars, as well as NOAA high frequency radars, etc.), which helps ensure offshore wind deployment is compatible with federal radar missions. Based on a more than a decade of experience in working through potential impacts of land-based wind turbines on different radar systems, potential impacts on radar systems can generally be mitigated through hardware or software improvements to the radar, integration of additional radars/fusing of data from other radars, and/or revisions to proposed projects. Therefore, the overall cumulative impacts on radar systems are correctly characterized as negligible and ACP supports that determination being adopted in the final EIS.

Response to comments: Thank you for your comment.

Comment theme: Aviation impacts

Associated comments

Table I-353 provides the full list of comments received as part of this comment theme.

Table I-353. Aviation impacts comment.

Comment Number	Comment
294-23	BOEM "assumes" that offshore wind project operators will coordinate with aviation interests during the entire offshore wind process to minimize impacts. Such coordination did not occur as part of the Cape Wind project analysis, which led to Congressional calls for investigation and FIOA [sic] requests of that project. This type of safety issue cannot be left to "assumptions" and must be a certain, regulated part of any permitting process.

Response to comments: Additional clarification has been provided in Section 3.5.7 of the FEIS regarding aviation activity potentially impacted by the proposed Project.

Comment theme: Borrow sites

Associated comments

Table I-354 provides the full list of comments received as part of this comment theme.

Table I-354. Borrow sites comment

Comment Number	Comment
322-4	It should also be noted that the Hither Hills export cable landing may necessitate a buffer zone to the Army Corps of Engineers borrow site 7 A, which has been identified in the Fire Island to Montauk Point (FIMP) reformulation study as the most likely sand source for the Downtown Montauk Feeder Beach. The DEIS identifies the buffer zone as potentially resulting in long-term minor adverse impacts to the Corps' ability to extract sand from the borrow area. However, due to the importance of the Montauk Feeder Beach project, any reduction in the volume of available sediment is a significant concern. Accordingly, the size of any buffer zone and its impact upon beach nourishment should be identified and evaluated.

Response to comments: Section 3.5.7.2.3 of the FEIS was revised to state "Because the Project would have no impacts on marine mineral resources or on dredged material disposal, other than long-term, minor adverse impacts to the USACE's ability to extract sand from borrow area 7A which could potentially reduce beach renourishment activities within the analysis area, the Project would only add negligible adverse incremental impacts to the conditions under the No Action alternative."

Comment theme: Search and Rescue

Associated comments

Table I-355 provides the full list of comments received as part of this comment theme.

Table I-355. Search and Rescue comments.

Comment Number	Comment
363-51	Of particular concern is the failure of the DEIS to address the impacts to search and rescue (SAR) and the following statement: Nonetheless, the presence and layout of large numbers of WTGs could make it more difficult for SAR aircraft to perform operations, leading to less effective search patterns or earlier abandonment of searches. This could result in otherwise avoidable loss of life due to maritime incidents. This is a logical conclusion despite having no attribution, but the DEIS does not attempt to address this concern nor outline proposed mitigation measures to address the "avoidable loss of life." If loss of life is predicted, and can be avoided, BOEM should require any mitigation measures necessary to do so as permit conditions.
301-26	In Section 3.5.7.2.2., the DEIS indicates that "the presence and layout of large numbers of WTGs could make it more difficult for search and rescue ("SAR") aircraft to perform operations, leading to less effective search patterns or earlier abandonment of searches. This could result in otherwise avoidable loss of life due to maritime incidents." This supposition is contradicted by real-world evidence: despite thousands of wind turbines existing off the shores of the United Kingdom and other European countries for decades, there is not a single documented case of a wind farm contributing to an otherwise avoidable loss of life. The South Fork Navigation Safety Risk Assessment calculates the risk at one additional maritime incident in the wind farm area over the 25-year life of the Project, a figure that was calculated without consideration of the many substantial mitigations outlined in Appendix 3 of the DEIS that will both prevent marine incidents and reduce the search effort required to locate mariners in distress in the event an incident occurs. In addition, as concluded in the USCG MARIPARS report, a minimum 1-NM x 1-NM grid layout spacing uniform across the entire geographic analysis area, would not have an adverse impact on navigation, would not lead to increased loss of life and would be sufficient for navigation safety and search and rescue operations. SFW requests that the FEIS should reflect the findings of the MARIPARS report, which indicate SAR operations would not be negatively affected.

Response to comments: Section 3.5.7 of the FEIS addresses potential impacts to military and national security uses and includes updates in Appendix G, table G-2 mitigation measures for search and rescue activities Following the layout recommendations in the Final MARIPARS would improve safety, but it would not remove the risk of allisions or collisions with WTGs during SAR operations particularly in challenging weather or visibility conditions (USCG 2020). The USCG is a cooperating agency to the FEIS and is the lead agency on navigational, and search and rescue (SAR) matters.

Comment theme: Radar impacts

Associated comments

Table I-356 provides the full list of comments received as part of this comment theme.

Table I-356. Radar impacts comments.

Comment Number	Comment
294-19	Contributing to effective search and rescue and maritime safety in the Project area is a fully functioning HF radar system. The DEIS states that 8 high frequency radars operate within line of sight of the South Fork Wind Farm project area. The DEIS also states that “The number of radars and their coverage area is anticipated to remain at current levels for the foreseeable future.” We do not see any analysis to back up this claim, particularly in light of the information presented at the U.S. Department of Energy July 27, 2020 webinar on the subject. According to a webinar on July 27, 2020, hosted by the U.S. Department of Energy, and attended by BOEM, as part of its “Offshore Wind Turbine Radar Interference Mitigation Webinar Series”, “36 radar systems affected to some degree by the 9 proposed and hypothetical wind farms evaluated- every wind farm evaluated affected at least 1 radar” and recommends that “BOEM consider radar LOS in COP reviews.” The slides presented at that webinar demonstrated the necessity of fully functioning HF radar for effective USCG search and rescue. They also demonstrated stunning loss of coastal HF radar coverage as a result of offshore wind in the region. No such charts or analysis is included in the South Fork Wind Farm DEIS, specific to the proposed Project or the MA/RI lease areas. This is a significant omission. A June 2019 “High Frequency Radar Wind Turbine Interference Community Working Group Report” states the following: “High Frequency (HF) radar is a critical component of our nation’s efforts to observe and monitor the coastal ocean. These land-based, remote sensing systems are the only instruments capable of making both high spatial resolution and high temporal resolution observations of the movement of waters at the ocean’s surface over the outer continental shelf. In the U.S., a distributed network of research scientists, in partnership with the U.S. Integrated Observing System (IOOS), have been operating HF radar systems for more than two decades. Data from the HF Radar Network is used by the U.S. Coast Guard and NOAA for search and rescue operations and spill response as well as by individual scientists on a daily basis. However, the rapidly emerging offshore wind energy industry in the U.S. has the potential to degrade the performance of HF radar systems operating in the vicinity of wind turbines. A recently completed study (Trockel et al.2018) has documented the wind turbine interference (or “WTI”) on HF radars and shown that the location and the magnitude of the interference can directly interfere with accurate measurements over broad areas of the radar’s coverage. For small numbers of turbines, pathways to mitigate the interference exist. Yet, the offshore wind industry will soon outpace these simplified solutions as plans for large farms of turbines are moving towards installation. This near-future scenario greatly exceeds the scope of initial efforts and at present no operational solutions exist to mitigate the future interference.” To permit any offshore Project until a solution can be found is unacceptable, particularly as BOEM expects to undergo permitting for 974 turbines in the Project area and surrounding leases, and the fact that BOEM has already acknowledged that it expects “otherwise avoidable loss of life due to maritime incidents” as a result of these turbines. To increase the likelihood of such deaths due to loss of HF radar as a reliable search and rescue tool is unacceptable. BOEM must conduct a full HF radar loss analysis as relates to both the proposed Project and cumulative analysis. This HF radar analysis should be complete with charts and companion SAR locations and analysis as part of the navigational safety risk assessment. An operational solution to mitigate any HF radar loss or interference must be included as part of any permit approval.
339-7	Radar interference created by WTGs[26] will mask the ability of High-Frequency (HF) radar within National Ocean Service (NOS) HF radar sites positioned along the east coast to determine wave current height which is crucial to determine the hot search zone for USCG SAROPS. In fact the entire DOE “Radar Interference” series spoke to many severe incompatibilities between WTGs and a variety of radars used that BOEM has to date not analyzed fully and completely, issues of grave importance to Homeland Security, FAA, NOAA climate science divisions and oil spill tracking. The entire webinar series, and these major negative impacts, must be analyzed in detail by BOEM along with DHS, FAA, and the Joint Chiefs of the Armed Services. As many of the webinars concluded, no mitigation exists at this time. As such, “No Action,’ is the only alternative that keeps our coastline and its citizens safe.
363-6	Provide answers to longstanding questions regarding radar interference from turbines to marine radar and ensure that all appropriate mitigation efforts are required;

Comment Number	Comment
366-22	While the threat of engine failures along with the routine dangers of transit by sea is ever present on fishermen's minds, the effects of scatter upon traditional commercial fishing radar and the inability of the United States Coast Guard's (USCG) Search and Rescue Operations (SAROPS) to possibly locate those that may be in harm's way without a transit lane must also be issues for BOEM to further analyze. The USCG discussed the major negative effects to SAROPS by radar interference by Wind Turbine Generators (WTG) during a Department of Energy (DOE) series on Wind Turbine Radar Interference Mitigation (WTRIM) seminars in July of 2020 . Without safe and wide transit lanes, such as the RODA-TLA, allisions and collisions may happen more frequently within the SFWF WEA. Radar interference created by WTGs will mask the ability of High-Frequency (HF) radar within National Ocean Service (NOS) HF radar sites positioned along the east coast to determine wave current height which is crucial to determine the hot search zone for USCG SAROPS. In fact the entire DOE "Radar Interference" series spoke to many severe incompatibilities between WTGs and a variety of radars used that BOEM has to date not analyzed fully and completely, issues of grave importance to Homeland Security, FAA, NOAA climate science divisions and oil spill tracking. The entire webinar series, and these major negative impacts, must be analyzed in detail by BOEM along with DHS, FAA, and the Joint Chiefs of the Armed Services. As many of the webinars concluded, no mitigation exists at this time. As such, "No Action,' is the only alternative that keeps our coastline and its citizens safe.

Response to comments: Sections 3.5.7 of the FEIS provide discussions of potential radar interference. A detailed discussion of radar interference can be found in: https://www.boem.gov/sites/default/files/documents/environment/Radar-Interferance-Atlantic-Offshore-Wind_0.pdf.

BOEM assumes that most offshore wind developments within the RI/MA area would use 1 x 1 nautical mile spacing in fixed east-to-west rows and north-to-south columns. This arrangement would reduce, but not eliminate, navigational complexity and space use conflicts during the operation phases of the projects. Navigational complexity in the area would increase during construction as WTGs and ESPs are installed, would remain constant during simultaneous operations, and would decrease as projects are decommissioned and structures are removed. The Final MARIPARS (USCG 2020) concluded that general mitigation measures, such as properly trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS all enable safe navigation with minimal loss of radar detection. BOEM is funding a study through the National Academy of Science to further address the concerns about interference with marine radar.

Comment theme: Military and national security uses.

Associated comments

Table I-357 provides the full list of comments received as part of this comment theme.

Table I-357. Military and national security uses comments.

Comment Number	Comment
360-17	The DEIS anticipates that the cumulative impacts associated with the Proposed Action and past, present, and reasonably foreseeable activities would result in moderate impacts on military and national security uses in the geographic analysis area. However, the evidence in the DEIS itself—as well as the recommendations of the Department of Defense (DoD)—support revising the overall cumulative impact rating for military and national security uses to minor. First, it is not clear why the overall impact rating of moderate was given in the first place. With respect to the moderate rating for cumulative impacts on military and national security, the main drivers for this impact rating appear to be installation of structures, primarily WTGs, within the RI and MA Lease Areas. The overall cumulative impacts rating of the DEIS for military and national security uses comes from two main categories of potential impacts: (1) those due to the increased presence of structures, which were quantified as having a “long-term, minor to moderate impact” on military and national security uses, and (2) those from vessel traffic, which would have minor long-term impacts. Thus, it is unclear in the DEIS why impacts from military and national security uses warrant an overall moderate rating overall with respect to cumulative impacts, in comparison to the lower ratings the DEIS in the individual categories. The first category—increased risk due to the presence of stationary structures—has a “minor to moderate” cumulative impact rating. Specifically, the DEIS states that WTGs would “increase the short-term and long-term risks of allision for military and national security vessels, as well as search and rescue [(SAR])] vessels.” However, the DEIS acknowledges that deep-draft military vessels are not anticipated to transit outside of navigation channels needed for search and rescue. Furthermore, it appears most of these can be mitigated. Potential allision risks if these vessels lost power would be minimized through the Proposed Action’s 1 ×1–nm WTG spacing, where “potential allision risks if would be minimized through the Proposed Action’s 1 ×1–nm WTG spacing.” The DEIS notes that it expects this layout to be “consistent with all other projects in the RI/MA WEA,” and assumes that “all offshore wind energy project operators would coordinate with relevant agencies during the COP development process to identify and minimize conflicts with military and national security operations.” It is safe to assume that similar engagement with the Department of Defense Clearinghouse (as discussed below) will be required of other offshore wind projects as well, and this should be taken into account in the cumulative impacts analysis in the final EIS.
294-20	The DEIS assumes that “the Project would have minor adverse impacts on military operations and national security”. According to page 3-160, the DEIS analyzes military and national security impacts from the entire MA/RI WEA, but concludes that “the overall impacts to military and national security uses are expected to be minor to moderate” even under the No Action Alternative. First, this is not consistent with the Vineyard Wind SEIS, which found cumulative impacts to military and national security to be “major” as part of that proposed Project. BOEM cannot say in one document that cumulative impacts are “major” and in another document that they are “minor to moderate.” Second, the analysis on this subject conducted as part of the Vineyard Wind SEIS was a more detailed analysis than included in the South Fork Wind Farm DEIS, yet it was still flawed. In the Vineyard Wind SEIS, BOEM and the developer assumed that impacts to long range military air radar systems could be mitigated by “overlapping coverage and radar optimization.” However, this is in direct contradiction to the Federal Interagency Wind Turbine Mitigation Working Group findings, specifically to the MA/RI WEA. In 2017 the Federal Interagency Wind Turbine Radar Interference Mitigation Working Group comprised of the DOE, DOD, FAA, DHS, NOAA, determined that radar interference caused by offshore wind leases off Massachusetts and Rhode Island could not be solved by overlapping coverage mitigation approaches and that such approaches could not restore low altitude radar coverage: “Effects of land-based wind turbines on radar systems are well understood. Wind turbines within radar line-of-sight can increase clutter that may inhibit target detection, increase the generation of false targets, interfere with target tracking, and hinder weather forecasting. However, the effects of offshore wind turbines on U.S. coastal radar systems are not well understood….Offshore wind turbines may pose unique impacts to coastal radar systems given the difference in propagation of radar signals over the ocean versus land, as well as the larger size of offshore wind turbines compared to land-based turbines….[The five Block Island Wind Farm] wind turbines increase the false alarm rate by approximately two orders of magnitude….For lease or planning areas where an impact is predicted, one mitigation approach would be to fuse output from a nearby unimpacted LRR or SRR ….However there are some lease and planning areas, particularly those along the coasts of Hawaii, as well as Massachusetts and Rhode Island, where unimpacted overlapping coverage does not exist and different mitigations would be needed. It is also important to note this fusion mitigation approach cannot restore low altitude coverage from 500-1000 feet AGL….”. This is an issue not addressed at all by the South Fork Wind Farm DEIS. BOEM cannot assume that mitigations that may work elsewhere exist in this particular area. See our Vineyard Wind SEIS comments for more detailed information. BOEM cannot maintain conflicting analysis in documents which analyze the same thing. Furthermore, BOEM has the responsibility to maintain due diligence when analyzing various aspects of impacts, particularly radar impacts to national security as a result of permitting. The DEIS should be updated to include the above information. Permit approvals should be delayed until comprehensive solutions exist.

Comment Number	Comment
360-18	The second—traffic—is designated as "minor." As the DEIS finds, military traffic and other vessel traffic within the wind development area represents a low percentage of all vessel traffic in the area; therefore, operational conflicts are not anticipated within the wind development area. Because BOEM anticipates that coordination with "military national security interests would be ongoing during construction, O&M, and conceptual decommissioning activity, impacts on military and national security from cumulative vessel traffic would be minor. In sum, with the exception of the increased risk to military vessels and aircraft due to increased navigational complexity and vessel allisions with stationary structures (minor to moderate), the individual potential impacts considered in the overall cumulative impact rating for military and national security uses range only from negligible to minor. Since only one of the potential impacts considered in the DEIS for military and national security has an impact rating of up to moderate, the DEIS does not provide sufficient evidence to support an overall finding of moderate impacts.
360-19	While it is unclear in the DEIS, to the extent the primary reason for the moderate impact rating is related to wind turbine structures in the Massachusetts and Rhode Island lease areas interfering with the USCG's search and rescue operation, the MARIPARS report concluded that it can effectively execute its search and rescue operations in the spacing scheme proposed in Proposed Action. Further, if BOEM is basing this rating on USCG search and rescue missions, we question whether that issue appropriately falls within the ambit of military and national security operations as opposed to vessel navigation and safety. Ultimately, ACP believes that the potential impacts on military and national security uses, when considered together, do not rise to moderate overall. If the only moderate impact for military and national security risk is search and rescue operations, and those are atypical activities, it is unclear why the DEIS made the finding it did. Instead, a minor impact rating would seem warranted, and BOEM should revise the overall rating in the final EIS accordingly.
360-20	Not only does the aforementioned evidence within the DEIS support a revised cumulative impact rating for military and national security uses, but to the extent there are impacts, South Fork and other offshore wind developers are required to engage with DoD to mitigate impacts. As any impacts will likely be mitigated in this process, this adds greater support to the appropriateness of a revised rating in this area and should be accounted for in the final EIS. Indeed, in the DEIS, BOEM notes that with respect to the South Fork, "The U.S. Department of Defense concluded that the Proposed Action would have minor but acceptable adverse impacts on their operations." The DoD Military Aviation and Installation Assurance Siting Clearinghouse (Clearinghouse) facilitates engagement by the military services to evaluate risks posed to military operations by energy production facilities and transmission projects. The Clearinghouse's formal review process applies to projects filed with the Secretary of Transportation, under Title 49 U.S.C., Section 44718 (Federal Aviation Administration obstruction evaluation process), and addresses all energy projects greater than 199 feet above ground level proposed for construction within military training routes or special use airspace, whether on private, state, or Federal property (including the Outer Continental Shelf). The DoD's Mission Compatibility Evaluation (MCE) process provides a timely, transparent, and science-based analysis of potential impacts to military operations. Once potential impacts are identified, the DoD works to identify mitigation strategies to minimize those impacts. The Clearinghouse oversees the MCE process through formal or informal review, and its process considers cumulative impacts of proposed projects and how parties coordinate to mitigate these potential impacts. The statute authorizing the DoD review process provides adequate protection for DoD interests to be represented and helps ensure that proposed offshore wind energy projects will have minor impacts, if any. Federal law allows DoD to raise concerns if a proposed energy project (individually or on a cumulative basis) may have any adverse impact on military operations and readiness. This is defined as adverse impacts to "flight operations, research, development, testing, and evaluation, and training that is demonstrable and is likely to impair or degrade the ability of the armed forces to perform their warfighting missions." The DoD review process covers a wide range of potential impacts, including to radars, flight paths, and vessel navigation, among others. If DoD identifies potential adverse impacts, DoD will engage in mitigation discussions with the energy project developer. If DoD's concerns can be mitigated, they will sign an agreement with the developer to memorialize the stipulations to which the party is agreeing. If DoD's concerns cannot be mitigated, DoD can formally object to a project that poses an "unacceptable risk to the national security of the United States," which is defined to include endangering air navigation safety, interfering with the efficient use of navigable airspace, and significantly impairing or degrading the capability of the DoD to conduct training, research, development, testing, and evaluation, and operations or to maintain military readiness. The statute authorizing the Clearinghouse also requires it to take on "such other functions as the Secretary of Defense assigns." DoD Instruction Memorandum 4180.02 specifically authorizes the Clearinghouse to facilitate DoD review of "offshore energy project development planning and mission compatibility processes when the associated projects are subject to the jurisdiction of BOEM and outside the scope of FAA authority." Further, as noted above, BOEM regulations for renewable energy development make clear that BOEM and project proponents are required to develop measures to address DoD concerns, which requires engagement with DoD.

Comment Number	Comment
	The Clearinghouse encourages all energy proponents to seek informal reviews as early as possible to identify potential compatibility concerns. DoD recommends that developers of an energy project, a landowner, a State, Indian tribal, or local official, or other federal agency request a preliminary determination from the Clearinghouse in advance of filing an application with the Secretary of Transportation, under Title 49 U.S.C., Section 44718, or where a preliminary DoD determination is desired. Generally, DoD installations or military services (e.g., Air Force, Navy) are assigned management responsibilities for specific sections of airspace. In many cases, proper documentation and charting of the location will provide sufficient mitigation. Methods to provide aircrew with development notices and updates to air navigation charts that are prepared and distributed expeditiously as offshore wind power development continues to accelerate will be reviewed and revised as appropriate to mitigate the potential risks associated with overflight and obstruction. Developers of offshore wind projects around the world, including many of the same companies active in the U.S. and holding leases in the Massachusetts and Rhode Island wind energy areas, have a history of working with military services to mitigate concerns, including those related to radar and airspace (e.g., making changes to project designs, funding radar upgrades). As retired Vice Admiral Dennis McGinn wrote in comments filed in the Vineyard Wind SDEIS docket, “Based on my experience in the Navy, I have no doubt that offshore wind can be deployed in a way that is consistent with safe vessel navigation. And, in light of my engagement with the Department of Defense’s (DoD) Military Aviation and Installation Assurance Siting Clearinghouse’s (“Siting Clearinghouse”) review process for proposed energy projects during my time as Assistant Secretary of the Navy, I am confident that offshore wind developers, DoD and BOEM can design projects ways that are fully compatible with military testing, training and operational activities and ensure that any potential impacts will be mitigated or minor.” For the reasons discussed, BOEM and DoD’s processes for evaluating the risk of offshore wind projects ensures that developers work with the DoD to mitigate those concerns and risks, and BOEM should include this fact in reevaluating the cumulative impacts on military and national security uses in the final EIS.

Response to comments: Section 3.5.7 of the FEIS addresses potential impacts to military and national security uses, including traffic and radar systems, and includes updates in Appendix G, table G-2 mitigation measures for search and rescue activities. BOEM coordinates with the Department of Defense and the U.S. Coast Guard throughout the process of identifying leasing area and approving the COP in order to identify and minimize conflicts with military and national security concerns. The USCG is a branch of the armed forces that operates under the Department of Homeland Security during peacetime, and under the Navy during times of war (14 USC §101 - 102). Thus USCG SAR operations are discussed in Section 3.5.7 of the FEIS, which includes military and national security uses. The South Fork Wind Farm geographic analysis area is different than Vineyard Wind, therefore impacts from the proposed action are not the same. Section 3.5.7.2.3 states “The U.S. Department of Defense concluded that the Proposed Action would have minor but acceptable adverse impacts on their operations.”

BOEM also assumes that most offshore wind developments within the RI/MA area would use 1 x 1 nautical mile spacing in fixed east-to-west rows and north-to-south columns. This arrangement would reduce, but not eliminate, navigational complexity and space use conflicts during the operation phases of the projects. Navigational complexity in the area would increase during construction as WTGs and ESPs are installed, would remain constant during simultaneous operations, and would decrease as projects are decommissioned and structures are removed. The Final MARIPARS (USCG 2020) concluded that general mitigation measures, such as properly trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS all enable safe navigation with minimal loss of radar detection.

Comment theme: Survey mitigation

Associated comments

Table I-358 provides the full list of comments received as part of this comment theme.

Table I-358. Survey mitigation comments.

Comment Number	Comment
310-43	Table G-2 presents “potential additional mitigation and monitoring measures,” including for impacts on scientific surveys. While we appreciate this matter being addressed and the several reasonable potential mitigation efforts, it is unclear what, if anything is being done to address the specific impacts to the federal surveys in this Project Area. This must be more clearly described in the FEIS.
355-8	Monitoring After many discussions with Orsted and other companies regarding the need for pre, during and post construction surveys and monitoring of the wind energy area it was disappointing to not see a detailed plan regarding this. Instead, there seems to be plans for monitoring during a very small amount of the project’s life. This is a major point that the industry has repeatedly stressed the need for since the beginning of our communications with wind energy companies. It is well known that development of these wind farms will prevent NOAA from conducting their scientific surveys. Because of this it should be required that the wind energy companies fund the alternative surveys necessary to gather the scientific information that will be lost due to development. The wind energy companies should work closely with the NEFSC and the industry on this.
360-32	The DEIS concludes that changes in required flight altitudes for protected species research programs, due to proposed turbine heights, would affect aerial survey design and protocols. While the increased altitude necessary for safe survey operations could result in lower chances of detecting certain marine mammals and sea turtles, especially smaller species, in the immediate vicinity of a turbine, that does not rise to major impacts on conducting such surveys, as there is no demonstration that the surveys cannot be conducted outside such areas or use technologies that allow for data collection at greater heights (such as digital and thermal photography) or for unmanned surveys that can maneuver at lower altitudes within wind farms using drones, sea gliders, and other technologies, which NOAA itself has indicated are currently in successful use by the agency. It is also worth noting that the operational maintenance on wind farms may provide a collaborative opportunity to collect more and different data than in the past by piggybacking on maintenance work to reduce survey costs.

Response to comments: Appendix G of the Final EIS has been updated to include modifications and/or additional mitigation and monitoring measures. The mitigation measures could be considered by decision makers and incorporated into the Record of Decision.

Comment theme: Survey impacts

Associated comments

Table I-359 provides the full list of comments received as part of this comment theme.

Table I-359. Survey impacts comments.

Comment Number	Comment
372-21	Further, the analysis of impacts to our scientific surveys is not consistently addressed in the document and there is limited discussion on the consequence of those impacts for fisheries management and protected species recovery programs. While we were pleased to see mitigation measures carried forward into the document, the analysis of survey impacts does not connect with mitigation measures described in Table G-2. We recommend you incorporate information from our previous efforts to inform the analysis in the FEIS related to impacts to NMFS scientific surveys and update the mitigation section based on recent efforts to advance a solution. We remain committed to working with you on the analysis of impacts to our surveys and the development of a survey mitigation program
144-15	Offshore wind energy (OWE) developers to fill scientific survey needs – NOAA fisheries conducts regular biological surveys in the OWE area. NOAA has already indicated that they will not be able to conduct some of these surveys after construction of OWE projects. This will leave a data gap that will increase the percent error of the data set and therefore reduce allowable landings due to uncertainty. If such an impact is seen due to placement of OWE structures then Orsted and other OWE developers should have a plan agreed to by NOAA fisheries whereby they provide funding to NOAA fisheries to supplement fisheries data collection to an extent that at least makes up for any losses of data collection due to OWE installation and operation.

Comment Number	Comment
294-5	The South Fork Wind DEIS does maintain consistency with the Vineyard SEIS in a determination of “major” adverse impacts on scientific research and surveys from both the Proposed Action and cumulative impacts analysis. The DEIS does acknowledge that offshore development “would prevent NMFS from continuing ongoing scientific research surveys or protected species surveys under current vessel capacities and could reduce future opportunities for scientific research in the area” and that “NOAA has determined survey activities within offshore wind facilities are outside of safety and operational limits.” It also acknowledges that the cumulative impacts from offshore wind development combined with the Proposed Action “would have major [adverse] effects on scientific research and protected species surveys, potentially leading to impacts on fishery participants and communities.” However, the DEIS does not include any mitigation for this impact. It also does not list it as an Unavoidable Adverse Impact of the Action Alternatives on Table 4.1.1-1, despite that it factually lays out loss of scientific research and fisheries surveys as a major negative impact from the Proposed Action and cumulative buildout. It merely states that “BOEM is committed to working with NOAA for a long-term solution”. All commercial and recreational quotas and harvest limits are derived from these surveys. Lack of data increases the amount of uncertainty in scientific models, stock assessments, and management decisions. The lack of having a functional fishery survey in all areas under consideration by the DEIS, including the Proposed Action, could will result in lower harvest limits and quotas, potentially leading to zero possession limits over time, which would in essence eliminate commercial and recreational fishing. Even if BOEM and NOAA are “committed to working together for a long-term solution”, there is no current solution and no timeline as to when a solution could become available. In the meantime, fisheries will suffer quota and income losses due to the lack of data necessary to effectively set quotas. Making commercial fisheries economically responsible for a lack of survey and scientific data caused by offshore wind projects is unacceptable. BOEM must find a solution to this major impact to commercial fishing communities and the sustainable management of United States marine resources prior to approval of any offshore project. It must also provide mitigation and compensation solutions for affected entities.
301-28	Table 2.3.1-1 states that "under all the Alternatives considered—even the No Action alternative, the overall effect would be major adverse for scientific research and protected species surveys.” The DEIS does not provide sufficient information and justification to support a finding of major adverse impacts for scientific research and protected species surveys. BOEM’s impact designations are based primarily on a NOAA policy, which advises survey vessels to remain at least 1 mile from fixed structures, if possible. Specifically, NOAA coordinators of large vessel survey operations or operations deploying mobile survey gear have asserted that activities within offshore wind facilities, which at approximately 1-NM spacing will be the largest wind farm turbine spacing in the world, would not be within their safety and operational limits. Further, the National Marine Fisheries Service (“NMFS”) has speculated that offshore wind farms would prevent it from continuing ongoing scientific research surveys or protected species surveys under current vessel capacities, and offshore wind could reduce future opportunities for scientific research in the area. Yet the USCG MARIPARS report determined that the 1-NM x 1-NM grid layout, as proposed for the entire MA/RI WEA, is sufficient for navigation safety. As such, the professional mariners of NOAA survey vessels should be able to safely navigate and conduct survey activities in the Project area. SFW is willing to host simulator sessions with BOEM and NOAA to demonstrate safe navigation within the Project area. The SFWF will have minimal impact on regional scientific surveys based on the size and scale of the Project. For example, impacts to the Northeast Fisheries Science Center (“NEFSC”) fishery independent trawl survey will be minimal because the majority of the Project area is untrawlable due to the presence of rocky habitat, and is therefore, not routinely sampled by the NEFSC trawl survey. The small size of the SFWF footprint (55 km2) relative to the large size of the NEFSC trawl stratum 5 (5,213 km2) that encompasses it, has led to very few randomly selected trawl survey tows being completed within the Project area over the last 15 years. Therefore, the direct impacts attributed to the Project will be negligible to minor and not moderate as stated in the DEIS (pg. 2-19). SFW recommends that the FEIS clearly describe the potential impacts to scientific research and surveys, while considering the findings of the USCG regarding navigational safety, the size and scale of the Project, as well as the lack of historical surveys in the Project area. The FEIS should reconsider the finding of moderate impact at the project level, and major in the cumulative assessment, and reduced, if not adequately supported and justified.

Comment Number	Comment
301-59	Scientific survey mitigation. The proposed mitigation measures for impacts to scientific and protected species surveys are disproportionate with the anticipated impact that the Project will have on regional survey activities. For example, due to the small size of the Project area, and the untrawlable habitat within the Project footprint, the NEFSC trawl survey does not routinely sample within the Project area. Likewise, given the small size associated with the Project area, impacts to other independent fisheries surveys will be Page 23 negligible. As the DEIS notes in the cumulative impacts analysis, changes to fisheries independent monitoring methodologies will be required whether or not the Project is constructed, therefore, the burden of mitigation should not be placed upon any single project. Further, BOEM has indicated its willingness to work with NOAA to develop a longterm solution to these issues. In support of these efforts by BOEM, SFW also intends to collect monitoring data for fish and invertebrate resources; this data will be widely shared and can also be used to inform regional assessments and other management strategies.
307-7	Fully fund all wind energy associated data requests, survey reorientation, and any other money drains on NMFS in order to keep them fully funded to perform their primary mission.
310-40	The actual consequences associated with curtailing the federal surveys are not described. The extent of the impact is also not described. The NMFS bottom trawl survey provides critical information on the abundance, distribution, biology, and size structure of fish and invertebrate species throughout the Northeast and Mid-Atlantic. This time series of fisheries-independent data is utilized in the stock assessments of commercially and recreationally important species. The survey has been designed and carried out using a stratified random design since the 1960's. Changes to the selection and distribution of survey stations could have profound implications for the survey results, and may lead to greater uncertainty within stock assessments.
310-41	The FEIS should represent the full implication of the loss of trawl survey stations and a shift in its station selection process, including, for example, the number of survey stations that would be eliminated. Will construction activities be coincident with survey time frames, potentially adversely affecting fish behavior and the resulting quality of the surveys?
316-2	By nature of their reliance on the ocean for their way of life, fishermen must be good stewards of the environment. Any proposed opening of fishing grounds or increase in allowable catch requires years of intensive scientific study. This scientific work falls in part to the National Marine Fisheries Service and their annual trawl survey. This survey is the foundation for fish population estimates and the basis for quota allocation and stock assessment. The cumulative impact of this site and others will limit the NMFS historic survey locations resulting in impacts to the data and the industry this science supports specifically the nations commercial and recreational sectors. BOEM, through this document and working with the developers must ensure the NMFS Survey is fully funded going forward and most account for the mitigation to amend this historic scientific study. Without this mitigation the resulting survey and supporting data will have additional uncertainty which will directly impact fish stocks and allocations to the State's and the industries relaying on them. These natural resources are a common good and impacts on new development must address these historic uses. The cumulative impact of this site and others will limit the NMFS historic survey locations resulting in impacts to the data and the industry this science supports specifically the nations commercial and recreational sectors. BOEM, through this document and working with the developers must ensure the NMFS Survey is fully funded going forward and most account for the mitigation to amend this historic scientific study. Without this mitigation the resulting survey and supporting data will have additional uncertainty which will directly impact fish stocks and allocations to the State's and the industries relaying on them. These natural resources are a common good and impacts on new development must address these historic uses.
338-52	63. The DEIS identifies major adverse impacts for scientific research and protected species surveys because survey vessels are required to remain at least 1 mile from fixed structures (see p. 3-164). Significant federal investment is needed to evolve major scientific surveys to adapt and develop calibrations for long-term time series so that adequate surveys can be undertaken and offshore wind development does not become a dominant driver for fisheries management decisions. BOEM should continue to work expeditiously with federal partners to identify solutions that address these major adverse impacts.

Comment Number	Comment
338-5	Scientific Surveys: Finally, immediate action is needed to address BOEM's finding of major adverse impacts to scientific research and protected species surveys. If National Oceanic and Atmospheric Administration (NOAA) survey vessels are excluded from operating in offshore wind facilities, it will lead to poorer data and greater uncertainty in stock assessments that will in turn result in more conservative catch limits (i.e., lower "quotas"). While this may be inadvertently beneficial to stock biomass, reduced data quality has a negative impact on confidence in the robustness of fisheries assessments and diminishes the overall effectiveness of the management process in balancing the interests of both the fisheries and the stocks on which they rely. BOEM's commitment to continued collaboration with NOAA is certainly helpful, but BOEM must also take bold action to significantly increase federal investment to evolve survey technologies, adapt methodologies, and develop calibrations for long-term time series so that adequate surveys can be undertaken and offshore wind development does not become a dominant driver for fisheries management decisions.
360-31	BOEM's rating of "major" impacts for scientific research and surveys from the Proposed Action alternatives from the effects of other foreseeable offshore wind projects from wind turbine structures is unsupported. First, it erroneously assumes a worst-case scenario, which is unnecessary in CEQ regulations; the assumption that surveys and techniques are static and inflexible is a worst-case and is not the case in scientific research. While activities associated with offshore wind development, such as site assessment activities, construction of wind turbines, associated cable systems, and vessel activity, could present minimal additional navigational obstructions for sea and air-based scientific surveys, the evidence in the DEIS does not support a "major" impact finding because it assumes mitigation has little effect on research access and research has no flexibility in its implementation. BOEM's cumulative impact rating for research is based on its assertion that the reasonably foreseeable build-out of offshore wind would result in navigational hazards that would affect the coverage of some survey areas used to estimate fishery stock abundances, oceanographic parameters, and protected species. In the case of the Proposed Action, the adjusted spacing of the turbines was not determined to be sufficient mitigation to result in an impact rating of moderate rather than major despite the reliance on obstructions as the main cause of research disruption. We recommend reconsideration of this determination. NOAA's many seasonal assessments use a variety gear from bottom trawls to aerial crafts and have been operating in the Atlantic since the establishment of Wood's Hole in 1871. Over that time, NOAA's scientific survey methods have changed considerably and evolved to account for technology innovation and adapted its analyses to integrate historical and new data. COVID 19 has driven NOAA to start implementing more autonomous surveys over the past year, showing the resilience and adaptability of NOAA in the face of research limitations. According to NOAA's report on technology implemented during the last year, "robotics and uncrewed systems are already widely used in place of in-situ and human operated systems, while autonomy and artificial intelligence are dramatically increasing the efficiency and effectiveness of nearly every ocean science discipline, including biological observations." In 2020, NOAA also published a In 2020, NOAA also published the NOAA Unmanned Systems Strategy to guide the transformative advances in autonomous maritime systems. In addition, NOAA has stated in its report on technology that "recent advances in materials science and information technology are driving exponential growth in the application of sophisticated relatively inexpensive [autonomous systems]." In fact, it noted that "the onset of the COVID-19 pandemic in the spring of 2020 disrupted much of NOAA's field science and research operations to an unprecedented degree. NOAA scientists and engineers acted quickly, mobilizing available uncrewed systems to mitigate impacts to operations and ensure the timely delivery of critical data and services." In Alaska, for example, Saildrone uncrewed surface vessels were deployed to support stock assessments for Pollock – the nation's largest fishery by volume – and to produce updated nautical charts ensuring safe passage of commercial vessels along the North Slope." NOAA also used new "omics tools" in combination other emerging technologies, such as uncrewed systems or robotics, to support safe, continuous ecosystem analyses while minimizing the need for direct human engagement in data collection at sea. NOAA noted that autonomous instruments and vehicles can conduct aquatic sampling for "omics analysis, and the process may be monitored remotely onshore," including "to places where ship sampling might not be possible due to weather, hazards, or environmental sensitivity."

Comment Number	Comment
	Passive (PAM) and active acoustic monitoring techniques are also advancing; a recent study reported that low-cost, open source sensors are expanding access to PAM technologies and that terrestrial and marine PAM applications are advancing rapidly. Passive acoustics has "greatly increased the detection of marine mammals in the Arctic when compared with previous visual observations." Another study found that commercially available active acoustic systems for fisheries can consistently detect marine mammal species. Passive acoustic monitoring is being applied to evaluation of density and use patterns of marine mammals, and NMFS has been investigating use of "advanced survey techniques" to fill data gaps. In addition, satellite imagery is now in use for identifying and counting whales. the technology to conduct surveys in and around offshore wind projects exists, is currently in use by NOAA and other researchers, is not difficult to obtain, is not unreasonably expensive, and is compatible with work already being undertaken by NOAA to increase its use of autonomous and remote systems. It is not new for NOAA to be using any of these technologies to replace or augment traditional visual or trawl surveys employed in fisheries and protected species management or other data collection on ocean conditions and resources. NOAA is already in a period of change and technological growth; the advent of windfarms may direct some of that growth and may be developed under large scale grants that have been becoming available with Department of Energy funds. For example, on August 4, 2020, the National Offshore Wind Research & Development Consortium announced the availability of $9 million through its Innovation in Offshore Wind Solicitation 1.0 for offshore wind technology research and development projects, which included funding toward development of monitoring technology. NOAA can work with offshore wind companies to use windfarms as a platform of opportunity to collect more and better data on fish stocks, marine mammals, birds, and other environmental parameters of interest and share the technological innovations growing out of offshore wind monitoring research. Regional science bodies are forming, like the Responsible Offshore Science Alliance (ROSA) and the nascent Regional Wildlife Science Entity to enable, fund, and direct such research. For example, ROSA has developed interim fisheries resources research, survey, and monitoring guidelines for evaluation and monitoring of potential impacts of offshore wind, and states like New York and New Jersey are requiring economic commitments to long-term wildlife and fisheries monitoring by developers as part of power purchase agreements. Because species of research interest often range over significant distances, it is common to collect data in randomized transects and extrapolate habitat use and density into areas that are not surveyed, which in the case that surveys were not conducted in wind farm areas, would include those areas. Although it is necessary to assess correction factors to adjust data collected in new ways and new locations to determine trends, trends are often difficult to assess regardless. For example, the U.S. Marine Mammal Stock Assessments rarely are able to provide population trend information for offshore cetacean species despite decades of aerial and ship-based surveys. Changes in abundance estimates from one Stock Assessment Report to the next for a population often are not indicative of actual changes in population sizes but rather are within error and uncertainty of each other from year to year. There are exceptions to this, such as significant research on North Atlantic right whale population trends, which has benefited by the strong nearshore habitat use of this species. The resolution of data products from protected species surveys is often fairly low (e.g., 10 X 10 km or greater), and extrapolations at such a low level of resolution could be made from data gathered outside of windfarms.
360-33	Mitigation includes long-term monitoring to document changes to ecological communities, including benthos and protected species habitat and use and centrally funded long-term regional monitoring to assess population level impacts for finfish, invertebrates, marine mammals and sea turtles. These mitigation measures, which clearly require both conducting and funding long-term monitoring that addresses the issues identified as impacting research in the DEIS, will help offset the impacts to research "substantially" for the South Fork project and are reasonably foreseeable as requirements of future wind farms undergoing consultation and permitting of projects under the same statutory requirements as South Fork. A "substantial" reduction in impact via mitigation for wind farms should thus lead to, at most, a moderate impact finding.
360-34	Overall, it is doing a disservice to NOAA to suggest that the agency has not demonstrated an ability to adapt, as is clear from research conducted during COVID 19 pandemic conditions, and the DEIS underrepresents the incredible work NOAA and its partners have done in developing excellent technological resources at reasonable costs with improved ability to process and analyze large amounts of data quickly, accurately, and efficiently. NOAA is clearly ready and able to meet the challenges of offshore wind farms, which will be constructed over several years, giving the agency even more time than it was afforded during the pandemic to apply its new technologies and approaches to data collection and monitoring to inform management. Further, required monitoring by wind companies and the platform of opportunity created by windfarms will benefit NOAA's research program and management. The final EIS should therefore change the impacts to scientific research to no more than moderate.

Comment Number	Comment
363-108	Offshore wind development will prevent the Northeast Fisheries Science Center (NEFSC) from completing its annual surveys in its current form. The NEFSC trawl survey has been in operation since 1963 and has become a cornerstone of fisheries management Long-running surveys provide valuable information that inform stock assessments. The NEFSC trawl survey has been conducted using the NOAA Ship Henry B. Bigelow since 2009 after calibration in 2008. The Bigelow measures 208 ft in length and 49 ft in width (beam). The targeted door spread of the trawl gear is 13 m. Specifications of all the gear components are publicly available including the amount of wire is used for each depth. The size of the vessel makes it impossible for the Bigelow to operate within a WEA and complete its survey. The sampling protocol is a random stratified design; incomplete strata directly impact the ability to estimate population size proxies. Many of these surveys travel well-defined transects and the stock assessment models are based on long-term datasets. To the extent transects or other data points become unavailable due to incompatibility with OSW, the foundation of our fisheries management is at risk. For example, the Northeast Skate Complex stock assessment is completely dependent on the NEFSC trawl survey. The assessment was affected by interruptions to the survey in recent years, forcing the NEFMC Plan Development Team to explore methodologies, e.g. smoothing, that would allow survey indices to be calculated. No sampling in the Southern New England and Mid-Atlantic strata resulted in no survey indices for rosette and clearnose skates; there is no methodology that will fix missing data from unsampled strata. The DEIS concludes that the SFWF project will have negligible to moderate impacts on scientific research and surveys. This differs again from the unfinished VW SEIS where the impacts were considered to be major. Impacts to the surveys directly impacts fishermen by increasing uncertainty in stock assessments, which typically results in reduced quotas. For example, the clam stock assessment does not include areas that are not surveyed; the region east of Nantucket is not surveyed and therefore is not included in the assessment despite clams being caught there commercially in the past. The economic impact of lost fishing grounds is exacerbated by the uncertainty created in stock assessments resulting in reduced catch limits. The National Standard 1 guidelines require the acceptable biological catch to account for any scientific uncertainty in the estimate of the overfishing limit. Scientific uncertainty is directly related to information regarding the status of the stock, e.g. stock assessments, which may be based solely on federal surveys depending on the stock. This represents a major unknown for the fishing industry because the magnitude of impacts will vary by species. These concerns have been widely cited, including through comments from NMFS.
372-20	Over the last year we have been working closely with you to evaluate and mitigate impacts to our scientific surveys from offshore wind development. Those efforts have been productive as we had come to an agreement and worked cooperatively on an approach for analyzing impacts to our surveys. As we highlighted in our cooperating agency review comments, much of that analysis was not incorporated into this document. Specifically, we disagree with your analysis that the South Fork project would have negligible to moderate impacts on scientific surveys. Overall, wind energy development will have negative impacts to all of NOAA's scientific surveys in the region, including efforts to assess the presence of North Atlantic right whales. Consequently, it will require substantial effort and resources to identify, design, calibrate and implement new survey designs and methods. As noted in previous discussions, the presence of wind turbines is anticipated to affect the height at which survey planes can operate over the project area. This has the potential to affect efforts to survey and locate North Atlantic right whales in the project area, particularly under low cloud ceiling conditions. Accordingly, we had requested the following language be incorporated; "the proposed wind farm has the potential to restrict a survey plane's ability to provide critical air support during disentanglement events for North Atlantic right whales. With less than 400 individuals, any lost opportunity to prevent entanglement mortality, particularly on a reproductive female can have major population level impact. In such disentanglement cases, disruptions to NMFS current survey and safety protocols could result in major impacts." We recommend the FEIS be updated to reflect this language.
166-33	The Councils have significant concerns about the cumulative impacts of wind farms on fishery independent surveys. We agree with the conclusion that the alternatives would have "major effects on scientific research…potentially leading to impacts on fishery participants and communities." We are encouraged by BOEM's commitment to working with NOAA on long term solutions to this challenge.
310-42	The FEIS also needs to consistently identify this issue. In the DEIS, the Affected Environment section stated that "Scientific research and surveys are anticipated to continue at similar levels to the present" (page 3-159) yet also states, "scientific research and protected species surveys could be curtailed within the Lease Area" (page 3-164).

Response to comments: Thank you for your comment. The level of impact under "other uses" scientific research has been clarified where we are addressing NMFS surveys versus other surveys that may occur in the project area. Please note that BOEM maintains a major impact rating under the cumulative impact analysis, because as NMFS noted, this is an overall program-level, determination by NMFS. Regarding the disentanglement information, we have included this under search and rescue, as this is not scientific research but search and rescue of entangled marine mammals. Additionally, resource sections of the FEIS include proposed mitigation, where applicable, and Appendix G of the FEIS, which is a summary of all proposed mitigation considered, has also been updated to include modifications and/or additional mitigation and monitoring measures. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures will be considered by decision makers and could be adopted in the Record of Decision and required as conditions of approval.

BOEM has added additional language to the Commercial Fishing Section: Offshore wind development could influence regulated fishing effort through two primary pathways, by changing fishing behavior to such an extent that overall harvest levels are not as predicted, and by impacting fisheries scientific surveys on which management measures are based. If scientific survey methodologies are not adapted to sample within wind energy facilities, then there could be increased uncertainty in scientific survey results, which would increase uncertainty in stock assessments and quota setting processes. Future spatial management measures may change in response to changes in fishing behavior due to the presence of structures. Impacts on management processes would in turn have short-term or long-term impacts on commercial and for-hire recreational fisheries operations. Section 3.12 discusses expanded planned action impacts on scientific surveys.

The sentence “Scientific research and surveys are anticipated to continue at similar levels to the present” in Section 3.5.7.1 was deleted to eliminate conflicting information.

Visual Resources

Comment theme: Interconnection Facility visual impacts.

Associated comments

Table I-360 provides the full list of comments received as part of this comment theme.

Table I-360. Interconnection Facility visual impacts comment.

Comment Number	Comment
322-6	The Interconnection Facility at Cove Hollow Road is evaluated in Appendix B (Visual Resource Assessment) to the application of Deepwater Wind South Fork, LLC (now South Fork Wind, LLC) to the New York State Public Service Commission pursuant to Article VII of the New York State Public Service Law, a copy of which Appendix is Exhibits Gl through 03 to this memorandum. The DEIS does not include details of this Interconnection Facility and does not address visual impacts related to the Interconnection Facility. Various documents other than the DEIS indicate that the following structures will be included as part of the Interconnection Facility: -- steel bus structures and voltage conversion equipment with a maximum height of approximately 30 feet -- a 22-foot by 30-foot, 12-foot-high control building lighting consisting of full cut-off fixtures and additional pole-mounted flood lights that would only be active during maintenance and repair operations -- a nine (9)-foot-tall, galvanized chain-link perimeter fence and an 11.5-foot-high concrete wall -- 11 lightning masts, potentially 45 feet high, consisting of galvanized steel monopoles -- a transformer, shunt reactors, and switch gear

Response to comments: See COP Appendix U - Visual Resource Assessment South Fork Export Cable Onshore Substations Section 4.0 Conclusions, page 35 for a summary of the potential effects related to the onshore substation and information that was available and assumed at the time of analysis. Section 4.2 of COP Appendix U also provides recommended mitigation measures based on project components analyzed.

Section 3.5.9.2.3of the FEIS provides a summary of impacts associated with the interconnection facility: Because of the similarity of the existing adjacent East Hampton substation's visual features and screening by mature vegetation throughout the area as noted in COP Appendix U, the operation of the onshore interconnection facility would cause negligible to minor long-term adverse visual impacts.

Comment theme: Interconnection Facility lighting.

Associated comments

Table I-361 provides the full list of comments received as part of this comment theme.

Table I-361. Interconnection Facility lighting comment.

Comment Number	Comment
322-8	Lighting Impacts The COP indicates that lighting will be kept the minimum necessary for facility safety and will comply with Town requirements for limiting off-site light spillage, and that it is anticipated that light will be directed downward where possible and manual switches and/or movement sensors will be installed for the security lighting so as to mitigate the effects of light pollution and reduce potential wildlife attraction. Appendix E of the DEIS (the Cumulative Activities Scenario), Table 3.12-1 (Summary of Activities and the Associated Impact-Producing Factors for Land Use and Coastal Infrastructure), discusses lighting and potential impacts from other portions of the Project but does not include lighting at the Interconnection Facility as a potential impact and the proposed mitigation therefor. The DEIS should be revised or supplemented to include a discussion of lighting at the Interconnection Facility and mitigation for same.

Response to comments: See COP Appendix U - Visual Resource Assessment South Fork Export Cable Onshore Substations, 1.2.3 SFEC Onshore Substation - Project Description, page 5 states that lighting would consist of a limited number of full cut-off fixtures for site security and safety. Additional pole mounted flood lights would only be active during maintenance and repair operations.

See COP Appendix U - Visual Resource Assessment South Fork Export Cable Onshore Substations, Section 4.0 Conclusions, page 35 for a summary of the potential effects related to the onshore substation and information that was available and assumed at the time of analysis. Section 4.2 of COP Appendix U also provides recommended mitigation measures based on project components analyzed.

Appendix E - Table 3.12-1 identifies ongoing and future activities separate from the Project which evaluates potential impacts associated with ongoing and future non-offshore wind activities."

Comment theme: Cumulative visual analysis area.

Associated comments

Table I-362 provides the full list of comments received as part of this comment theme.

Table I-362. Cumulative visual analysis area comment.

Comment Number	Comment
338-54	66. Figure E-10 (p. E1-10), the cumulative visual impacts analysis should analyze the total number of blades visible from all projects in the WEA by measuring the 40-mile Maximum Visibility from the WEA boundary, not the SFWF project center.

Response to comments: Based on the Project location in relation to the WEA which predominantly occurs southeast of the Project and where the curvature of the earth becomes a factor in visibility, BOEM has determined the cumulative visual impacts analysis area is sufficient in evaluating cumulative impacts in relation to Project.

Comment theme: Visual simulations.

Associated comments

Table I-363 provides the full list of comments received as part of this comment theme.

Table I-363. Visual simulations comment.

Comment Number	Comment
285-7	b. The DEIS provides inadequate visual simulations. The visual simulations in the DEIS are incomplete and inadequate to show the actual impact of the WTGs, and they must be improved to assess accurately adverse impacts and to determine appropriate avoidance, minimization, or mitigation measures. As the responsible agency, BOEM must provide consulting parties and the public with adequate and easily accessible information that informs all parties of potential impacts. The DEIS itself does not include sufficient photo simulations showing the aesthetic impacts of the Project within the Project Area. Instead, the large majority of the DEIS's photos are contained in a separate document located on BOEM's webpage, in a format and quality impossible to judge or interpret. Furthermore, the photo simulations are far too limited in scope. There are no simulations depicting the construction impacts, for example, and all simulations are from a single viewpoint at ground level. Additional simulations representing each season, with strict adherence to best practice guidelines and methodology as identified by BOEM's Compendium Report for the New York Call Area, are necessary. Furthermore, more comprehensive photo simulations, such as depictions from the Lighthouse itself and from the ocean viewing the Lighthouse, are necessary for BOEM to analyze impacts to the Southeast Lighthouse. Overall, the visual simulations provide a "best case" representation only of the Project's visual impact upon the Lighthouse, and BOEM does not provide enough information for SELF to evaluate less favorable scenarios. To ensure it adheres to its obligation to provide complete and adequate information, BOEM should include the following in its photo simulations: •Standards and methodology, as identified in the "Renewable Energy Viewshed Analysis and Visualization Simulation for the New York Outer Continental Shelf Call Area: Compendium Report"; •Panoramic Photomontages, such as Trueview Simulations; •Single Frame simulations per season and during specific times of local concern (e.g., sunset), from nondeceptive angles or perspectives (e.g., ground level vs. Lighthouse). The public should be able to easily compare the visual simulations from different developers "apples to apples" for projects within the same viewshed; and •Use of 3D software that permits the viewer to create custom views, such as submitted in the 400-page visual simulation assessment within the DEIS for Deepwater Wind's Block Island Wind Farm.

Response to comments: BOEM has determined that the visual simulations and other media prepared by the lessee are adequate for assessing visual impacts. BOEM does not intend to prepare any additional simulations or media.

The EIS tiers to previously prepared technical reports to aid the reader in the understanding of resource impacts. COP Appendix V Visual Impact Assessment, Section 4.2.3 Visual Simulations Page 83 further outlines the methodology associated with the development of the simulations as part of the technical report and subsequent findings.

Comment theme: Cumulative visual impact determinations.

Associated comments

Table I-364 provides the full list of comments received as part of this comment theme.

Table I-364. Cumulative visual impact determinations comments.

Comment Number	Comment
360-16	In addition, BOEM found that the majority of the visual impacts were associated with the amount of offshore light sources generated—all existing wind turbine stationary structures would have navigation marking and lighting in accordance with FAA and BOEM regulations. Relying on field observations of FAA nighttime lighting visibility off of Block Island, BOEM noted that under clear sky conditions in open water, FAA hazard lighting may be visible to the naked eye at a distance of 26.8 miles from the viewer. BOEM found that the synchronized flashing strobe lights required in FAA hazard lighting systems that would be in use for the duration of Project O&M would have long-term minor to major impacts on sensitive offshore and viewing locations. In making this impact finding, BOEM appears to assume that all 857 WTGs in its cumulative impact analysis will use the standard continuous FAA warning system, and will therefore be lit at all nighttime hours. Although BOEM notes that the implementation of an ADLS or similar system that would activate the hazard lighting system only in response to detection of nearby aircraft would have reduced visual impacts at night, approximately reducing it to less than 1% of the normal operating time, BOEM does not appear to take this potential mitigating factor into account to its cumulative impact analysis. Ultimately, ACP believes that the potential visual impacts, when considered in aggregate, do not rise to a major or even moderate level—first, because the majority of them will not be visible from coastal regions, even after sundown. In addition, it appears the only main impact for visual impacts is due to FAA lighting, and those impacts may vary project-by-project, depending on whether a project selects certain mitigation techniques. Instead, a minor impact rating would be warranted, and BOEM should revise the overall rating in the final EIS accordingly."
360-15	In the DEIS, BOEM determines that the cumulative impacts associated with the Proposed Action and past, present, and reasonably foreseeable offshore wind activities would result in “long-term, minor to major visual impacts” on visual resources, and overall cumulative adverse impacts would be “moderate.” Specifically, BOEM determines that the combined visual effects of the WTGs and associated infrastructure from the 857 WTGs from proposed or anticipated future wind facility projects in the visual geographic analysis area could have up to major visual impacts if future projects are fully implemented, grouping them as follows: • BOEM leases that are within 12 miles of viewing areas would have major visual impacts; • Viewing areas within 12 to 24 miles would have moderate to major impacts; and • Viewing areas within 24 to 30 miles would have minor impacts. ACP disagrees with BOEM’s finding that visual impacts would have a moderate or major impact rating, given these metrics. As shown in the figure below, the majority of the leases in the MA/RI WEA may have visual impacts in about nine major viewing areas in the coastal region. However, with the exception of a few outliers, almost every potential WTG location in the MA/RI WEAs fall outside of the 12-mile viewing area radii—in other words, they do not fall into the first “major impact” category. In fact, the majority of potential WTG locations are beyond the 12-to-24 mile “moderate to major” impact category for viewing locations, and would therefore fall in to the “minor” impact category. The table below provides a truncated overview of the mean nautical miles for all potential WTG locations from viewing areas—the closest lease area to Monatuk Point Lighthouse, for example, is Deepwater at 26.1 NM, while the Mayflower lease area and Vineyard South lease areas are 60.6 and 67.9 NM from Monatuk Point, respectively. ACP does not believe that a “major” rating, therefore, is justified. A minor impact rating, using BOEM’s own distance-based assessment, would best align with the findings below.
301-35	The DEIS (p 3-178) indicates that "BOEM expects the overall impact on non-historic visual resources from the Proposed Action alone to be moderate, as the overall effect would be notable but the resource would be expected to return to pre-Project conditions after conceptual decommissioning." However, Section V states, "Negligible to major, adverse impacts on non-historic visual resources from Project construction and installation, O&M, and conceptual decommissioning. Overall cumulative adverse impacts would be moderate, as the viewshed would return to previous condition after conceptual decommissioning." These statements appear to be contradictory. While the range of impacts has been accurately portrayed, it seems the overall visual impacts should 1007:1007be expressly defined in the context of the entire Project. It should be noted that in 39% of the KOPs, the Proposed Action resulted in "Negligible" visual impacts to onshore, non-historic visual resources. Similarly, 27% of the KOPs would receive "Minor" visual impacts and 27% and 7% would result in moderate or major visual impacts, respectively. Considering the temporal nature of the conditions present at the KOP's that received a "Major" visual impact (clear conditions, with specific worst-case lighting), it appears the overall impacts resulting from the Proposed Action should be weighted more toward minor to moderate. The FEIS should resolve these contradictions.

Response to comments: BOEM is unable to assume all future scenarios and what will be required for FAA lighting for all projects within the WEA. The EIS analysis considers a worst case scenario as part of the findings and conclusions and considers all viewing areas in its conclusions.

Distance, as part of the EIS findings, is only one metric evaluated and was not used to determine overall visual impacts. Viewing areas and subsequent distance to turbines were categorized as described in COP

Appendix V - Visual Impact Assessment to aid in the understanding of influencing factors such a viewer direction, time of day, atmospheric conditions, approximate percentage of turbine visible, blade angle, and field of view which was determined evaluating the provided simulations as part of COP Appendix V - Visual Impact Assessment. Based on categorization of the above information, impact thresholds of negligible, minor, moderate and major as identified in Table 3.5.9-1 were then determined and applied to viewing areas as part of all Alternatives evaluated.

Several EIS revisions were made to improve impact consistency:

- Section 3.5.9.2.3: "BOEM expects the overall impact on non-historic visual resources from the Proposed Action alone to range from minor to moderate, as the overall effect would be notable, but the resource would be expected to return to pre-Project conditions after conceptual decommissioning."
- Revision - Table ES-1: "Negligible to major, adverse impacts on non-historic visual resources from Project construction and installation, O&M, and conceptual decommissioning from identified KOPs. Overall cumulative adverse impacts would range from minor to moderate, as the viewshed would return to previous condition after conceptual decommissioning."

Comment theme: Visual section editorial comments.

Associated comments

Table I-365 provides the full list of comments received as part of this comment theme.

Table I-365. Visual section editorial comments.

Comment Number	Comment
301-33	• In the cumulative impact discussion (pg. 3-173), the statement, "The SFWF WTGs would be more visually apparent as viewed from the western communities and sensitive viewing locations (Montauk, New York, and Block Island, Rhode Island) due to less screening from other lease areas under the foreseeable development scenario" suggests that the SFWF is visually apparent from Montauk. However, the simulations and discussion provided in the COP clearly suggest the turbines, at a distance of 35 miles from Montauk Point, would be very difficult to discern. SFW recommends removing Montauk from the statement.
301-97	The description of lighting in the FEIS should reflect the differences in lighting between mid-tower and nacelle. For example, there are two FAA lights on the nacelles, whereas the DEIS indicates that there is one.

Response to comments: Montauk was removed from the FEIS due to distance and negligible visibility.

The following EIS revision was made: "The amassing of these WTGs and associated synchronized flashing strobe lights affixed with a minimum of three red flashing lights at the mid-section of each tower and two at the top of each WTG nacelle."

Comment theme: Visual impacts to the recreational and commercial mariner community.

Associated comments

Table I-366 provides the full list of comments received as part of this comment theme.

Table I-366. Visual impacts to the recreational and commercial mariner community comment.

Comment Number	Comment
167-4	While BOEM does find in the DEIS the potential for impacts on the viewshed and notes that the recreational and commercial mariner community could experience “major adverse effects” to their viewshed, this may not necessarily be correct. While the view may change in some areas, it is worth noting that wind farms built offshore such as those near Nysted, Denmark have attracted pleasure-craft, with the then-mayor commenting that more sailboats have come to the town since the windfarm was built and the harbormaster discussing how popular the ability to sail inside the wind energy area has been with tourists and boat owners. Likewise, the physical presence of the towers, bring their own positive impacts. We do applaud BOEM for referencing the “reef effect” offshore wind facilities can create; we believe this is an important fact. Fisherman often explicitly seek out the red snapper that congregate near oil and gas facilities and other offshore structures in the Gulf of Mexico and off of California, and clearly BOEM Regions are aware (and have even funded studies that show) that the creation of fixed-bottom structures have and can continue to attract more mariners, both commercial and recreational. Clearly, the global experience and even limited local experience show that we should not assume negative impacts from wind farms for the domestic tourism and sea-faring economy.

Response to comments: Please reference Appendix H - Section 3.5.8 Recreation and Tourism of the FEIS for a discussion of the presence of structures and the effects related to the offshore fishing industry.

Comment theme: Mitigation measures for visual resources.

Associated comments

Table I-367 provides the full list of comments received as part of this comment theme.

Table I-367. Mitigation measures for visual resources comments.

Comment Number	Comment
301-34	The DEIS (p 3-180) includes a discussion of aircraft detection lighting systems (“ADLS”) but does not explicitly state that visual impacts would be reduced from moderate or major. Rather, it states there would be fewer visual impacts. This implies that the level of impact would remain "major" from certain views during activation. However, based on the anticipated activation of the aviation obstruction signals with ADLS, the visual impacts would be substantially mitigated and would only occur as little as 3 minutes per month. It thus appears that "duration" is not being considered as a factor in the potential reduction in night-time visual impacts. In fact, the duration of impacts with the implementation of ADLS could be characterized as fleeting, suggesting that it would likely be missed by most viewers and would not last long enough to result in visual distraction (similar to passing ships, buoys, air traffic, etc). SFW recommends that the FEIS should consider duration and state that night-time visual impacts would likely be reduced to negligible to moderate with the use of ADLS.
365-4	The night sky off the shores Martha’s Vineyard is rather empty of manmade articles. The occasional fishing boat or airplane; most of the time it’s just the stars and the moon, water and sky. It isn’t until you reach the west end of the island, that the Gay Head Light breaks the night sky, protecting mariners as it has for over a hundred years. To maintain the night’s visual solitude, we strongly request that BOEM make the use of Aircraft Detection Lighting System (ADLS) lighting system a requirement in the construction of the SFWF, and strongly recommend its inclusion as a best practice in the wind turbine industry.

Response to comments: Thank you for your comment. Section 3.5.9.4 of the FEIS was edited to state "BOEM could require installation of an ADLS as a mitigation measure. The use of ADLS technology would reduce long-term, negligible to major adverse visual impacts to non-historic properties from nighttime lighting to negligible or minor because of the short-duration synchronized flashing of the ADLS would have substantially fewer visual impacts at night than the standard continuous, medium-intensity red strobe light aircraft warning systems due to the short duration of activation as discussed in Section 3.5.9.2.2 No Action Alternative."

Comment theme: Interconnection Facility visual impacts and proposed mitigation.

Associated comments

Table I-368 provides the full list of comments received as part of this comment theme.

Table I-368. Interconnection Facility visual impacts and proposed mitigation comments.

Comment Number	Comment
322-5	THE DEIS DOES NOT COMPLETELY IDENTIFY ENVIRONMENTAL IMPACTS OF THE PROJECT OR MEANS TO MITIGATE SUCH IMPACTS Section 1502.16 of the 1978 NEPA implementing regulations provides that the DEIS section on "environmental consequences" "forms the scientific and analytic basis for the comparisons [of alternatives] under § 1502.14," and shall include, among other things, "discussions of ... [d]irect effects and their significance," "[i]ndirect effects and their significance," "[t]he enviromnental effects of alternatives including the proposed action," and "[m]eans to mitigate adverse environmental impacts ... " Visual Impacts Onshore Conceptual Drawings dated May 13, 2019, copies of which are Exhibits A through F to this memorandum, have been submitted to the Town's Architectural Review Board for comment and include profiles of the Interconnection Facility and its proposed perimeter walls, as well as a site plan that depicts the proposed location/lease site for the Facility. This information should be included in the DEIS. The site plan indicates that the lease site for the Interconnection Facility directly borders existing conservation easement areas along the westerly and southerly lease lines. The DEIS should be revised or supplemented to indicate how the vegetation within these easement areas will be protected from encroachment during the construction process.
322-7	The aforesaid Visual Resource Assessment finds that the facility will potentially be visible from portions of Dune Alpin Drive and Horseshoe Drive, the Long Island Rail Road (LIRR) right-of-way, and an adjacent self-storage facility. The Visual Resource Assessment notes that mature vegetation, ranging in height from 50-70 feet, provides screening. The Assessment further notes that, to further minimize potential visibility of the proposed substation from residences, a buffer of evergreen plantings could be installed along the western perimeter of the proposed substation to provide additional year-round screening and finds that additional screening is not warranted around the northerly, easterly, or southerly perimeters of the proposed substation. The COP (Construction and Operations Plan) for the Project further indicates that the Interconnection Facility will be screened to minimize long-term impacts from visible structures and that additional screening may be considered to further reduce potential visibility and noise. The Town's Planning Department notes that a line of native evergreen trees, such as White pines (Pinus strobus) planted in a staggered fashion and supplemented with a lower-growing native evergreen such as Inkberry (flex glabra), could provide the reduction in visibility discussed in the Visual Resource Assessment and COP, particularly if the existing deciduous tree buffer fails at some point in the future. The DEIS does not address the need for this mitigation. The DEIS should be revised or supplemented to address the potential visual impacts at the Interconnection Facility and such proposed mitigation.

Response to comments: Revision was made to Table G-2 of the FEIS to include:

- “Scenic easements near the interconnection facility will be staked or clearly identified to avoid vegetation disturbance.
- SFW will work with local officials to identify appropriate vegetation screening options during governmental permitting processes.”

Comment theme: Visibility of the towers and turbines from Montauk Point State Park.

Associated comments

Table I-369 provides the full list of comments received as part of this comment theme.

Table I-369. Visibility of the towers and turbines from Montauk Point State Park comments.

Comment Number	Comment
357-2	My prior work, reported in Cohen-3, also used fully scientific and mathematical work that proved the SFWF will be visible from Montauk Point State Park. The claims of SFWF are strongly wrong on visibility. Even the East Hampton Town Board has agreed with my view that towers and turbines will be visible. South Fork Wind Farm, the highly expensive and visible wind farm should not be allowed.
357-4	Attachments include: Cohen 3 Deepwater Wind South Fork Turbines Will Be Seeable from Montauk;

Response to comments: Thank you for the information. BOEM considered the information as part of the preparation of the FEIS.

Comment theme: Impact to visual aesthetics of Montauk Harbor.

Associated comments

Table I-370 provides the full list of comments received as part of this comment theme.

Table I-370. Impact to visual aesthetics of Montauk Harbor comments.

Comment Number	Comment
287-2	The proposed facility will change the character and visual aesthetics of Montauk Harbor with an unsightly crane, an enormous steel building, industrial yard, crew transfer vessels and operations and maintenance vessels.
304-2	The proposed facility will change the character and visual aesthetics of Montauk Harbor with an unsightly crane, an enormous steel building, industrial yard, crew transfer vessels and operations and maintenance vessels.
332-2	The proposed facility will change the character and visual aesthetics of Montauk Harbor & our residential community with an unsightly crane, an enormous steel building, industrial yard, crew transfer vessels and operations and maintenance vessels.

Response to comments: Thank you for your comment. The O&M facility would include offices, a warehouse, training facilities, repair facilities, and a floating dock, which are consistent with the range of land uses already associated with Montauk Harbor.

Comment theme: Visual impact rating of the KOP from Block Island Ferry.

Associated comments

Table I-371 provides the full list of comments received as part of this comment theme.

Table I-371. Visual impact rating of the KOP from Block Island Ferry comment.

Comment Number	Comment
301-32	The DEIS notes that the Key Observation Point (“KOP”) from Block Island Ferry (4C - Atlantic Ocean/Block Island Ferry) received an average scenic quality reduction of 0.8 as a result of the visual impact rating, completed by four professionals. The capacity for visual change from this KOP was negative five, suggesting a relatively low scenic quality. The DEIS notes the visual impacts to this resource as "Major". This conclusion seems to depart significantly from the findings presented in the visual impact analysis. The FEIS should align the visual impacts with the ratings from the professional review panel.

Response to comments: Thank you for your comment. Table 3.5.9-2. Summary of Impacts by Viewing Area notes KOP 4C as a minor impact.

Proposed Action

Comment theme: Project decommissioning and associated economic and environmental impacts.

Associated comments

Table I-372 provides the full list of comments received as part of this comment theme.

Table I-372. Project decommissioning and associated economic and environmental impacts comments.

Comment Number	Comment
171-1	Very little or nothing is being said about decommissioning. The end user, the electric companies should be required to post a bond sufficient to cover all costs to put seafloor back to its original condition, similar to bonds onshore for wind farms and solar farms. Its surprising how quiet the environmentalists are about this subject, but the same decommissioning on land they are very vocal.
294-12	The DEIS discusses only “conceptual decommissioning”. According to the document, the developer would submit a decommissioning plan “prior to any conceptual decommissioning activities” and this decommissioning “may not occur for all Project components.” The DEIS actually seems to lean toward non-removal of underwater structure because to do so “would result in a loss of any beneficial impacts” of the so-called “reef effect”, as stated above. This is unacceptable. Certainty of the decommissioning process is essential to Project management. It is also necessary to assessing Project impacts. Any good planning process must ensure certainty of the process, particularly when other ocean users are impacted by the project. To allow permitting without that certainty is unacceptable. No analysis can be completed for the Project itself without certainty of decommissioning. Decommissioning must occur for all Project components, including all underwater structure, cables, boulders and concrete used as scour protection, turbine bases, etc., and the ocean floor must be restored to its original state. This must be a permitting requirement. Without such permitting requirements, all adverse impacts including bottom tending fisheries exclusions, will be permanent. If this is BOEM’s intent, then new analysis would need to be conducted, particularly on a cumulative scale. BOEM cannot complete a comprehensive analysis of the Project without an analysis of decommissioning. Decommissioning cannot be an unknown. An official and complete decommissioning plan must be a part of any offshore wind permitting process. BOEM should obtain and approve such a decommissioning plan from the developer prior to DEIS or permit approval. This may necessitate a supplemental EIS in the case of this Project, for public input and transparency of process.
338-11	Additional detail should be provided in the description and analysis of conceptual decommissioning activities: a. The Agencies commend BOEM for identifying the importance of cable removal during decommissioning in Section 2.1.1.5; however, it is confusing to include the regulatory reference to 30 CFR 585, Subpart I as the regulations include the option to decommission cables-in place. b. Section 2.1.1.5, p.2-8 should indicate that attempts would be made to remove secondary cable protection and scour protection during decommissioning. Following decommissioning activities, seabed contours should be restored to pre-construction elevations where feasible. c. In Section 2.1.1.2, p. 2-8, BOEM should clarify that a NEPA document analyzing decommissioning activities would be prepared if the project components left in-place (e.g., cables, secondary cable protection, scour protection) or components not decommissioned have the potential to interfere with traditional and reasonably foreseeable future uses at the time of decommissioning. 15 CFR § 585.902(a) states, “Except as otherwise authorized by BOEM under § 585.909, within 2 years following termination of a lease or grant, you must: (1) Remove or decommission all facilities, projects, cables, pipelines, and obstructions; (2) Clear the seafloor of all obstructions created by activities on your lease, including your project easement, or grant, as required by the BOEM.”

Comment Number	Comment
355-1	Decommissioning Many of us in the industry have stressed from the start that when it comes to decommissioning the COMPLETE structure should be removed from the water and not just be cut off 15 feet from the surface. The ocean is dynamic and there is always a risk of exposure. If that exposure does happen will Orsted be responsible, after the life of the project, for any damages that have occurred from an exposure? If not, will there be a fund that is set aside for damage to gear post project?
363-76	BOEM must require OSW developers to fully decommission and return the lease area to its natural state (to the greatest extent possible) as a full requirement of the lease terms. The DEIS refers to the decommissioning of the SFWF as "conceptual." No part of decommissioning should be considered "conceptual" or allow for decommissioning to potentially "not occur for all Project components", as suggested in the DEIS. The DEIS contains inadequate analysis and details of decommissioning the SFWF. No details are provided apart from the statement that decommissioning "would follow the same relative sequence and time frame as construction, but in reverse." This is both ludicrous and simply inadequate. It is not possible to "reverse engineer" a monopile from the sea bed. The public cannot be asked to provide comments with the lack of information regarding the following: • What is the estimated total length of cable that won't be removed? • What volume, if any, and type of material(s) will be left in or under the sea floor? • What is the total time developers will have to remove turbines? • What is the decommissioning process for the onshore components of the project? • What level of GHG emissions will be generated in the decommissioning process? • How deep will the turbines be cut off their bases? Will it be 2 meters similar to proposed burial depth of cables? • How much of the turbines can be recycled, and would such recycling be required? • What is the process for extending the lease if turbines are upgraded instead of decommissioned? • What is the process for the public to comment on the decision to decommission and its associated requirements, e.g. extent of turbine removed? • How much scour material will be removed? • What happens if the project has to be decommissioned before the end of the lease period? • What happens if a developer can't afford decommissioning? As RODA has pointed out in previous comment letters, if no further NEPA review of the project decommissioning will occur in the future, the DEIS should contain explicit details regarding decommissioning activities. Otherwise, this project would be in violation of NEPA, by not completing the required public comment process and consideration of the environmental impacts of this major federal action. At a minimum there should be assurances as to the process and the factors BOEM will evaluate in making future decisions, in light of the vagueness of the DEIS. The DEIS should include any approved methods for removing turbine structures from the seabed. All removal methods should minimize further negative impacts to benthic habitat. The potential use of explosives in decommissioning is especially of concern for the negative impacts to benthic habitat and fishery resources, and if it is used, BOEM must conduct a NEPA-compliant environmental review to assess the potential impacts of that activity, which are unknown at this time.
363-79	As with other topics, alternatives for decommissioning were raised through the scoping process that are not address in the DEIS, including "[a]lternatives to cable decommissioning that remove all cables, etc. rather than decommissioning buried cables in-place." The DEIS must be revised to include a full analysis of decommissioning, as it is within the scope of this environmental review.
363-80	BOEM has provided no information regarding the economic considerations of decommissioning. The cost to decommission a 500 MW OSW development was estimated by Adedipe & Shafiee. They estimated the total decommissioning costs (including a 10% contingency) to range from £145,313,411.69 (min) to £241,495,688.48 (max). This is a massive cost and there is no indication in the DEIS as to who will pay for that or what is being done to minimize that. A report on decommissioning from 2015 estimated decommissioning costs to be over €1 million per turbine (€ 200,000 to € 600,000 per MW) equivalent to roughly 60 to 70% of installation costs. The regulations at 30 C.F.R. § 585.516 require developers to reserve funds for decommissioning in a separate account to make sure they can fulfill their obligations to the American public. The DEIS does not disclose how the cost of decommissioning was calculated nor the amount of bonded funds, preventing the public's ability to submit informed comments.
364-9	Additional Considerations Regarding Decommissioning Requirements The final offshore wind development plan should require the project developer to describe how it intends to handle the end of the project's estimated operating life. This should include a consideration and evaluation of several potential options, including repowering and/or refurbishing at one or more stages of the project's projected lifespan, as well as ultimate decommissioning. Consideration of these issues at the outset may positively impact design and construction decisions from the perspective of both environmental mitigation and overall project cost

Comment Number	Comment
364-10	Decommissioning considerations should take into account the environmental and ecological impacts of both a wholesale dismantling and removal of all structures and associated apparatus (essentially retuning the site to a “pre-build state”) as well as a more selective approach in which some elements of the project may remain in place. The impact of decommissioning on the surrounding ecosystem should be the first and highest consideration. Consideration of the reuse and recycling of decommissioned equipment should also be part of the process, with disposal/landfilling of material to be considered as a last resort.
364-11	There have been several decommissionings of offshore wind facilities in Europe and BOEM and New York should look to these for lessons to be learned. While quite different from an offshore wind facility, there may also be lessons to be learned from the much longer history of decommissioning offshore oil and gas facilities. In addition, the United Kingdom has issued guidelines for decommissioning offshore renewable energy facilities and Ontario Ministry of the Environment and Climate Change has more recently published an “Assessment of Offshore Wind Farm Decommissioning Requirements.” While these sources will undoubtedly yield useful information, it is important to bear in mind that ultimately any decommissioning plan must be uniquely tailored to the environment in which the project is operating and where the work will occur.
364-12	In addition to the criteria already listed, the project developer should demonstrate its financial capacity to decommission the project in an environmentally sound manner. The project developer should be required to post a decommissioning bond, in an amount to be determined by the permitting authority, to ensure responsible decommissioning of the offshore wind project in the event that the project owner becomes insolvent or otherwise unable to meet its obligations under the project proposal. The amount of the bond should be based upon the expected decommissioning cost.
379-19	James Fletcher: And another question I have is when these have lost their life span, who's responsible for taking them out. And my last thing is just a chain-jerking comment. The woman that just said that you could trust the Coast Guard, I would ask her to ask the Coast Guard about the men that lost their lives on their cutters in the Gulf of Mexico and the Chesapeake Bay. The Coast Guard said it was safe, but, yet they killed the men that were on those boats, and it was their men, so don't trust the Coast Guard. Anyhow, BOEM needs to re-back drop back and look before they approve putting anything in the bottom. I thank you for your time and we'll standby. Finest guide, James Fletcher, United National Fisherman’s Association.
154-14	Turbine decommissioning. This issue is completely ignored by Orsted in the DEIS. We fully anticipate that Orsted will abandon the subject turbines at the end of the lease term. Also, lease extensions for this project are likely. As it stands, turbine abandonment is allowed by BOEM. To rectify this error, we ask that BOEM require sufficient bond security from the developer prior to construction.
157-7	Decommissioning is referred to throughout the DEIS as conceptual. What is conceptual about decommissioning? The commercial fishing industry deals with the wastes left behind when projects are no longer useful. I’ve personally lost tens of thousands of dollars’ worth of fishing gear on abandoned telecommunications cables without a way to recoup these losses. The ocean floor must be returned to its original state. Decommissioning must be regulated, pre-planned and required; the monies necessary to pay for decommissioning put in a trust in advance and put to work when the site has reached the end of its useful life. There are decommissioning studies and experiences from European wind energy areas that, at a minimum, could be referenced, but the DEIS attempts no analysis of decommissioning. Inactive wind energy sites are going to create a big, huge mess in the open ocean, and we must plan for this now. What decommissioning techniques are available? How successful have decommissioning efforts been at removal off all structure? The EIS must make some effort to analyze this, time will go by and these projects will see the end of their useful life.
166-5	Relative to long term impacts, the document should acknowledge that although future decommissioning will attempt to reverse all impacts and return the area to pre-construction conditions, this may not be possible.

Response to comments: As described in Section 2.1.1.5 of the FEIS, pursuant to 30 CFR 585.902 and other BOEM requirements, South Fork Wind would be required to remove or decommission all installations and clear the seabed of all obstructions created by the proposed Project. South Fork Wind would need to obtain separate and subsequent approval from BOEM to retire any portion of the Proposed Action in place. If the COP is approved or approved with modifications, South Fork Wind would have to submit a bond (or another form of financial assurance) that would be held by the U.S. government to cover the cost of decommissioning the entire facility. This explanation has been added to Section 2.1.1.5 of the FEIS.

The decommissioning section of the EIS in Section 2.1.1.5 was also updated to state "SFW would be required to complete decommissioning within 2 years of the termination of its lease, which would return the area to pre-construction conditions, as feasible."

Comment theme: Cable protection details.

Associated comments

Table I-373 provides the full list of comments received as part of this comment theme.

Table I-373. Cable protection details comment.

Comment Number	Comment
141-11	Amount of Cable to be Protected. The DEIS references Tables 3.2-2 and 3.2-3 of the COP and notes that concrete matting may be required for up to 5 percent of the SFECOCS (7.0 acres), up to 2 percent of the SFEC-NYS (0.2 acres) and at seven locations (0.6 acres) where the SFEC-OCS will cross existing utilities. We recommend that further detail be provided to explain the estimates of the amount of project cable requiring protection, the type of protection needed, and how these estimates were derived.

Response to comments: Table 3.2.2 footnotes in the COP state the following assumptions regarding estimated cable protection, "Conservatively assumes additional cable protection, consisting of concrete matting, fronded mattresses, rock bags, or rock placement (8 feet long by 20 feet wide [2.4 m long by 6.1 m wide]), for up to 5 percent of the SFEC - OCS (7.0 acres) and up to 2 percent of the SFEC - NYS (0.2 acres), and for seven locations (0.6 acres) where the SFEC - OCS will cross utility crossings, each of which may need up to 180 linear feet (54.9 m) of concrete matting." No change made to the EIS.

Comment theme: Inclusion of midline buoys to minimize cable sweep.

Associated comments

Table I-374 provides the full list of comments received as part of this comment theme.

Table I-374. Inclusion of midline buoys to minimize cable sweep comment.

Comment Number	Comment
338-23	18. Effects from anchoring and anchor disturbance are discussed in multiple locations in the DEIS; however, as part of the ongoing Article VII proceeding, DWSF has agreed to use of midline buoys to minimize cable sweep. Midline buoys are not mentioned in the DEIS and it is not known whether the use of these would decrease the anchor disturbance area which is estimated to be 821 acres.

Response to comments: BOEM has revised the FEIS to include the midline anchor buoys.

Comment theme: Use of a barge for dredged material.

Associated comments

Table I-375 provides the full list of comments received as part of this comment theme.

Table I-375. Use of a barge for dredged material comment.

Comment Number	Comment
338-31	P. 2-6 states “excavated sediments placed in the immediate vicinity of the cofferdam would be allowed to disperse naturally.” As part of the ongoing Article VII proceeding, the developer has agreed to place excavated material from the HDD on a barge for use as backfill. The Final EIS should consider whether placement of excavated material on a barge could be adopted for other portions of the Project where dredging is proposed.

Response to comments: BOEM has revised the FEIS to include the use of a barge for dredged material.

Comment theme: Recommended Proposed Action edits.

Associated comments

Table I-376 provides the full list of comments received as part of this comment theme.

Table I-376. Recommended Proposed Action edits comment.

Comment Number	Comment
363-42	The description of the proposed action also contains at least three errors: • It states that DWSF has “committed” to a grid layout of approximately 1.0 nm. This should be changed to “proposed” or the DEIS should clearly describe the definition of commitment BOEM has applied. • It states that the proposed layout “aligns with other proposed adjacent offshore wind projects in the Rhode Island/Massachusetts Wind Energy Areas.” It is unclear what definition of “proposed” BOEM is adopting as to the best of our knowledge there are no ongoing NEPA consultations evaluating projects with this layout, and none have been approved. This language should read “may” align. • The proposed action includes only monopile foundations and Table 2.1.5-1 describes all other existing turbine foundation types as technically infeasible. However, Appendix G includes the use of monopile turbines as a proposed mitigation measure for impacts to fishery resources. The DEIS must clarify whether alternative turbine foundations are available and, if not, remove the use of monopiles as a mitigation measure. The proposed action must be clarified and greater detail provided.

Response to comments: BOEM has reviewed identified language related to proposed grid layout and determined that no change is required in the EIS. BOEM has revised the EIS to remove monopile foundation as a mitigation measure if it is the only foundation considered in the Proposed Action.

Comment theme: Planned cable installation, maintenance, monitoring, and protection.

Associated comments

Table I-377 provides the full list of comments received as part of this comment theme.

Table I-377. Planned cable installation, maintenance, monitoring, and protection comments.

Comment Number	Comment
141-9	Installation of Cable Systems (p. 2-6, Section 2.1.1.3.2). The DEIS notes that "Inter-array cables and the SFEC are not expected to require planned maintenance; however, DWSF would develop a cable inspection program prior to Project commissioning; regular monitoring and inspections would be based on manufacturer-suggested methods." While we support inspections and regular monitoring, we also recommend that the FEIS provide a more detailed description of the need for and projected frequency of cable maintenance, repair and replacement, and associated impacts. The description should include design measures to be taken to minimize the need for future cable repair or replacement and any associated impacts.
141-10	Cable Protection Measures. While we recognize that concrete mattresses may be more appropriate from an engineering standpoint for certain cable protection applications, we recommend that the FEIS explain which applications will use concrete mattresses, and where alternative cable protection measures such as rock can be used.
338-4	Cable Burial Depth: The NEPA analysis should demonstrate that all reasonable measures are being taken to achieve a 6-foot target burial depth, avoid the use of secondary cable protection measures, and minimize risks to mariners, as informed by a cable burial risk assessment that evaluates the full range of existing and future risks of external aggression. Armed with this detailed analysis, BOEM could ascertain where remedial burial should be undertaken if target burial depth is not initially achieved and when secondary cable protection measures (e.g., concrete mattresses) are warranted, as it may not be necessary to install them in every location target burial depth is not attained.
338-12	Cable Burial Depth and Secondary Cable Protection Measures 7. BOEM and the developer should demonstrate that all reasonable measures are being taken to maximize burial depth, avoid the use of secondary cable protection measures, and minimize risks to mariners, as informed by a cable burial risk assessment that evaluates the full range of existing and future risks of external aggression. Along the proposed route on the Outer Continental Shelf (OCS), the SFEC would cross challenging sediment conditions where an estimated 2.9 miles of the cable would be buried less than 4ft deep and nearly 180 acres of concrete mattresses are projected to be needed. The SFEC-OCS would be installed in an existing major coastwise shipping route located off the south shore of Long Island and in areas heavily fished by New York commercial fishermen using mobile bottom-tending gear. The SFEC-OCS would also run parallel to and within the proposed tug-tow safety fairway, which may increase the future risk of an anchor strike. Neither the DEIS nor the COP presents a detailed analysis of risks to the SFEC or inter-array cables (e.g., the SFEC was effectively excluded from the study area evaluated in the Navigation Safety Risk Assessment). To that end, the Agencies recommend conducting a cable burial risk assessment to inform the target burial depth and identify where installing secondary cable protection measures is justified. BOEM should require that remedial burial be undertaken if target burial depth is not initially achieved, unless additional passes with the installation tool risk causing damage to the cable or the installation tool or, due to geologic obstructions, additional passes would not increase the burial depth or risk causing cable exposure. Finally, BOEM and the developer should identify specific instances when secondary cable protection measures are warranted, as it may not be necessary to install them in all instances where target burial depth is not achieved (e.g., in very firm or cohesive sediments where the risk of external aggression would also be low).
363-96	Insufficient details have been provided regarding a number of aspects of the cable system. Multiple important topics related to cabling are absent from the DEIS and must be evaluated both for their environmental impacts and consideration of a range of alternatives for mitigation (these are mostly addressed elsewhere in this document, but provided here for simplification): • Details regarding the decommissioning of the cable transmission system; • Details regarding the cable inspection program, which is supposed to be developed prior to project commissioning; • Siting—and micrositing—of the SFEC cable route, which should require direct fisheries input. • Location of inter-array cables.
355-6	Regarding the cables, the document states that cables are to be buried 4-6 feet below the surface. It must be noted that the Block Island Wind cables that were buried at this depth range became exposed last year. Talks of reburying the cables are ongoing and it seems as though they will now bury the cables 25-50 feet below the surface of the bottom. One article state's: "This is deep enough to withstand changing ocean floor conditions". "Changing ocean floor conditions" is the reason why the industry has consistently been calling for burying cables at a depth deeper than Orsted is planning to and why we insist that the entire structure of the turbine be removed at the end of the project.

Response to comments: The cables will be buried in most locations and will not require maintenance, however, monitors will be in place to ensure the cables do not become exposed. Where burial is not possible, the cables will be protected by rock or concrete mattresses. SFW provided a maximum extent of rock or concrete but the precise location and amount cannot be determined at this stage in the review. BOEM analyzed the maximum potential armoring to estimate impacts. The burial of the cable to 4-6 feet is designed to reduce the likelihood of damage from anchoring, dredging, or storm events. However, the cable could be damaged or exposed. Repair of the cable will involve unburying, repairing, and reburying the cable, with similar impacts as the initial installation but in a reduced area. Thus impacts from cable repair would be similar but less than installation.

Resource sections of the FEIS include proposed mitigation, where applicable, and Appendix G of the FEIS, which is a summary of all proposed mitigation considered (including cable burial monitoring), has also been updated to include modifications and/or additional mitigation and monitoring measures. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures will be considered by decision makers and could be adopted in the Record of Decision and required as conditions of approval.

Comment theme: Onshore cables burial depth and the mitigation impacts due to flooding risk and emergency maintenance.

Associated comments

Table I-378 provides the full list of comments received as part of this comment theme.

Table I-378. Onshore cables burial depth and the mitigation impacts due to flooding risk and emergency maintenance comment.

Comment Number	Comment
141-15	We recommend that the FEIS provide a discussion of how the design burial depth for the onshore cables of 4-6 feet was developed, particularly given that the chosen route is within a coastal flood plain. The discussion should also address mitigation of impacts due to flooding risk and required emergency maintenance.

Response to comments: The Applicant developed their Proposed Action based on a siting and route selection process that is described in Section 3.2 of the COP. The burial depth of 4 to 6 feet refers to the sections of the cable that are offshore. The onshore section will be buried along existing roadways and the Long Island Railroad with a duct bank maximum depth of 40 inches (Section 3.2.2.3 of the COP). Section 2.2 of the FEIS notes that "SFW designed the Project components to withstand severe weather events. However, severe flooding or coastal erosion could require repairs during construction and installation activities." Resource sections of the FEIS include proposed mitigation, where applicable, and Appendix G of the FEIS, which is a summary of all proposed mitigation considered (including cable burial monitoring), has also been updated to include modifications and/or additional mitigation and monitoring measures. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures will be considered by decision makers and could be adopted in the Record of Decision and required as conditions of approval.

Comment theme: Turbine placement and alternatives to the Project.

Associated comments

Table I-379 provides the full list of comments received as part of this comment theme.

Table I-379. Turbine placement and alternatives to the Project comment.

Comment Number	Comment
379-18	James Fletcher: The other thing, I have a question of why these towers cannot be moved within three to four miles of shore. I know it's aesthetic but is there anything that shows that the wind in these particular areas are more prone to greater power. And this brings up another question. Is there an alternative to wind power that BOEM hasn't looked BOEM put a lot of grants out and stuff like that, but people that had alternative ideas, that would have harvested the Bay of Fundy power and stuff like that. You couldn't get a grant, you had to be in the ”In”, you had to be in the elite group to get a grant, so I asked BOEM and why they didn't put to open it up to people that had alternative ideas. I’ve heard the problem, the marine life. BOEM has looked at what turned the atmosphere of the world from carbon dioxide to oxygen back many geologic periods ago. There are alternatives that exist that will do away with this need for the windmills.

Response to comments: Thank you for your comment. BOEM's jurisdiction includes federal waters 3 miles or farther off the coast, where the lease area is located for the proposed South Fork Wind Farm. During the area identification process, viewshed impacts were identified as a major concern. Therefore, current lease areas are 10 or more miles from shore to reduce impacts. BOEM efforts related to identification of alternative energy generation technologies other than offshore wind are outside the scope of this EIS. The National Renewable Energy Laboratory (NREL) Wind Prospector map illustrates areas of more or less wind speed offshore and is available here: https://maps.nrel.gov/wind-prospector/.

Comment theme: Scour protection.

Associated comments

Table I-380 provides the full list of comments received as part of this comment theme.

Table I-380. Scour protection comment.

Comment Number	Comment
338-10	Table 2.1.1-1 should include scour protection, in addition to foundation cable protection.

Response to comments: Thank you for your comment. This edit was made in the FEIS.

Comment theme: Extreme weather events.

Associated comments

Table I-381 provides the full list of comments received as part of this comment theme.

Table I-381. Extreme weather events comment.

Comment Number	Comment
363-94	Section 4.2.4 of the SFWF COP outlines the wind speed and wave height associated with storms and cyclones in the New England region, the results do not predict dominant wave or wind direction. Current turbine design based on the International Electrotechnical Commission, are not designed to withstand the extreme winds and directional wind shifts of hurricanes larger than Category 2, which can occur in the NE region. In fact, researchers found that turbines built to current standards that experience wind gusts from the eyewall and near-eyewall areas of Atlantic Category 5 hurricanes “would incur structural damage.”94 The DEIS fails to sufficiently analyze how gusts and wind shifts during extreme weather events may damage turbines and negatively impact energy generation capacity.

Response to comments: The design parameters for the WTGs are sufficient based upon historical data, site-specific measurements, and engineering design practices. The South Fork Wind project will be designed in accordance with the International Electrotechnical Commission (IEC) 61400-1 and 61400-3 standards. These standards require designs to withstand forces based on site-specific conditions for a 50-year return interval (2 percent chance occurrence in a single year) for the WTGs. This means that the WTGs are not designed just for average conditions, but for the higher end event that is reasonably likely to occur. The newly revised IEC standard now also recommends a robustness load case for extreme metocean conditions, where the WTG support structures are checked for a 500-year event (0.2% chance occurrence in a single year), to ensure that the appropriate level of safety is maintained in case of a less likely event.

Comment theme: Maximum Work Area.

Associated comments

Table I-382 provides the full list of comments received as part of this comment theme.

Table I-382. Maximum Work Area comment.

Comment Number	Comment
363-58	The proposed “maximum work area” in that figure extends beyond the lease area without explanation as to what work is occurring there. It is unclear what this refers to and whether legal authorization exists for OSW-related work outside of lease areas and associated right of ways.

Response to comments: The Maximum Work Area (MWA) as described in COP Section 3.1.1 Project Location "is the designated area where installation and supporting activities having seabed disturbance (e.g., anchoring) could potentially occur. The MWA has an approximate buffer of at least 2,070 ft around the outer edge of the WTG layout for increased work space. While the MWA includes limited areas outside the boundary of the Lease Area, all WTGs and foundations will be installed inside the Lease Area." Clarifying edits made in the FEIS.

Comment theme: Onshore grid capacity.

Associated comments

Table I-383 provides the full list of comments received as part of this comment theme.

Table I-383. Onshore grid capacity comment.

Comment Number	Comment
363-78	BOEM should analyze the capacity and needs of the existing electricity grid to determine whether early decommissioning may occur and include this information in the DEIS. The Utgrunden OSW project in Sweden was decommissioned after only 15 years of usage. Research on the performance of the WEA determined that between 2001-2003 the WEA produced 31.4 GWh per year, with a capacity factor of about 34%. The main factor the researchers thought was affecting performance was grid faults, likely caused by conventional power plants used to balance the grids. The efficiency of OSW projects may be drastically reduced if grid infrastructure or environmental conditions do not allow them to operate at maximum capacity, raising further questions about their environmental impacts and benefits. The onshore grid capacity must be discussed when considering costs and benefits of new OSW projects.

Response to comments: The onshore grid capacity depends on numerous variables beyond the scope of the EIS and over which BOEM does not have authority.

Comment theme: Sourcing of the seabed materials and other Project description details.

Associated comments

Table I-384 provides the full list of comments received as part of this comment theme.

Table I-384. Sourcing of the seabed materials and other Project description details comments.

Comment Number	Comment
363-99	Also missing from the DEIS is information regarding the sourcing of the large amount of seabed materials that would be used for mattressing or other project activities. A full analysis must be included regarding its origin and the environmental impacts of associated dredging activities. Currently, the only information provided states that "[b]oulder relocation would be carefully executed to minimize damage to colonizing organisms. The disturbed boulder surfaces would recolonize over time, likely regaining full habitat function." This statement is unsupported and appears logistically improbable.
363-41	The proposed action consists of development of part of the Deepwater Wind South Fork Lease Area (OCS-A 0517) with up to 15 wind turbines, a maximum of 21.4 miles of 6- to 12-inch-diameter inter-array cables, and an offshore substation, in addition to installment of an export cable and interconnection facility in East Hampton, NY. The size of this project is more appropriate for its consideration as the first OSW facility in U.S. federal waters than multiple other projects under consideration that are substantially larger. However, it is difficult to evaluate even the proposed action in the DEIS as there are numerous project details that are not described. These are addressed in later sections of this comment letter, and include: • Of the 18 turbine locations provided on the map, which locations would be used and where a substation would be located; Specific location ("micrositing") of the cable route and turbine locations; • Possibilities for coordinated transmission; and • Specific descriptions and quantities of materials used, where and how they would be sourced, and how their sourcing and transport would affect the environment.

Response to comments: The sourcing of materials and possibilities for coordinated transmission is outside the scope of the EIS. Combining of transmission projects is too speculative to be analyzed in this EIS. Figure 3.1-1 of the COP displays the location of all proposed turbines and the offshore substation. Section 2.1.1.1 of the FEIS was revised to add the following reference to this figure. A detailed map showing the location of all proposed WTGs, inter-array cables, and offshore substation is provided in Figure 3.1-1 of the COP.

Waters of the United States

Comment theme: USACE authority to issue a permit for the proposed action under 404(b)(1) Guidelines.

Associated comments

Table I-385 provides the full list of comments received as part of this comment theme.

Table I-385. USACE authority to issue a permit for the proposed action under 404(b)(1) Guidelines comment.

Comment Number	Comment
169-8	The Army Corps of Engineers does not have the authority to issue a permit for the proposed action. The 404(b)(1) Guidelines prohibit the Corps from granting a Section 404 permit “if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." 40 C.F.R. § 230.10(a). Delivering renewable energy to the Northeastern area of the US is not water-dependent. Solar and onshore wind could deliver all requirements. If the Corps finds that a proposed project by its general nature is not water dependent, which it must here, then the Corps must presume that practicable alternatives to the project are available in less sensitive areas. See 40 C.F.R. § 230.10(a)(3). Likewise, the Corps must presume that such practicable alternatives have less adverse impact on the aquatic ecosystem. See id.

Response to comments: The 404(b)(1) Guidelines are applicable to the specification of disposal sites for discharges of dredged or fill material. While the permit is related to the proposed activities, the Section 404 permit in itself does not assess the validity of an infrastructure project. The guidelines state that the USACE will “examine practicable alternatives to the proposed discharge, that is, not discharging into the waters of the U.S. or discharging into an alternative aquatic site with potentially less damaging consequences.” Alternatives in this case are referring to the discharge location proposed.

Terrestrial and Coastal Habitats and Fauna

Comment theme: Hither Hills SFEC ecosystem impacts.

Associated comments

Table I-386 provides the full list of comments received as part of this comment theme.

Table I-386. Hither Hills SFEC ecosystem impacts comment.

Comment Number	Comment
322-3	Hither Hills SFEC Overland Route Additional details are required to assess the environmental impacts of the alternative Hither Hills cable route. It should be noted that groundwater-fed freshwater wetlands that are not mapped by either the New York State Freshwater Wetlands or the Federal National Wetland Inventory mapping programs are not uncommon throughout the Napeague area of eastern Amagansett, which would be crossed by the Hither Hills cable route. Moreover, the Hither Hills cable route is proposed adjacent to the Napeague Harbor NYS Significant Coastal Fish and Wildlife Habitat. The wetlands within this area contain a high concentration of plant species listed by the NYS Natural Heritage Program. At a minimum, information on the full extent of land clearing, excavation for trenching, and staging of materials and equipment for conduit and vault installation, as well as details for any necessary dewatering activities, are required to properly evaluate the environmental impacts of this alternative cable route.

Response to comments: Section 3.4.5 of the FEIS discloses existing ecological communities as well as special-status habitats and faunas that may be present, as well as potential impacts to these resources based on Project activities. The reader is referred to Section 3.2 of the COP for details on Project construction activities. The project will be buried beneath public roads and along the Long Island Railroad right of way. Additionally, the onshore segment is subject to permitting by the Army Corps of Engineers and the State of New York, through the Article VII process. No change made in the FEIS.

NMFS TECHNICAL LETTER COMMENTS AND RESPONSES

Table I-387. NMFS Technical Letter Comments and Responses

Comment #	Comment Text	Comment Category	Comment Response
291	p. A-9 - Please update the last paragraph under MMPA to reflect the proposed IHA published in the Federal Register on February 5, 2021 (86 FR 8480). The public comment period was open from February 5, 2021 through March 10, 2021. https://www.federalregister.gov/documents/2021/02/05/2021-02263/takes-of-marine-mammals-incid ental-to-specified-activities-taking-marine-mammals-incidental-to	Appendices	This edit was made.
2	Pgs IV to V_ Table ES-1 suggests impacts of the project to EFH are minor. Given the extent of complex habitat in the project area and the analysis of impacts in the document, the suggestion that impacts to EFH are minor is not supported.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment. Per discussion with NMFS, the significance criteria and determinations are refined with consideration to the specific issues of concern raised in the comments provided below.
5	Pages 2-1 to 2-2_Table 2.1.1-1 suggests the proposed action will result in 18,042 acres of impacts (temporary and permanent) for WTGs and approximately 352.7 acres for inter array cable (temporary and permanent). Given the extent of complex habitat in the lease area, we would expect that some of the anticipated short-term impacts may actually be more long-term impacts, if they occur in complex habitats. The level of impacts described does not meet the definition of minor impacts to EFH for the project.	Benthic habitat, EFH, Inverts, and Finfish	Table 2.1.1-1 indicates that 821 acres may be temporarily impacted from vessel anchoring/mooring while 22.1 acres will be permanently impacted by the presence of turbines and 12.7 acres from the inter-array cable. The estimated extent of complex habitat in the lease area is estimated to be over 2,000 acres.
15	Pages 2-16 to 2-19_The Benthic Habitat, EFH, Invertebrates, and Finfish sections in Table 2.3.1-1, suggests there are no differences in impacts between the alternatives considered in the document. Variations in the alternatives are only noted under the cumulative effects which evaluates impacts across a broader area. The Benthic Habitat, EFH, Invertebrates, and Finfish analysis should be the variation in the alternatives to address those impacts, it is not clear how the NEPA analysis concludes all of the alternatives to be the same. revised in the FEIS to fully analyze impacts of the proposed action and each alternative, in the context of the lease area located on Cox Ledge. Given the sensitive habitats within Cox Ledge and the variation in the alternatives to address those impacts, it is not clear how the NEPA analysis concludes all of the alternatives to be the same.	Benthic habitat, EFH, Inverts, and Finfish	The Fisheries Habitat Minimization Alternative, developed with and concurred on by NMFS along with the associated language in the DEIS defers detailed evaluation until completion of the EFH assessment. BOEM has worked closely with the NMFS habitat team to evaluate the area to determine the reduced level of impacts from the alternative. The FEIS is updated to include this analysis and the comparison revised. All of the potential impacts from each alternative are not considered the same. However, because the various potential impacts are not anticipated to affect species at the population level, overall impacts are considered moderate to negligible. Please see Tables 3.1.1-1, 3.1.1-2, and 3.4.2-1 for a more detailed description of the impact indicators and significance criteria.
20	Page 3-2_Based on the definition of “minor” impacts, the effects to benthic habitats and EFH described for the proposed action do not appear to fit within this definition. The proposed action does not avoid adverse impacts and, while this proposed wind farm has fewer turbines than other projects, the extent of impacts to complex habitats is substantial, and would not result in recovery without mitigation. Given this definition, it is not clear how the impact rating for the proposed action would be the same as the habitat minimization alternative, or even the vessel transit alternative.	Benthic habitat, EFH, Inverts, and Finfish	The broad impact criteria on p. 3-2 address all resources analyzed in the FEIS and are intended to be applied to an overall impact determination. Table 3.4.2-1 further describes the impact indicators and significance criteria for benthic habitat and EFH. Minor impacts may include the loss of a few individuals but impacts to sensitive habitats are avoided and, impacts that do occur, are short term or temporary in nature.

Comment #	Comment Text	Comment Category	Comment Response
21	Page 3-4_It is stated that Inspire Environmental identified four benthic habitat types in the area of direct effects. As noted above, the current definition of direct effect area is based on the maximum area of direct effects for one IPF (i.e. noise). Inspire Environmental has not identified benthic habitats within this maximum direct effect impact area, only the project lease area and cable corridor. The extent of habitats within the currently defined area of is "area of direct effects" has not been evaluated or presented. As previously stated, we do not feel that it is appropriate to use the "direct effects" area as currently defined to analyze impacts of IPFs other than noise effects, as other IPFs are not expected to extend beyond the project area. Such an approach, using a defined maximum direct effects area, makes it difficult to evaluate the effects of each IPF and compare those effects among the proposed action and project alternatives.	Benthic habitat, EFH, Inverts, and Finfish	BOEM has refined the impact area in coordination with NMFS. We will not use the size of the impact relative to impact area as a basis for making significance determinations. The FEIS is revised accordingly.
22	Page 3-7_On page 3-7, it should be clarified that the list of species and management groups provided are simply those that have designated EFH, not those that have designated EFH in the project area.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment, clarification will be added.
23	Page 3-7_As previously commented on in the cooperating agency review, HAPCs are a subset of EFH that may be determined by particular habitat types, or by a discrete area. For example summer flounder HAPC is anywhere within the mapped EFH for juvenile or adult where SAV or macroalgae occur (specific habitat type), but nearshore juvenile cod is MHW to 20 meters depth from ME to RI (discrete area within mapped EFH). The discussion of HAPCs should be updated to reflect this. In particularly the information should reflect that the juvenile Atlantic cod HAPC is a subset of the juvenile EFH designation as a discrete area (i.e. ME to RI from MHW to 20 meters depth) and is consistent with the HAPC designation within this discrete area wherever the habitat parameters identified in the text description are met.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment, clarification is added to Section 3.4.2.1.2 of the FEIS.
24	Page 3-8_At the top of page 3-8, it should be further stated that a portion of the proposed Cox Ledge Habitat Management Area directly overlapped with the proposed project. It would be beneficial to include or reference a map depicting overlap with the lease area and proposed management area.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment. Text in Section 3.4.2.1.2 of the FEIS is revised to acknowledge habitat value.
25	Pg 3-8_Currently, this section only references a NOAA newsletter (NOAA 2020a), at the top of the page as a source for information on a study of "commercial fish species use" of the SFWF. This reference includes a cod tagging and telemetry study, funded by BOEM., however no information on the study is presented. The importance of this research, particularly for understanding Atlantic cod spawning, in the Cox Ledge area should be emphasized. Instead of the NOAA reference for the study, a link to the study or other appropriate BOEM citation should be provided (https://www.boem.gov/sites/default/files/documents/environment/ environmental-studies/AT-19-08_ 0.pdf).	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment, clarification is added to Section 3.4.2.1.2 of the FEIS.
26	Page 3-8_It is stated in the last sentence of Section 3.4.2.1.2 that the outcome of the commercial fish use "study will inform future management decisions about Cox Ledge and surroundings." It is not clear what is meant by "future	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment, statement has been stricken.

Comment #	Comment Text	Comment Category	Comment Response
	management." Please clarify if BOEM intends to use data collected in this study to inform regulatory decisions and project evaluations. Specifically, there has been limited references in the DEIS to any preliminary data or information related to cod spawning in and around the project area.		
27	Page 3-8_On page 3-8 (first paragraph), mollusks need to be added to the list of soft sediment (non-complex) invertebrates, besides the commercial mollusk species mentioned in the last sentence. There are non-commercial infaunal mollusks species, especially in mud sediments, as well as some non-commercial epifaunal mollusks. Also missing are anthozoans, like burrowing anemones.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment, additional detail is included in Section 3.4.2.1.3 of the FEIS.
28	Page 3-8_On page 3-8 (second paragraph), sponges should be added to the list of invertebrates found on hard substrates, as well as hydroids and bryozoans.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment, additional detail is included in Section 3.4.2.1.3 of the FEIS.
29	Page 3-8_The last sentence of the second paragraph refers to squid eggs being laid in structured habitats, which is misleading. Longfin squid egg EFH also includes mud and sand habitats.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment, clarification is included in Section 3.4.2.1.3 of the FEIS.
30	Page 3-8_In the third paragraph it is stated that "detailed benthic mapping is underway." It is not clear what this is referring to, particularly if additional benthic mapping efforts are underway. If the intent is to describe BOEM's ongoing effort to further review the existing data, that should be clarified.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment. Benthic habitat mapping has been completed so the statement is no longer applicable and has therefore been stricken.
31	Page 3-8_On page 3-8 (fourth paragraph), the statement "Disturbance of benthic invertebrate communities by commercial fishing activities can impact community structure and diversity and limit recovery." is very general. BOEM should add that the severity of disturbance and rate of recovery is highly dependent/correlated with sediment type.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment, additional detail is included in Section 3.4.2.1.3 of the FEIS.
32	Page 3-9_This section references a number of different documents and tables that include information useful to characterizing finfish in the project area and region. We recommend the information and tables be incorporated into the NEPA document or include hyperlinks to the specific information being referenced.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your recommendation. The recommended table cannot be included due to page limitations; however, all cited Project documents are available to NMFS and the public with the FEIS at https://www.boem.gov/renewable-energy/state-activities/south-fork.
33	Page 3-9_It would be helpful to provide more information on the types of demersal and pelagic species expected to occur in the project area to better describe the affected environment. As this section only describes general characteristics of demersal and pelagic fish. All life history stages (i.e. eggs, laveae, juvenile, and adult) should also be considered.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your recommendation Section 3.4.2.1.4 of the FEIS is revised to include examples of demersal and pelagic species and life stages that use the affected environment.
34	Page 3-9/15 - We suggest adding a brief description of how the action overlaps with critical habitat designated for one or more of the DPSs of Atlantic sturgeon and include BOEM's conclusions regarding effects to critical habitat.	Benthic habitat, EFH, Inverts, and Finfish	Designated critical habitat is not present within the construction and operational footprint for the project as currently understood. The only potential for overlap with project activities would involve construction and maintenance vessel travel trips originating from U.S. ports within designated critical habitat. The only such port under consideration is the Paulsboro Marine Terminal on the Delaware River estuary in New Jersey, but the applicant has indicated that the use of this port is unlikely. Text in Section

Comment #	Comment Text	Comment Category	Comment Response
			3.4.2.2 of the FEIS is revised to acknowledge that construction and operational effects on sturgeon critical habitat is unlikely to occur.
35	Page 3-13, 3-14 - The section on Presence of Structures is inadequate with respect to the marine mammal section and the overall potential changes due to energy extraction from the near full build-out of wind farms associated with the no-action alternative. These changes could impact a host of other species besides protected species. Most of the text focuses on the impacts of individual structures, which, while important, are only part of the issue. The third paragraph in particular seems to reflect an incomplete understanding of the issue as it starts talking about the overall impacts of energy extraction (presumably on a shelf or wind farm level) and then shifts to effects of individual turbines. This sentence in particular seems to confuse the impacts of individual turbines and larger wind-farm or shelf build out scenarios: "The presence of wind turbine structures could reduce wind-forced mixing of surface waters and increase vertical mixing of water forced by currents flowing around the foundations (Carpenter et al. 2016; Cazenave et al. 2016; Schultze et al. 2020)." These two potential impacts are on two very different scales caused by different processes, it should at least be clarified at which scale each could occur and which is causing which (large scale wind farms or individual turbines). The remainder of the paragraph continues on about the potential effects of individual turbines. Particularly since this is in the no-action alternative section, the impacts of a large build-out should be discussed with additional detail and clarity (e.g., ".. reduced wind speed and stress leads to less mixing, lower current speeds and higher surface water temperature" as per Afsharian et al. 2020). Potential impacts to plankton distribution should be clearly discussed as their distribution, aggregation, and possible abundance may shift, and this could have a significant impact on North Atlantic right whales, among other large whales and plenty of planktivorous pelagic fish, as zooplankton are the primary source of prey for many higher trophic level organisms.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment. We acknowledge the potential implications of broad scale effects on ecosystem function should such effects result from the planned buildout of planned wind energy facilities on the mid-Atlantic OCS. However, the likelihood, extent, and significance of these potential effects remains unclear. We agree that localized effects on circulation and vertical mixing (e.g., Carpenter et al. 2016; Cazenave et al. 2016; Stegtnan and Christakos 2015) are related to but distinct from broader scale oceanographic and ecosystem effects and will revise Section 3.4.2.2.2 of the FEIS to clarify this distinction. While we can draw inferences about the potential for such effects from studies on windfarms in other countries (because no utility-scale projects currently exist in the United States aside from the relatively small Block Island Wind), the applicability of these observations is somewhat limited as most windfarms have been developed in environments with different oceanographic conditions from those present on the mid-Atlantic OCS. While we appreciate the potential implications of the Afsharian et al. (2020) findings for Lake Erie we question their applicability to the open ocean environment. The findings of Schultze et al. (2017, 2020) are potentially more informative. They modeled hydrodynamic effects of offshore wind foundations in different stratification environments comparable to those present in the project area and determined that wake turbulence and vertical mixing effects are relatively muted under strong stratification conditions, with enhanced forcing towards restratification in the wake region. This suggests that hydrodynamic effects and related ecosystem impacts may be relatively muted given the strong seasonal stratification present in the project vicinity. However, Schultz et al. (2020) caution that additional studies are necessary to more fully understand how offshore wind foundations affect stratified and well mixed systems, and how these effects are influenced by the number and spacing of foundations. Therefore, while the potential for broad scale hydrodynamic effects exists, it would be speculative to draw conclusions about the likelihood of changes in oceanographic conditions sufficient to cause cascading food web effects on large whales and other marine species. Even still, BOEM is currently funding a modeling study to examine impacts of wind farms on hydrodynamics in the region (https://www.boem.gov/sites/default/files/documents/environment/ environmental-studies/NSL-19-04.pdf) Section 3.4.2.2.2 of the FEIS will be revised to clarify the distinctions noted above and address uncertainty about potential for broad scale ecological effects under the no-action alternative.
36	p. 3-23 - "The radial distance within which injury could occur from driving an 11-m-diameter monopile with attenuation equipment (6-dB attenuation goal) and a hammer energy of 4,000 kilojoule (kJ) is provided in Table 3.4.2-3." The	Benthic habitat, EFH, Inverts, and Finfish	Text in Section 3.4.2.2.3 of the FEIS is revised for clarity.

Comment #	Comment Text	Comment Category	Comment Response
	footnotes in Table 3.4.2-3 reference modeling with 10-dB attenuation. This inconsistency should be addressed.		
37	Pgs 3-2 to 3-3 and 3-10_The document should clarify which significance criteria definitions are being considered in the analysis and in the ultimate conclusions related to anticipated level of impact for Benthic Habitat, EFH, Invertebrates, and Finfish. While Table 3.1.1-1 provides significance criteria for adverse impacts, additional criteria for Benthic Habitat, EFH, Invertebrate and Finfish are included in Table 3.4.2-1. It is not clear which significance criteria are being considered in the analysis and in the ultimate conclusions related to the anticipated level of impacts. More clarity should be provided related to how the significance criteria in both tables are being used to analyze impacts of the proposed action and alternatives.	Benthic habitat, EFH, Inverts, and Finfish	Significance criteria in Section 3.4.2 of the FEIS are refined for clarity. Please also see response to Comment 2.
38	Pg 3-10_Table 3.4.2-1 does not include an impact indicator for EFH for Underwater noise. We recommend including EFH, as this EFH is composed of both benthic habitats and pelagic habitats (i.e. water column). It is also not clear why EFH is considered not applicable for power transmission. Power transmission can emit EMF and heat in both the sediments and the water column. While BOEM considers impacts of these effects negligible, there are detectable effects of power transmission so it would not be appropriate to include “not applicable.”	Benthic habitat, EFH, Inverts, and Finfish	Table 3.4.2-1 is revised to include EMF/heat and noise as impact-producing factors for EFH. EMF and heat effects on EFH are considered in Section 3.4.2 of the FEIS (please also see response to comment 104).
39	Pg 3-10_In Table 3.4.2-1, BOEM should clarify the language describing "Increased Erosion" issue indicator language, as it is not clear. It should be clarified whether this issue/indicator is intended to assess the impact of suspended sediments resulting from erosion and/or to assess scour impacts on recolonization.	Benthic habitat, EFH, Inverts, and Finfish	Scour protection placement around the monopile foundations is expected to effectively prevent chronic erosion and associated suspended sediment effects. Table 3.4.2-1 is revised accordingly.
40	Pg 3-11_ Under the second paragraph, the document states “Hazardous materials that could be released include fuels, lubricating oils, and other petroleum products. These materials tend to float in seawater, so are unlikely to contact benthic or other seafloor resources.” Please provide citations for this statement; even if floating materials do not directly impact benthic resources, what about pelagic organisms and the life stages of benthic fish/invertebrates that have a pelagic phase?	Benthic habitat, EFH, Inverts, and Finfish	The applicant will adhere to BOEM and USCG requirements to avoid hazardous spills, and has included the development of a detailed spill response plan as an environmental protection measure (EPM) that would effectively minimize environmental impacts in the unlikely event of an accidental spill. These measures will avoid significant adverse effects on aquatic life. The text in Section 3.4.2.2 of the FEIS is revised for clarity.
41	Pg 3-10_Under Anchoring and new cable emplacement/maintenance section, describing the impacts as minor is not consistent with the definition of “minor” impacts in the NEPA document. As stated in the last sentence of the paragraph, impacts to SAV or hard bottom habitats could be more long term/permanent and such impacts would not meet the definition of minor. Consider revising the language or clarifying long term impacts to sensitive habitat could have more than a minor impact.	Benthic habitat, EFH, Inverts, and Finfish	See response to Comment 2. Characterization of impact extent and duration is revised for consistency in Section 3.4.2.2 of the FEIS.

Comment #	Comment Text	Comment Category	Comment Response
42	Pgs 3-11 to 3-12_Under EMF it is stated that “330 feet from other known cables … ensures that there are no additive EMF effects from adjacent cables.” A citation for this statement should be provided. It is further stated that: “Impacts would be highly localized and undetectable beyond the immediate vicinity of the cables, but localized effects would persist as long as the cables are in operation.” This assessment should be further expanded and supported with citations or reference and hyperlink more detailed analyses in other sections of the document.	Benthic habitat, EFH, Inverts, and Finfish	Modeling of EMF effects from the inter-array cable and SFEC (Exponent Engineering 2018 [COP Appendix K1]) indicates that induced magnetic and electrical field effects from either cable are below the lowest conceivable biological detection and physiological effects thresholds for any species group. Based on these findings and those for the Vineyard Wind project, it is reasonable to assume that EMF from other future offshore wind facilities would be similar. Additional details and documentation for this conclusion are provided in the responses below. As such, there is effectively no potential for additive EMF effects from parallel cables. Text in Section 3.4.2.2 of the FEIS is revised to clarify this and related findings with supporting references.
43	Pg 3-12_The effect of noise is described as causing EFH to be “unsuitable.” A clearer way to present the impact would be that there would be an adverse effect causing injury, mortality, and behavioral effects.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your recommendation. Text in Section 3.4.2.2 of the FEIS is revised for clarity.
44	Pg 3-12_This section states that the behavioral impacts to finfish and invertebrates would be 13.4 miles. However this is not consistent with the “direct effects" threshold of 8 miles presented on page 3-4 and consistent with Table 3.4.2-3 (41,818 feet), nor with the 84,233 feet determination presented in the evaluation of Cumulative Impacts of the Proposed Action on Page 3-31. There should only be one noise threshold distance for behavioral impacts to finfish and invertebrates for the document. Please update the document with the accurate noise behavioral impact threshold distance for all relevant sections.	Benthic habitat, EFH, Inverts, and Finfish	Impact area calculations in Section 3.4.2 of the FEIS were reviewed and are revised for consistency.
45	Pgs 3-12 to 3-13_This Noise section includes a good general discussion on the implications of noise impacts during spawning periods. However, this discussion is not presented in the evaluation of the project specific impacts under the proposed action or alternative evaluations. Further discussion is needed regarding the impacts of noise from the proposed project on finfish, particularly cod and squid, two commercially important species that spawn in this area and are sensitive to noise disruptions to spawning and feeding behavior.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment. The effect analysis for the alternatives in Section 3.4.2 of the FEIS is expanded to provide additional details on potential effects of species of interest. The text includes an acknowledgment of the potential for potentially significant auditory masking and behavioral effects on species like cod (Dean et al. 2012; Rowe and Hutchings 2006) and squid (Andre et al. 2011; Jones et al. 2020, 2021).
46	Pgs 3-12 to 3-13_We suggest including the following information where appropriate in this section: When induced noise by humans in the sea becomes loud enough, fish are killed or sustain temporal (temporal threshold shift, TTS) or permanent (permanent threshold shift, PTS) hearing loss. This is because high intensity sounds like explosive blasts, impact pile driving or air-guns, can damage internal organs leading to death or damage of the sensory hair cells in the otolith organs (reviewed in Popper and Hastings, 2009). https://www.diva-portal.org/smash/get/diva2:391860/FULLTEXT01.pdf	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your recommendation. Explosive blasts and air guns are not part of this project’s activities. Impact pile driving will be employed to install WTGs. Please see the benthic habitat, invertebrates, and finfish sections in 3.4.2.2.3 – Proposed Action Alternative in the EIS for detail on how noise is anticipated to affect these resources.
47	Pg 3-13_ Please insert citations for the geographic scale of the noise impacts.	Benthic habitat, EFH, Inverts, and Finfish	The geographic extent of noise impacts is an estimate based on the size of eligible lease areas, typical 1-nm turbine spacing, and the behavioral effect threshold distance for SFWF monopile installation. The latter is considered to be representative for the purpose of a generalized impact assessment. The text in Section 3.4.2.2.2 is revised accordingly.

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48	Pg 3-13_Under Port Utilization, the basis for the effects determination is not clear. The determination appears to be based upon the expectation that port utilization will include the expansion of existing ports. However, such an assessment does not appear to consider the potential for such expansions to occur in sensitive habitats or areas where expansions may result in substantial effects to one or more resources; or that such expansions may require substantial structural changes that result in a larger impact to, or complete loss of, resources within the existing port facility. More information should be provided to support the effects determination.	Benthic habitat, EFH, Inverts, and Finfish	Under the current project description the only proposed port expansion would occur at the Montauk O&M facility. Section 3.4.2.2.2 of the FEIS is revised accordingly.
49	Pages 3-14 to 3-15_ A discussion of impacts from dredging and disposal should be included. Itt should be noted that impacts may vary based on the time of year dredging occurs as well as the change in depth. While the document states that localized impacts would be high, it should also be noted that the level of impact in the larger geographic area will likely depend on the extent of dredging and the change in profiles.	Benthic habitat, EFH, Inverts, and Finfish	The only dredging currently proposed is construction and maintenance dredging at the Montauk O&M facility. The dredged material would be used for beach nourishment. Section 3.4.2.2.2 of the FEIS is updated to reflect this information.
50	Pg 3-13_It would be beneficial to discuss the potential of habitat conversion for juveniles as well and indicate that impacts may vary based on habitat type. While the majority of locations described may include conversion of soft bottom habitats, that is not the case for all lease areas.	Benthic habitat, EFH, Inverts, and Finfish	Section 3.4.2.2.2 of the FEIS is revised to provide the recommended context.
51	Pg 3-13_A broader discussion of the impacts from changing predator/prey relationships and habitat alteration is needed to identify which species may benefit or be harmed by the presence of structures.	Benthic habitat, EFH, Inverts, and Finfish	While predator prey relationships may change as a result of construction, operation, and decommissioning of the SFWF, it is outside the purview of this NEPA analysis to speculate as to how such changes may exhibit themselves in the natural environment.
52	Pg 3-13_The potential for invasive species to colonize from the presence of structures. While invasive species is included in accidental dispersal, the potential for colonization should be briefly discussed in this section.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for the comment. Text in Section 3.4.2.2.2 of the text is revised accordingly.
53	Sediment Deposition and Burial and Seabed Profile Alterations Pg 3-14_Please provide a clear definition of “local”.	Benthic habitat, EFH, Inverts, and Finfish	The text in Section 3.4.2.2.2 of the FEIS has been modified. The term “localized effects” has been stricken and is replaced with more specific language about the extent of potential effects from dredged material disposal.
54	Pg 3-14_It is stated that the impact would be insignificant because the deposition area of overlap would recover quickly. However, this does not appear to consider sensitive species or habitat types and does not track with the defined impact duration or significance criteria terminology. Additional discussion of the potential impacts of habitat conversion is necessary to identify affected species and the scale of impacts. The same is true for the impact determination for dredging. The document should state that impacts may vary by habitat types and use consistent impact terminology. Based on the defined significance criteria and duration definitions, impacts to sensitive habitats would appear consistent with “moderate” and “long-term.” The range of potential impacts (e.g. minor to moderate) should be clearly presented.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 2. The text in the no-action alternative analysis is revised for consistency with the revised analysis described in the response to Comment 71.

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55	Pg 3-15_This impact category is also not clearly addressed in each of the Action Alternatives. This may be a result of the change in formatting for particular subsections of each action alternative, and we recommend that the formatting is made consistent for each resource in this chapter under each action alternative. At a minimum this impact category should be evaluated for each resource under each action alternative.	Benthic habitat, EFH, Inverts, and Finfish	Formatting has been made consistent across action alternatives.
56	Pg 3-15_ The links from the IPF discussions to these Conclusion impact determinations are not clear. It would be beneficial to either include the duration and significance criteria determination in the discussion for each impact type (preferred), or state here what the determination is for each impact type.	Benthic habitat, EFH, Inverts, and Finfish	Please refer to the response to Comment 2.
57	Pg 3-16_ The determination that the resources would be expected to "recover completely" should be reconsidered, as it is not supported by the information provided. The resources will not be expected to recover completely - some likely will over time, others will be converted to a new altered state that will have some level of function. While this may not result in population level (major) impacts, the distinction should be made that long-term to permanent impacts are expected.	Benthic habitat, EFH, Inverts, and Finfish	The text in Section 3.4.2.2.3 of the FEIS is revised accordingly.
58	General to Section_Similar to the discussion in the No Action Alternative, insert a discussion of the impacts from the presence of structures in this section, including in the Essential Fish Habitat, Invertebrates, and Finfish sub-sections. This discussion should include reference to the impacts of turbines on the distribution and settlement of eggs/larvae. Alternatively, you could reference the cumulative impacts discussion on page 3-32.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your recommendation. Text in Section 3.4.2.2.3 is revised for clarity.
59	General to Section_In general, this section is not structured and organized consistently with the No Action Alternative above and is difficult to follow. Even subsections within this section are not consistently structured. It would be helpful to the reader to structure the other alternatives by impact producing factor similar to the No Action Alternative section above. Of particular concern is that some IPFs do not seem to be fully addressed under each biological resource, and it is difficult for the reader to compare each of the Action Alternatives to each other as well as the No Action Alternative. Further, there are a lot of different activities incorporated into each paragraph of the biological resource subsection. It may be helpful to the reader to break down the analysis by each construction activity. In the FEIS, the structure included under the No Action alternative should be followed for the proposed action and alternatives (breaking down each discussion by potential impact).	Benthic habitat, EFH, Inverts, and Finfish	These sections differ in layout because, under the No Action alternative, there are no additional impact mechanisms to assess. Under the action alternatives, the analyses of impacts are organized around resources and impact mechanisms which require some additional headers to help remind the reader of the subject under consideration. Such headers (e.g., Construction and Installation) would not make sense in the No Action alternative.
60	Pg 3-16_ We do not recommend the term "non-complex" be used to describe soft sediment habitats. Soft sediment habitats generally are less complex than hard sediment habitats, but as with all habitat types, soft sediment habitats have varying degrees of complexity. We recommend the use of "complex" and "soft sediment" habitats instead of "complex"and "non-complex."	Benthic habitat, EFH, Inverts, and Finfish	The benthic habitat characterization is revised in coordination with NMFS. The term "non-complex benthic habitat" category was retained in the FEIS.

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61	Pg 3-16_The impacted area values provided in Table 3.4.2-2 do not match the totals provided in Table 2.1.1-1 or 2.1.1-3, which reference the COP. Further, the calculated areas presented in this table do not reflect the impact area calculations presented in the assessments of impacts within this section. Should different considerations for a particular analysis result in a different impact area calculation, the assumptions or information considered should be clearly identified and discussed. We recommended all impact calculations be reviewed and made consistent in the FEIS.	Benthic habitat, EFH, Inverts, and Finfish	Impact quantities were reviewed and are revised for consistency in Table 3.4.2-2 of the FEIS.
62	Pg 3-16_Similar to the use of the term “unsuitable” to describe impacts to EFH, use of the phrase “exclude the use of benthic habitat” when describing impacts is not an accurate description of the impact. Species will not be “excluded” from the area, but the area will be adversely impacted and species (those that are able to) are expected to avoid the disturbed areas. The text should be updated to reflect this.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your recommendation. Text in Section 3.4.2.2.3 of the FEIS is revised for clarity.
63	Pg 3-16_It is stated that long-term impacts will affect 354.8 acres of benthic habitat within the SFWF in the first paragraph. However, this number is greater than the total long term impact for both the SFWF and SFEC in the table above (Table 3.4.2-2), and nearly 3 times the long term impact area calculation for the SFWF (126.8 acres). This discrepancy should be addressed.	Benthic habitat, EFH, Inverts, and Finfish	Impact quantities were reviewed and are revised for consistency in Section 3.4.2.2.3 of the FEIS.
64	Pg 3-16_It should be stated when the 4-month construction window is expected to occur. If time of year restrictions may be placed on this construction window to minimize impacts to spawning behavior and reproductive success for various species, such measures should be discussed and included in the Mitigation table in Appendix G.	Benthic habitat, EFH, Inverts, and Finfish	The FEIS reflects the most current project schedule. The project includes a range of mitigation measures to avoid and minimize impacts to the greatest extent practicable. Refer to Appendix G, Table G-1 for lessee-proposed environmental protection measures and Table G-2 for mitigation measures that BOEM will consider for incorporation in the Record of Decision.
65	Pg 3-16_The DEIS does not describe the process for preparing the seafloor for turbine construction and associated impacts. Given this is an impact of construction, the methods and anticipated effects associated with seafloor preparation should be described in the document. Furthermore, based on the information provided we know it is not possible for the proposed action to avoid boulder fields and hard bottom habitats so the impacts of this should be further discussed, and adequately reflected in the impact determinations, in the FEIS.	Benthic habitat, EFH, Inverts, and Finfish	Impact quantities in Section 3.4.2.2.3 of the FEIS include boulder relocation and seabed preparation methods as described in the COP. The revised benthic habitat characterization includes quantification of seabed preparation impacts.
66	Pg 3-17_The first paragraph on page 3-17 fails to account for the complexity of the habitat on Cox Ledge and in portions of the SFEC that are expected to be impacted by the project. A sentence was added at the top of the page stating in very general terms that “Complex habitats may take longer to recover but would still recover (HDR 2020)” but we could find nothing in HDR 2020 that addresses recovery of complex habitats. Further, conclusions based on information reported in HDR 2020 (“rapid recovery in non-complex habitats”) are not applicable to the Cox Ledge area. This report should be more thoroughly reviewed and summarized more accurately. It states that recovery of surface sediment scars was 41% complete within 14 months, this is not consistent with your provided definition of short-term effects. Sediments are much more complex in the more heterogeneous Cox Ledge area, so the habitat recovery data from Block Island	Benthic habitat, EFH, Inverts, and Finfish	Section 3.4.2.2.3 of the FEIS is revised to acknowledge the habitat value of Cox Ledge, and the characterization of habitat impacts is revised to reflect the updated benthic habitat characterization developed in coordination with NMFS. The discussion of complex benthic habitat recovery is revised consistent with our response to Comment 71, supported by reported observations at Block Island Wind Farm. HDR (2020) reported an increasing diversity of epifaunal species, including corals, sponges, mussels, and coralline algae, on hard structures at the BIWF four years after installation. These findings appear consistent with other research indicating that complex benthic habitats may take a decade or more to achieve functional recovery post-disturbance (Auster and Langton 1999; Collie et al. 2005;

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	would apply more directly to the sandier portions of the OECC rather than in the lease area. Further, this assessment of recovery only includes the physical component of habitat and does not address the biological components that can take decades to recover in complex hard substrates. Recovery evaluations should include an evaluation of both biological resources and physical habitat features. The analysis should acknowledge how long it may take these habitats to reach a completely recovered state and the variation in recovery times based on the habitat types that would be impacted. Any cited references for recovery times should consider the type of recovery (e.g. physical or biological) and the criteria used to evaluate recovery (e.g. particular species, species diversity). This evaluation should also consider the conversion of habitat types, particularly permanent losses of complex habitats.		Tamsett et al. 2010). Significance determinations presented in the FEIS are revised for consistency.
67	Pg 3-17_The suspended sediment information presented should be qualified by the source – the expected duration and impact area are based upon modelled estimates, not field verified, or from monitoring and/or peer-reviewed research. The information presented also does not address redeposition of suspended sediments to adjacent habitats. Redeposition is discussed below for the SFEC impact assessment but it is not clear why such an assessment is not provided for the inter-array cables where complex habitats are prevalent.	Benthic habitat, EFH, Inverts, and Finfish	The estimated duration extent of TSS effects are based on sediment dispersal modeling provided by the client (Vinhateiro et al. 2018). The text in Section 3.4.2.2.3 is revised to reflect that these are modeled estimates that comport with observed suspended sediment impacts resulting from the construction of the nearby Block Island Windfarm transmission cable (Elliot et al. 2017). This suggests that the assessment of potential sediment effects is representative. Additional details are provided regarding specific impacts resulting from inter-array cable construction.
68	Pg 3-17_The second paragraph on page 3-17, states that 573 acres of the SFEC would be impacted by cable laying activities, which does not align with the impact calculations presented in Table 3.4.2-2. It is also not clear what the percentage and larger acreage total are intended to convey. The fact that only 11.5% of the 4,944 acre designated cable corridor route will actually be impacted does not provide a meaningful analysis. If the project was minimized, or modified to reduce the impact area that should be presented. If there is some significance to this percentage it should be clearly discussed, otherwise we recommend removing it from the document.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 2. Impact quantities were reviewed and are revised for consistency in Section 3.4.2.2.3 of the FEIS.
69	Pg 3-17_The determination that impacts to finfish and invertebrates from redeposition of sediments of depths from 0.05 to 0.5 inches in depth is negligible does not appear to consider the effects of such burial depths to on particular managed species/life history stages (e.g. winter flounder eggs, longfin squid eggs), or sessile invertebrates (both to existing species and potential settlement and recruitment). The determination that impacts to these resources are negligible is not consistent with the provided definition. A determination of minor to moderate (soft sediment to hard sediment, respectively) impacts appears to be consistent with the significance criteria for this resource listed in Table 3.4.2-1.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for the comment. The impact assessment is revised accordingly. Please see response to Comment 89 for details.
70	Pg 3-17_The calculation for potential impacts from cable protection (179.3 acres) appears to be the only impact area calculation that is consistent with those presented in Table 3.4.2-2. However, as this number is stated to be the anticipated area for cable protection measures, it does not appear to account for long-term to permanent habitat conversion impacts that would occur from cable burial within hard habitats. Further, it is stated that the 179.3 acres of impact	Benthic habitat, EFH, Inverts, and Finfish	Impact quantities were reviewed and are revised for consistency in Section 3.4.2 of the FEIS.

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	would only account for 3.6% of the SFEC. This description is confusing and should be clarified. It was previously stated that only 11.5% (12.5% based on Table 3.4.2-2) of the SFEC will be impacted by cable laying. Based on the acreage provided, this appears to indicate nearly one third of the constructed cable is expected to require cable protection measures; it also appears that the calculation is only based on the extent of hard habitat. The habitat types, and extent of those habitat types, that are expected to require cable protection should be clearly described and presented.		
71	Pg 3-17_It is stated that over time the hard surfaces of cable protection materials will become colonized and provide similar functions as natural cobble and boulder habitats. No citations have been provided to support this statement. Supporting citations and further discussion to support this statement should be provided. Specifically, it would be helpful to describe the functions that are expected to be similar and what functions are expected to differ or be lost. The function of cable protection compared to natural habitats, including cobble and boulder, is highly dependent on the choice of materials and the composition of existing habitat types. The potential for colonization of invasive species should also be addressed. Furthermore, while the paragraph only discusses scour protection impacts on hard bottom, the last two sentences appear to solely focus on scour projection in soft bottom habitats. If soft bottom habitats (e.g. sand and mud) are expected to require cable protection, impacts and the conversion of habitat type should also be discussed. Additionally, it would not be expected that all hard bottom habitats would require cable protection. Cable burial in mixed sediment and smaller grained hard habitats would likely be feasible. The potential for cable burial to convert such hard bottom substrates to soft bottom (e.g. cobble and pebble habitats to sand) and soft bottom habitats to finer grained habitats (e.g. course sand to fine sand, fine sand to mud) should be addressed. The potential for depressions and loss of fines should also be discussed.	Benthic habitat, EFH, Inverts, and Finfish	The FEIS is updated with additional detail to address the identified concerns. With regard to complex benthic habitat, it could take a decade or more for introduced hard surfaces to become colonized by sessile organisms to the extent that they provide functional complex benthic habitat (Auster and Langton 1999; Collie et al. 2005; Tamsett et al. 2010). Concrete mattresses may take 3 to 12 months to fully cure after placement before the surfaces are suitable for colonization (Lukens and Selberg 2004). As such, the installation of these features would result in a diminishing intermediate-term adverse effect on the availability of complex fisheries habitat lasting up to 10 years. This lag effect would extend to non-complex habitats that are converted to hard bottom by scour and cable protection. The quantity estimates presented in the FEIS consider the likelihood that some areas soft-bottomed habitats may overly harder substrates preventing cable burial to target depths, per the geotechnical investigation presented in COP Appendix F. The potential changes in sediment composition (e.g., pebble to sand, sand to mud, dispersal of fines), and changes in the distribution of depressions are acknowledged but have not been quantified. These potential impacts will be discussed qualitatively.
72	Pg 3-17_ The determination that long-term impacts to benthic habitat functions would be minimal as they would make up a small percentage of the area of direct effect, does not appear to be supported. First, the “area of direct effect” is associated with noise effects rather than the area of anticipated effects to benthic resources. Further, as discussed in comments above, based on the provided numbers, nearly one third of the direct impact area for cable laying would require cable protection which is quite substantial. In addition, to restore benthic habitat functions, it would require mitigative measures to allow for recovery to an altered state.	Benthic habitat, EFH, Inverts, and Finfish	The analysis area is refined and clarified in the FEIS to more clearly characterize the extent and significance of benthic habitat effects.

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73	Pg 3-17_The statement that “direct, long-term adverse impacts to benthic habitat from cable burial would be negligible to minor, although local impacts to complex habitat may be moderate,” does not appear to fully consider the impacts to soft sediment habitats. As discussed in prior comments, the conversion of soft sediments to artificial hard substrates, as well as the recovery time of physical and biological components in soft sediments should be further evaluated. Similarly, the following sentences do not appear to be supported by the provided analyses: “Post-construction, benthic habitat would recover to conditions similar to the existing baseline. Therefore, potential adverse impacts to benthic habitat from the conversion of soft bottom to hard bottom are considered minor.” Given the assessment that nearly one-third of the cable corridor will require cable protection, combined with the potential for additional habitat conversions in areas where cable protection is not necessary, the rationale for the determination that benthic habitats would recover to conditions similar to the existing baseline conditions is clear and should be fully discussed. Please see prior comments on impact significance determinations.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 71. With regard to impact quantities, approximately 0.07 to 0.12 acres of non-complex benthic habitat could be displaced by the monopiles, and 2.7 to 5.4 acres would be modified by the placement of scour protection, depending on the pile diameter selected. Approximately 105.5 to 126.5 acres of non-complex benthic habitat would be modified by concrete mattress placement for inter-array cable and SFEC protection, depending on the SFEC route alternative selected. The significance determination and supporting rationale are revised per your recommendation.
74	Pg 3-18_The evaluation of the proposed O&M facility states that finfish and invertebrates will be “excluded” from the area during construction. Similar to prior comments, species will not be excluded (unless rigid embedded exclusion devices are employed), but the construction would result in injury and mortality, and behavioral impacts (e.g. avoidance). The text should be revised to reflect this.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your recommendation. Text in Section 3.4.2.2.3 is revised for clarity.
75	Pg 3-18_It is further stated the proposed dredging will only occur within the existing dredge footprint and therefore will not result in a substantial change in the disturbance pattern of benthic habitats. However, it was previously stated that the current dredge cycle is every four to five years. The proposed dredge modification is stated to require annual maintenance dredging. Such a change will have implications for the recovery (or lack thereof) of benthic resources within the dredge footprint. These changes should be fully evaluated and presented.	Benthic habitat, EFH, Inverts, and Finfish	The impact assessment is revised to reflect this important distinction.
76	Pg 3-18_ The determination that suspended sediments would result in negligible impacts does not appear consistent with the significance criteria definitions provided for EFH. Suspended sediments result in adverse impacts to EFH and may require mitigative measures to minimize impacts.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comments 71 and 89. Hydroplow/jet plow installation of the transmission cables was selected as a project EPM specifically because this method minimizes sediment suspension and associated water quality and sedimentation impacts (please see Appendix G, Table G-1). We are not aware of other practicable mitigation measures for cable installation.
77	Pg 3-18_ The statement that summer flounder HAPC is limited to SAV is not accurate. The summer flounder HAPC also includes all areas of macroalgae within designated juvenile and adult summer flounder EFH. The assessment of potential impacts to summer flounder HAPC should be revised accordingly.	Benthic habitat, EFH, Inverts, and Finfish	In this context, SAV includes algae. Text in Section 3.4.2.2.3 is revised for clarity.

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78	Pg 3-18_ It is stated that measures will be employed to avoid impacts to SAV during construction, but only measures to avoid impacts to SAV during HDD activities are referenced as included in Appendix G. This should be revised to include measures to avoid SAV impacts during all stages of construction.	Benthic habitat, EFH, Inverts, and Finfish	The text is revised accordingly. Impacts on SAV would be avoided to the extent practicable through cable route adjustments during installation.
79	Pg 3-18_It is stated that project structures will “slightly” increase EFH for species that use hard bottom substrates, and “slightly” decrease EFH for species that utilize soft-sediment habitats. Foundations, and scour and cable protection should not be equated to hard bottom habitat. Artificial hard bottom habitats are designated EFH for a select few managed species (i.e. black sea bass, red hake), but are not included as EFH for the majority of managed fish species with hard habitats included in their text descriptions. Foundations would only increase EFH for those species with artificial habitat designated as EFH, and scour and cable protection would need to include natural hard habitat materials and features to result in an increase in EFH for all other managed fish species with hard habitats included in their text description. As previously stated, the potential for scour and cable protection materials to provide similar habitat functions to natural hard habitats is highly variable and would require mitigative measures to be employed. The discussion of impacts to EFH should be revised to reflect these considerations.	Benthic habitat, EFH, Inverts, and Finfish	References and additional context are provided in Section 3.4.2.2.3 of the FEIS.
80	Pg 3-18_Micrositing of WTGs and cables is included as a method to minimize impacts to EFH. It is not clear what extent this option is being considered under the Proposed Action. Further discussion of this measure should be provided. This distinction will be important in evaluating the Proposed Action to the Fisheries Habitat Minimization Alternative.	Benthic habitat, EFH, Inverts, and Finfish	Micrositing would be used to minimize impacts to complex fisheries habitat under the Fisheries Habitat alternative.
81	Pg 3-18_The Essential Fish Habitat section should be revised to better assess impacts to EFH in the project area. The conclusions related to impacts to EFH are not supported and do not meet the definitions. NMFS will work with BOEM as they prepare an updated EFH assessment to ensure sufficient information and analysis is provided to initiate consultation. The information from that update EFH assessment should be incorporated into the FEIS.	Benthic habitat, EFH, Inverts, and Finfish	The FEIS reflects the revised EFH assessment submitted to NMFS in April 2021.
82	Pg 3-18_ Underwater noise is an impact to EFH and should be included in the evaluation of the proposed action to EFH. This evaluation should include a discussion of the impacts to cod spawning areas on Cox Ledge, which is in close proximity to the project area and could overlap with the area that would result in behavioral disturbance from construction noise.	Benthic habitat, EFH, Inverts, and Finfish	Construction noise impacts are presented as a short-term impact on EFH. For the purpose of noise impact assessment, cod and other gadids are considered "hearing specialists", belonging to the group of fishes having a swim bladder physiologically connected to the inner ear and involved in hearing (per Popper et al. 2014). The FEIS emphasizes cod as a species of particular concern and acknowledge that changes in ambient noise can interfere with communication and could potentially disrupt spawning activity (Dean et al. 2012; Rowe and Hutchings 2006). The bulk of cod spawning occurs from November to April. As stated in Appendix G, Table G-1, lessee-proposed project EPMs include a measure that states that no impact pile driving will occur during this period to avoid impacts on NARW. This would effectively avoid the most significant potential underwater noise effects on cod spawning.

Comment #	Comment Text	Comment Category	Comment Response
83	Pg 3-19_Under the Invertebrates section, it is stated that anchor scars are expected to recover to baseline conditions within 18 months to 2 years, based on post-construction monitoring at the nearby BIWF (HDR 2018), but also says that scars associated with jet plow cable installation are expected to recover in a matter of weeks, allowing for rapid recolonization (MMS 2009a). Recovery times of 18 months to 2 years are not consistent with the provided definition for temporary impacts, since they would last beyond the construction phase of the project. It is also not clear why another EIS is being utilized as a reference. Multiple studies have documented the persistence of anchor and jet-plow scars and depressions for years post-construction. Additional citations and further evaluation of these statements and evaluations should be provided. Further, these conclusions belong more appropriately in the Benthic Habitat section since they relate to the recovery times of physical habitat features, not associated invertebrates. We recommend that this section focus on the impacts and recovery times of infaunal and epifaunal invertebrates that are affected by the various construction activities.	Benthic habitat, EFH, Inverts, and Finfish	Section 3.4.2.2.3 of the FEIS is revised to address this inconsistency. Benthic community structure is expected to recovery within 18–24 months following disturbance by anchors and hydroplow cable installation based on the responses observed at BIWF (HDR 2018) and in other environments (de Marignac et al. 2009). Anchoring and cable trenching may also alter the seabed by creating temporary depressions, but these features are not likely to persist over long time periods as sand and mud sediments on the mid-Atlantic OCS are continually reshaped by winter storms (Butman and Moody 1983; Daylander et al. 2013). The time required for benthic habitat recovery will depend on the timing of disturbance relative to subsequent winter storm events and recolonization of the affected area by habitat forming organisms. The resulting effects on EFH will vary depending on how each EFH species uses these habitat features. For example, hydroplow trenching during cable installation would flatten depressions and small sand waves and kill or displace habitat forming organisms like worm and amphipod tubes, which provide habitats used by silver hake larvae and juveniles (Langton et al. 1995). Recolonization and recovery of these habitats could take up to 24 months, as described above. In contrast, species like lobster, red hake, and skates actively dig depressions in the substrate that they use as habitat (Langton et al. 1995). The pits and shallow troughs created by construction disturbance might provide similarly attractive habitat, therefore these species would not be negatively affected by temporary disturbance.
84	Pg 3-19_ The habitat alteration discussion should also discuss the alteration of complex habitats which are quite substantial in the project area and can range from gravels, cobbles, and large boulders. This discussion tends to only focus on recovery of soft bottom habitats. In addition, while it is important to discuss the potential for impacts to squid eggs given their demersal nature, it will be difficult to establish no-anchor areas around a squid spawning area as spawning may occur throughout the project area. It is also not clear if this is a proposed mitigation measure to minimize impacts to squid egg mops. The analysis of impacts to invertebrates does not appear to meet the definition of negligible impacts, as it describes measurable effects.	Benthic habitat, EFH, Inverts, and Finfish	Please see our responses to Comments 2, 71, 73, and 83.
85	Pg 3-19_Under the invertebrate habitat conversion discussion, include a discussion of the indirect impacts of predator/prey relationships due to changing habitat conditions and species composition. For example, increasing hard bottom habitat could increase the presence of both lobsters and black sea bass, but also increase the predation of lobsters by black sea bass.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your recommendation. We provide some representative examples of potential changes in predator/prey interactions at a level of detail consistent with NEPA requirements. The suggested example is useful as HDR (2020) documented a significant increase in black sea bass abundance around the foundations of the BIWF 3 years post-installation, which would in turn indicate the potential for increased lobster predation. However, it is unclear if the observed changes represent an actual increase in black sea bass abundance or a concentration of existing abundance around desirable habitat. Section 3.4.2.2.3 of the FEIS is revised to provide useful context.

Comment #	Comment Text	Comment Category	Comment Response
86	Pg 3-19_ The technique to relocate boulders should be presented in the document, or a hyperlink to the applicable section in the COP should be provided. The impact assessment of boulder relocation does not appear to consider potential impacts to surrounding hard habitats in areas where boulder relocation would be necessary, or the potential for colonization by invasive species. The discussion should be revised to include these evaluations and assessments.	Benthic habitat, EFH, Inverts, and Finfish	Boulder relocation and seabed preparation methods and impacts are reflected in the final impact quantities summarized in the FEIS.
87	Pg 3-19_ The assessment of impacts within the Montauk O&M facility for the conversion of soft to hard habitats is not clear. It was previously noted that there would be the addition of a new bulkhead and piles; if this is the basis for the evaluation that should be clarified. While this will be a small area of impact, there are many studies on fouling communities versus natural hard habitat communities that would better describe the expected effect and would be beneficial to include in the impact analysis.	Benthic habitat, EFH, Inverts, and Finfish	The revised project description for the O&M facility no longer includes bulkhead improvements. Section 3.4.2.2.3 of the FEIS reflects the projected effects of the current project design.
88	Pg 3-19_ In the Direct Mortality section, the analysis of cable-laying on benthic invertebrates should be improved by providing more details regarding the impacts of jet plowing in soft sediment which has other habitat effects such as fluidization and re-sorting of sediments in the trenches that can adversely impact habitat quality for re-colonizing species. Studies done on the habitat impacts of hydraulic clam dredges which penetrate sand and gravel sediments to a depth of 10-12 inches with pressurized water show that re-colonization of benthic invertebrates is relatively rapid, but it takes years before the original infaunal community is completely restored. (See Gilkinson, K.D. et al. 2005. Immediate impacts and recovery trajectories of macrofaunal communities following hydraulic clam dredging on Banquereau, eastern Canada. ICES J. Mar. Sci. 62: 925-947). Further, it is acknowledged that some invertebrates on hard substrates take longer to recover and there is a range of recolonization and recovery rates depending on the substrate type . However, recovery is dependent on the metric and species used to evaluate recovery. Cable installation in hard bottom areas would have more than temporary effects, especially on longer-lived epifaunal species (e.g. sponges, anemones) that attach to hard substrates and would be dislodged or buried by jet plowing. It could take several years to decades for benthic communities in cable corridors to recover completely from benthic disturbance. Given that, it is unclear why direct mortality is ranked as having a negligible impact.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for the reference. Please see response to Comment 83 The impact assessment and determinations are revised accordingly.

Comment #	Comment Text	Comment Category	Comment Response
89	Pg 3-19_ The evaluation of Direct Mortality and Water Quality do not include an analysis of re-deposition of sediments on demersal squid eggs and sessile invertebrates/hard substrates where such impacts may result in direct mortality, or short-term to long-term impacts to invertebrates depending on the sediment composition As previously commented, recovery times are highly variable based on the impact type, sediment type, and baseline community composition. An analysis of impacts from turbidity and sedimentation should be included and indicate that impacts to fish and invertebrates may vary depending on time of year the activity is occuring, and should discuss the demersal life stages, including eggs and larvae, that may be more vulnerable to impacts.	Benthic habitat, EFH, Inverts, and Finfish	Section 3.4.2.2.3 of the FEIS is revised to address these impacts in more detail. The modeled sediment impacts presented in the COP (Vinhateiro et al. 2018) indicate that hydroplow trenching for inter-array cable and SFEC construction could produce burial depths exceeding 0.1 and 0.4 inches over an estimated 2,268 and 464 acres, respectively. Burial depths between 0.4 and 1.2 inches (10 and 30 mm) are associated with sublethal to lethal effects on benthic invertebrates (Wilber and Clarke 2001; Yang et al. 2017). While sensitivity varies widely, egg and larval life stages are particularly sensitive and can experience sublethal or lethal effects from as little as 0.4 inch (10 mm) of sediment deposition (Kjelland et al. 2015; Michel et al. 2013; Wilber and Clarke 2001). Certain species, like winter flounder, are highly sensitive to sediment deposition and can experience mortality at burial depths less than 0.1 inch (3 mm) (Michel et al. 2013). The modeled sediment dispersal estimates comport with observed sediment impacts resulting from the construction of the nearby Block Island Wind Farm transmission cable (Elliot et al. 2017), indicating that these estimates are representative of potential water quality impacts.
90	Pg 3-21_The conclusion of construction noise from pile driving having a “negligible to minor” effect on invertebrates is not strongly supported in the analysis in the preceding paragraphs especially given that squid spawn in the area of direct effect. Roberts and Elliott (2017) provides a good review of vibration effects on invertebrates.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for the Roberts and Elliot (2017) recommendation. Please see response to Comment 2. Section 3.4.2.2.3 of the FEIS is revised to incorporate the information summarized, which suggests that behavioral effects on benthic invertebrates could extend up to 500 meters from impact pile-driving activities. The potential physiological implications of these behavioral responses will also be discussed. This should provide an appropriately precautionary assessment of potential effects from project construction. The effects of non-impulsive vibration from WTG operations are less clear; however, the fact that foundations are readily colonized by sessile invertebrates in abundance suggests that these effects are insignificant.

Comment #	Comment Text	Comment Category	Comment Response
91	Pg 3-22_ Insert a discussion about habitat conversion under the finfish section. Finfish are both directly and indirectly (predator/prey relationships) affected by habitat conversion from the proposed action. Also, discussions of noise should also consider the timing of that noise. As noted previously, if noise occurs during spawning season and disrupts spawning activity, noise over the distances identified in Table 3.4.2-3 could have short and long-term impacts on certain species such as cod.	Benthic habitat, EFH, Inverts, and Finfish	Section 3.4.2.2.3 is revised to include discussion of the broader effects of habitat conversion by offshore structures like WTGs on predator/prey relationships. The reef effect associated with offshore wind structures is likely to increase biomass and productivity, leading to increases in abundance of certain fish species and changes in biological community structure on and around the structures (Degraer et al. 2020; Methratta and Dardick 2019). For example, researchers monitoring the biological effects of the BIWF observed a substantial change in the biological community on the structures and the surrounding sediments, and a large related increase in biological productivity. Black sea bass are attracted to both the structure provided by the turbine foundations and the increased prey availability the support, and their abundance has increased significantly within the windfarm footprint (Hutchinson et al. 2020). Similar biological hotspots have formed at virtually every offshore wind facility, leading to changes in biological productivity and fish species distribution and abundance (Causon and Gill 2018; Degraer et al. 2020). As offshore wind expands these hotspots will become more numerous and broadly distributed, providing stepping-stones that could support range shifts or range expansion by both native and non-native species. The presence of these stepping stones could be beneficial if it helps native fish species shift their range to adapt to changing climatic conditions, or potentially negative if they support species invasions that disrupt native ecosystems. While non-native species have been observed at offshore wind facilities including the BIWF (Degraer et al. 2020; Hutchison et al. 2020), broader threats to native ecosystems have not been observed (Degraer et al. 2020). On balance, the increased biological productivity generated by reef formation on offshore wind farms is likely to produce a beneficial effect on some finfish species. These beneficial effects could be offset if vulnerable populations become concentrated in areas that are less favorable for reproduction or that increase exposure to predation. Regarding noise effects, please see responses to Comment 82.
92	Pg 3-22_ Under the Finfish section, the discussion of water quality should also include information about demersal eggs and larvae when discussing the effects of turbidity and sedimentation.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 89. Section 3.4.2.2.3 of the FEIS is revised accordingly.

Comment #	Comment Text	Comment Category	Comment Response
93	Pg 3-22_While the Noise section provides an overview of potential noise impacts, it does not discuss these impacts relative to the project area. Atlantic cod are known to spawn on Cox Ledge, and disruption to spawning events could result in greater impacts. Given the current status of the stock, impacts to cod spawning could result in more substantial impacts and should be fully considered. This section should discuss how pile driving may or may not overlap with those spawning events. BOEM should consider incorporating a discussion of the on-going telemetry study of cod spawning in the vicinity of Cox Ledge, including any preliminary results. (See comment about this study and a link to the proposal in Section 3.4.2.1.2). It is also not clear why there is reference to marine mammals and sea turtles when this section is focused on environmental consequences to finfish.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 82. Section 3.4.2.2.3 of the FEIS references reconnaissance-level surveys to determine Atlantic cod use of the project area and vicinity as spawning habitat (Inspire Environmental 2019, 2020b), and the ongoing study funded by BOEM (#AT-19-08) of commercial fish species use of the SFWF and surroundings to address these and related uncertainties (BOEM 2019). The latter includes a tagging and telemetry component to characterize how cod use Cox Ledge and surrounding habitats during their life cycle. The inappropriate reference to marine mammal and sea turtle resources was removed. The reconnaissance-level surveys of Atlantic cod may be accessed at https://www.boem.gov/renewable-energy/state-activities/south-fork. A profile of the BOEM-funded study (#AT-19-08) may be accessed at https://www.boem.gov/sites/default/files/documents/environment/environmental-studies/Movement%20Patterns%20of%20Fish%20in%20Southern%20New%20England_0.pdf.
94	General to Section_More detail should be provided in terms of species impacted and the degree of that impact. In many instances, there are only general references to species groups (i.e., invertebrates or hard bottom species) and ranges of impacts (months to years, or shorter and longer periods), without the detail necessary for the reader to reach a conclusion about the actual anticipated impacts on individual species and the scale of those impacts (see discussion on pages 3-19 to 3-20). Identify which invertebrate species may take years to recover from the placement of the export cable to help the reader identify the importance of such impacts.	Benthic habitat, EFH, Inverts, and Finfish	Section 3.4.2 of the FEIS is revised with descriptive examples for specific species, as detailed in the responses to related comments above and below.
95	Pg 3-25_General to Operations and Maintenance and Conceptual Decommisssioning_Conceptual decommissioning is a separate process and should be covered in a separate section.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your recommendation. BOEM has not reorganized the document to maintain an organization similar to the DEIS.
96	Pg 3-25_ Under Operation and Maintenance and Conceptual Decommissioning, Benthic Habitat, there is limited discussion related to the potential for invasive species to populate impacted hard bottom habitats. In addition, the benefits of adding scour protection will vary depending on the habitat to be impacted and that should be discussed. Again, the habitat in this location is particularly complex and heterogeneous. The impacts of both project construction and operation may vary widely depending on the habitat types in and around the impact area. The analysis of impacts should better describe potential impacts to development in these complex and heterogeneous habitats.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comments 15, 66, 71, and 91.

Comment #	Comment Text	Comment Category	Comment Response
97	Pg 3-25_The potential benefits from anticipated reef effects from the conversion of soft bottom habitats to hard substrates through foundation, cable and scour protection are well presented. However, the potential adverse effects (e.g. attraction of large predators) are not fully described and should be further evaluated and included in the analysis. The discussion regarding the artificial reef effect should be reframed to convey that the conversion to hard bottom habitat will have winners and losers. Currently, the text suggests that the artificial reef effect will be a net benefit for the system overall. Causon and Gill (2018) is used to support the statement that biodiversity will have "beneficial habitat effects for some species". However, this paper also states that, "whether changes in biodiversity will have positive, negative or neutral effects on ecosystem services is unclear, as is the magnitude and extent of such effects," and Causon and Gill (2018) go on to underscore the importance of considering changes in "functional diversity". Danheim et al. (2020) is also cited in the text in support of the artificial reef having a beneficial effect; however, this paper also highlights the potential for artificial reefs to contribute to the establishment and range expansion of non-native species. I recommend reading the recently published Degraer et al. (2020) which also explores the complexities of the artificial reef effect.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your recommendation. Text in Section 3.4.2.2.3 is revised to include this perspective.
98	Pg 3-25_As previously commented, a change to annual dredging from periodic dredging every 4-5 years may be a substantial change and we recommend that the impacts from such a change are more fully evaluated.	Benthic habitat, EFH, Inverts, and Finfish	The text in Section 3.4.2.2.3 of the FEIS reflects the change in disturbance frequency.
99	Pg 3-25 and 3-26_ Under both the Benthic Habitat and EFH sections, it is not clear how the conclusion of negligible to minor impacts from decommissioning was determined. The impacts described do not appear to meet the definition of negligible impact. Further, the analysis on page 3-26, assumes the lease area is all soft sediment that will be impacted. That does not accurately describe the project area or appropriately analyze the impacts to development on Cox Ledge. This section should be modified in the FEIS.	Benthic habitat, EFH, Inverts, and Finfish	The decommissioning analysis incorporates refinements to the significance criteria as discussed in the response to Comment 2, and the revised benthic habitat characterization and impact analysis developed by BOEM and the applicant in coordination with NMFS. Impact quantities are updated accordingly.
100	Pg 3-26_ It is not clear what the stated loss of 50.2 acres of reef effect by returning to soft sediments is based upon. Cable protection was previously stated to be 179.3 acres, this would suggest that the majority of cable protection is expected to occur within existing hard habitats. The following paragraph below in the EFH section states that within the SFWF area there will be 176 acres of soft to hard conversion. Further, the stated 176 acres of soft bottom to hard bottom habitat is not consistent with Table 3.4.2-2 which states only 128.6 acres of long term impacts. The extent of habitat conversions, by habitat types, from project construction and decommissioning should be clearly presented in all applicable sections.	Benthic habitat, EFH, Inverts, and Finfish	Impact quantities were reviewed and are revised for consistency in the FEIS.
101	Pg 3-26_ Please see prior comments regarding the addition/loss of EFH for managed species and revise the evaluation of benefits/impacts to managed species EFH through the creation of artificial hard habitats accordingly.	Benthic habitat, EFH, Inverts, and Finfish	Section 3.4.2.2.3 of the FEIS is updated for consistency with the revised EFH assessment and the responses to preceding comments provided above.

Comment #	Comment Text	Comment Category	Comment Response
102	Pg 3-26_ As stated in our cooperating agency comments, the document should not use a Biological Opinion from a previous project to reference impacts of this project. . This section also appears to only consider impacts at the regional scale, but impacts to hydrodynamics will have implications for species use (temporal and spatial) and colonization at the project impact scale and such impacts should be addressed and discussed. Specifically, the following statement should be re-evaluated: "significant hydrodynamic effects are unlikely because the monopile foundations would be widely spaced". Effects on hydrodynamics at both local and broad scales are possible. Locally, downstream turbulence, surface wave energy, and upwelling patterns are modified as currents pass by structures (Bakhoday-Paskyabi et al., 2018; Clark et al., 2014), while at broad scales wind wakes may affect patterns of vertical stratification (Carpenter et al., 2016) up to 10s of km from the wind farm with potential implications for nutrient distribution, primary, and secondary production (see van Berkel et al., 2020 for review).	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 35 for your reference recommendations (incorporated therein). The discussion of hydrodynamic effects in Section 3.4.2 is revised accordingly, recognizing that considerable uncertainty remains with regard to the potential geographic extent and significance of these effects.
103	Pg 3-26_ Please see our prior comments on the change in disturbance patterns for the dredge location from every 4-5 years to annual.	Benthic habitat, EFH, Inverts, and Finfish	Please see responses to Comments 45, 75, and 98.

Comment #	Comment Text	Comment Category	Comment Response
104	Invertebrates Pg 3-27_Please include some discussion on the effects of heat from cables and operational sound. Pg 3-27_ Information related to the distance of the eelgrass beds from the O&M dredge footprint should be provided, particularly if they may be impacted by indirect turbidity from dredging activity. As previously noted, summer flounder HAPC is not restricted to SAV, macroalgae habitats are also consistent with the designation and impacts to such habitats should be evaluated.	Benthic habitat, EFH, Inverts, and Finfish	Text in Section 3.4.2.2.3 of the FEIS is revised to include a discussion of cable heating effects on benthic invertebrates and invertebrate life stages. Hughes et al. (2015) and Emeana et al. (2016) evaluated the thermal effects of buried electrical transmission cables on the surrounding seabed. They determined that the surrounding water would rapidly dissipate heat from exposed cable segments, resulting in minimal heat effects on the underlying substrates. In contrast, buried cables can significantly increase the temperature of the surrounding sediments, with the magnitude and extent of heating effects varying depending on transmission voltage and sediment permeability. In medium to low permeability sediments (e.g., sand and mixed sand/mud), the typical buried HVAC electrical cable will heat the surrounding sediments within 1.3 to 2 feet (0.4 to 0.6 meters) of the cable surface by +10 to 20°C above ambient conditions with effects diminishing rapidly at greater distance. Substrate temperature changes of this magnitude could adversely affect habitat suitability for juvenile and adult life stages of infaunal species like Atlantic surf clam and ocean quahog (Acquafredda et al. 2019; Harding et al. 2008). However, because the inter-array cable would be buried to a minimum depth of 4 to 6 feet (1.2 to 1.8 meters) along the majority of its length and most benthic infauna are found at depths of less than 2 feet, heat effects from buried cable segments would likely be insignificant. Cable segments at the transitions between fully buried and exposed cable segments would be buried at shallower depths, potentially exposing quahog and surf clam habitat and infaunal prey species to adverse thermal effects. Based on conceptual designs for the exposed cable segments (COP Appendix G2), these shallow buried segments would account for approximately 10 percent of exposed cable length. Note however that suitability of these habitats for benthic infauna would also be negatively affected by the overlying concrete mattresses so the areal extents of these two impacts are not additive. With regard to O&M facility dredging, the closest documented SAV beds occur along the eastern shore of inlet to Lake Montauk, approximately 375 feet (114 meters) at closest distance to northwest corner of the facility, and in the northwestern portion of Lake Montauk proper approximately 900 feet (275 meters) from the southeast edge of the O&M facility footprint (NYSDEC 2018; Stantec 2020b; NPV 2014; USACE 2019). Please see response to Comment 77 regarding summer flounder HAPC. In this case the term “SAV” was intended to be inclusive of macroalgae. The FEIS text is revised for clarity.
105	Pg 3-27_ The effects determinations for decommissioning and combined effect determinations for O&M and decommissioning are not well supported and do not appear consistent with the defined significance criteria. Further evaluation of the effects and review of the effects determinations would be beneficial.	Benthic habitat, EFH, Inverts, and Finfish	The decommissioning effects discussion in Section 3.4.2.2.3 of the FEIS is revised for consistency with the revised significance determinations described in our responses to the previous comments.

Comment #	Comment Text	Comment Category	Comment Response
106	Pg 3-27_ It would be beneficial to reference this more detailed EMF discussion in prior sections where EMF impacts are discussed.	Benthic habitat, EFH, Inverts, and Finfish	This content is reorganized in Section 3.4 of the FEIS to provide a more logical flow.
107	Pg 3-27_ The effects determination of negligible does not appear consistent with the provided definition. It would appear that the effect determination would be at least minor, some impacts would be expected but mitigative measures (burial) could address the impacts.	Benthic habitat, EFH, Inverts, and Finfish	Please see responses to Comment 2 and subsequent related comments.
108	Pg 3-28_The paragraph on the top of page 3-28 does not include any discussion of the fact that natural hard and complex structures, including smaller grain habitats, like cobbles and small boulders may be replaced by large grain artificial structures. Again, any discussion related to artificial reefs should acknowledge the complexity of the existing project area.	Benthic habitat, EFH, Inverts, and Finfish	The text in Section 3.4.2.2.3 of the FEIS is revised to reflect the fact that some coarse-grained substrates will be displaced by larger-grained materials, including concrete as well as angular natural rock.
109	Pg 3-28_The potential for non-native species establishment and range expansion is briefly mentioned. There is literature on the “stepping stone” concept (Coolen et al., 2020) and evidence for the presence of a non-native tunicate at Block Island Wind Farm (Hutchison et al., 2020) that should be noted in the discussion of this topic.	Benthic habitat, EFH, Inverts, and Finfish	Please see responses to Comments 91 and 96.
110	Pg 3-28_Potential consequences for changes in sediment nutrient enrichment, organic content, and size should be discussed in more detail. This will change the prey field for species that forage for sediment epifauna and infauna in proximity to the structures.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 91.
112	Pg 3-28_ Please see prior comments regarding the change in dredge frequency to annual dredging from the existing 4-5 year cycle. This change in benthic disturbance would be expected to have a substantial effect on invertebrates in the dredge footprint	Benthic habitat, EFH, Inverts, and Finfish	Section 3.4.2.2.3 of the FEIS reflects the change in disturbance frequency.
113	Pg 3-28_ The effects determinations for invertebrates from decommissioning do not appear to be supported in the analysis provided. Specifically, it was previously determined that the “reef effect” could result in potential benefits which would be lost under the described decommissioning actions. Further, even without consideration of the potential beneficial reef effects, there will be a habitat conversion from which invertebrates would be unavoidably impacted and recovery would be required. Such effects do not appear to be consistent with the short-term or negligible effects definitions provided for this resource.	Benthic habitat, EFH, Inverts, and Finfish	The discussion of decommissioning effects in Section 3.4.2.2.3 of the FEIS is revised to more clearly articulate these effects, consistent with the revised application of significance thresholds, as described in responses to previous comments. In general, the removal of structures and materials would result in minor to moderate effects, should these structures support a significant reef effect as described in responses to Comments 15, 66, and 71. Recovery periods following disturbance would also be comparable to those described above.

Comment #	Comment Text	Comment Category	Comment Response
114	Finfish Pg 3-28_Provide an estimate of the amount of area that will be converted from soft bottom to hard bottom habitat.	Benthic habitat, EFH, Inverts, and Finfish	Applying the revised benthic habitat characterization and impact assessment developed by BOEM and the applicant in coordination with NMFS, approximately 0.12 acres of non-complex benthic habitat would be displaced by the 16 monopiles and 5.39 acres of non-complex habitat would be converted to hard bottom by scour and cable approach protection around the foundations. A maximum of 54.02 acres of non-complex benthic habitat would be converted to hard bottom by placement of concrete mattresses to protect exposed segments of the inter-array cable. For the SFEC, a maximum of 101.73 acres of non-complex benthic habitat would be converted to hard bottom by placement of concrete mattresses on exposed cable segments. Section 3.4.2.2.3 of the FEIS is revised to reflect the updated impact characterization.
115	Pg 3-28_ The loss/addition of hard and soft habitats having losses/gains for some species should be further evaluated to address our prior comments on the utility of artificial substrate as hard habitat for managed fish species.	Benthic habitat, EFH, Inverts, and Finfish	The FEIS quantifies long-term habitat conversion effects from project-related impact mechanisms on complex, potentially complex, and non-complex benthic habitats. Per our conversation with NMFS technical staff, the FEIS is updated with examples of potential effects on representative species using these habitat types to provide context and improve understanding. For example, as noted in responses to Comment 85 and 91, Hutchison et al. (2020) documented a significant increase in black sea bass abundance around the foundations of the BIWF 3 years post-installation. These findings suggest that the introduced structures could provide desirable habitat for black sea bass, consistent with the definition of adult EFH for this species. In contrast, species that depend on non-complex habitats, like ocean quahog and surfclam, would lose suitable habitat when mixed sand and mud substrates are converted to hard bottom by scour and cable protection.

Comment #	Comment Text	Comment Category	Comment Response
116	Pg 3-29_Please include some discussion on heat from cables; changes in the prey field; potential effects of EMF on migratory behavior, local movement, feeding, predator avoidance, behavior; potential acoustic effects on behavior, communication, and masking; facilitation of non-native establishment and range expansion; artificial reef as an ecological trap for finfish.	Benthic habitat, EFH, Inverts, and Finfish	Please see responses to Comments 45, 82, 91, and 120 for additional details on noise effects, the reef effect, and the potential for facilitating non-native species invasions. With regard to EMF effects, the induced magnetic and electrical fields produced by the inter-array cable and SFEC are one or more orders of magnitude below the lowest observed physiological and behavioral thresholds for all fish species likely to occur in the project area during any life stage (see response to Comment 118 for additional details). The available evidence for EMF effects on benthic invertebrates is less clear than for fish. Some studies have observed physiological effects on clams, mussels, and worms exposed to low strength fields over relatively short periods ranging from hours to days, while other studies have observed no apparent effects on similar organisms exposed higher intensity fields over periods ranging from days to months (Albert et al. 2020). Substrate heating effects from inter-array cable and SFEC operations may also affect benthic invertebrates. The typical buried HVAC electrical cable will heat sand and mud sediments within 1.3 to 2 feet (0.4 to 0.6 meters) of the cable surface by 18 to 36°F (10 to 20°C) above ambient conditions (Emeana et al. 2016; Hughes et al. 2015). Temperature effects diminish rapidly beyond that distance. Most invertebrate infauna live within 1 to 2 feet of the bed surface, indicating that cable burial to target depths of 4 to 6 feet would avoid adverse heat effects on these organisms. The only locations where substrate dwelling invertebrates are likely to be exposed to heat effects is at the transitions between exposed and fully buried cable segments where the cable is less than 4 feet from the bed surface.
117	Pg 3-29_ EMF from the cables decreases with distance, so burying cables is indicated as a way to increase distance between animals and EMF. However, cables can become unburied in high energy environments and Block Island Wind Farm demonstrated this. Burying cables cannot be relied upon to consistently increase distance between cable EMF and animals.	Benthic habitat, EFH, Inverts, and Finfish	The inter-array cable and SFEC would be implemented with real-time thermal monitoring features that would immediately identify exposed cable segments. While cable exposure is not expected to occur, the immediate identification and reburial of exposed cable segments would limit the duration of any associated EMF effects.

Comment #	Comment Text	Comment Category	Comment Response
118	Pg 3-29_ For electrical field effects on Atlantic sturgeon, it is stated that “insufficient information is available to associate exposure with significant behavioral or physiological effects (Gill et al., 2012)”. Given this and that cables may not remain buried as noted above, the conclusion of “negligible” effects should be re-evaluated.	Benthic habitat, EFH, Inverts, and Finfish	Section 3.4.2.2.3 of the FEIS is revised to support this determination more clearly based on the field strength modeling developed by Exponent Engineering (2018; COP Appendix K1) and relevant research on fish magneto- and electrosensitivity. Studies on closely related sturgeon species indicate that Atlantic sturgeon are unlikely to be sensitive to induced magnetic fields below 10,000 mG (Bevelhimer et al. 2013, 2015). This threshold is several orders of magnitude greater than the strongest magnetic field effect likely to result from the project, indicating that EMF effects on sturgeon are likely to be negligible. Sensitivity to induced electrical field effects is somewhat less clear. Prior research has demonstrated that electrosensitive organisms are highly attuned to weak electrical fields similar to the low frequency (< 5 Hz) bioelectric fields generated by prey but are unable to detect stronger electrical fields at frequencies above 20 Hz. This suggests that sturgeon may not be able to detect the low strength 60-Hz electrical field generated by the HVAC transmission cables.
119	Pg 3-30_Please clarify what “ambient levels” means in the following sentence: “According to measurements at the BIWF, low-frequency noise generated by turbines reaches ambient levels at 164 feet but is drowned out by waves and boat engine sound (HDR 2019b).”	Benthic habitat, EFH, Inverts, and Finfish	The term “ambient” in this context is synonymous with “background,” meaning that operational noise attenuates to levels comparable to background noise intensity as monitored by HDR (2019b). The text in Section 3.4.2.2.3 in the FEIS is revised for clarity.
120	Pg 3-30_The evaluation of operational noise for finfish appears to base the evaluation on the noise generated by the BIWF turbines. However, the WTGs in the BIWF include different design parameters (6MW vs up to 12MW and jacket versus monopile foundations) than are being considered for this project. The potential for such design considerations to effect operation noise, and the effects to finfish should be addressed. It would be useful to discuss any European studies that have evaluated operational noise from a similar foundation design. Given the known proximity, and potential overlap of cod spawning aggregations with the lease area, the potential for operational noise to affect Atlantic cod spawning should be discussed and fully evaluated.	Benthic habitat, EFH, Inverts, and Finfish	Tougaard et al. (2020) summarized available monitoring data on windfarm operational noise, including both older-generation geared turbine designs and quieter modern direct drive systems like those proposed for the SFWF. They determined that operating turbines produce underwater noise on the order of 110 to 125 dBRMS, occasionally reaching as high as 128 dBRMS, in the 10-Hz to 8-kHz range and particle acceleration effects on the order of 10 to 30 dB re 1 micrometer per second squared (μm/s2) at a reference distance of 50 meters. This is consistent with the noise levels observed at BIWF (Elliot et al. 2019) and the range of values observed at European wind farms and is therefore representative of the range of operational noise levels likely to occur at the SFWF. The potential implications for cod spawning is discussed below (please see responses to Comments 45 and 82).
121	Pg 3-31_ (also Pg 3-32)_The document states there will be “821 acres of anchoring and mooring-related disturbance and 913 acres of cabling-related seabed disturbance.” These totals do not match the Proposed Action disturbance calculations provided in Table 3.4.2-2. The disturbance area calculations should match what is presented in Table 3.4.2-2 in this section, or the calculated area should be fully explained.	Benthic habitat, EFH, Inverts, and Finfish	Impact quantities were reviewed and are revised for consistency in Section 3.4 of the FEIS.
122	Pg 3-32_Micrositing and the Habitat Alternative are offered as ways to avoid/minimize effects on cod spawning habitat on Cox’s Ledge. Are any effects on cod spawning habitat anticipated under these scenarios?	Benthic habitat, EFH, Inverts, and Finfish	The fisheries habitat and transit alternatives would have potentially less impact on complex benthic habitat because fewer turbines would be installed. However, some impacts to complex benthic habitat would still occur under each alternative.

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123	Pg 3-33_ Given the results of the analyses described for the Proposed Action, it is not clear why BOEM anticipates the impacts resulting from the Proposed Action alone would “range from negligible to minor for benthic resources, minor for EFH, and negligible to minor for invertebrates and finfish.” Furthermore, since some of the estimated times for complete recovery are on the order of years and in some cases impacts would be permanent, we question the rationale for the overall minor impact determination (effect would be small and the resources would be expected to recover completely without remedial or mitigating action). This section should be revised to ensure the significance criteria determination is consistent with the analysis.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 2.
124	Pg 3-33_The Vessel Transit Lane Alternative would result in less impacts to complex habitats in addition to soft bottom habitats given the reduced project size. The evaluation should address how this alternative would minimize impacts to complex habitats compared to the Proposed Action.	Benthic habitat, EFH, Inverts, and Finfish	The FEIS quantifies impacts by benthic habitat type for each action alternative based on the best currently available information.
125	Pg 3-33_As previously stated, the potential for micrositing to avoid impacts to complex habitats in the Proposed Action was not discussed under that alternative. Once added, a hyperlink or citation to the discussion should be included where referenced under this alternative evaluation.	Benthic habitat, EFH, Inverts, and Finfish	Micrositing is considered for the Fisheries Habitat alternative.
126	Pg 3-33_Please see prior comments on impact determinations. Specifically, there would be unavoidable habitat impacts which would result in unavoidable impacts to species and should be defined as moderate based on your significance criteria definitions.	Benthic habitat, EFH, Inverts, and Finfish	Please see responses to Comment 2 and subsequent related comments.
127	Pg 3-33_This alternative is evaluated to have “slightly reduced” impacts from the Proposed Action. This determination should be fully described. For example, this alternative would result in the removal of turbines and associated inter-array cables, the percent reduction of impacts could be presented and discussed	Benthic habitat, EFH, Inverts, and Finfish	The FEIS quantifies impacts by benthic habitat type for each action alternative based on the best currently available information.
128	Pg 3-33_The statement that “ the overall cumulative impacts of this alternative when combined with past, present, and reasonably foreseeable activities would be negligible to moderate and short term,” is not accurate. Based on information in the analysis, the proposed project will result in permanent and long-term impacts and this statement should be revised accordingly.	Benthic habitat, EFH, Inverts, and Finfish	Please see responses to Comment 2 and subsequent related comments.
129	Pg 3-34_It is not clear what is intended by the statement: “If WTG shifts result in changes that increase turbidity and sedimentation, alter water currents, or increase risks of inadvertent spills, these effects could increase cumulative impacts relative to the Proposed Action.” This statement should be clarified and the rationale provided. It would be beneficial to include an example.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your comment regarding the need for clarity. This statement is intended to acknowledge that the Transit Lane alternative would result in fewer WTG foundations being installed, and that the locations of remaining WTGs may be shifted. The FEIS is revised to reflect that the change in project scope and design could result in reduced extent and distribution of water quality, hydrodynamic, and other potential cumulative effects.
130	Pg 3-34_Please see prior comments regarding significance criteria determinations. The overall effects of this, and the Proposed Action, would be consistent with the provided significance criteria definition for “moderate” effects rather than “minor.”	Benthic habitat, EFH, Inverts, and Finfish	Please see responses to Comment 2 and subsequent related comments.

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131	Page 3-34_Please see prior comment regarding the use of the term "non-complex." We recommend the use of "soft-bottom" habitat as these habitats may also have complex features and should not be described as non-complex.	Benthic habitat, EFH, Inverts, and Finfish	The benthic habitat characterization is revised in coordination with NMFS. The term non-complex benthic habitat category was retained in the FEIS.
132	Pg 3-34_ The four scenarios (A-D) that make up the habitat minimization alternative refer only to turbines, not turbines and inter-array cables. The potential benefits of micro-siting cable routes to avoid or minimize impacts to complex habitats are not mentioned anywhere in the analysis until the final summary statement of conclusions. We recommend that both the proximity and overlap of WTGs and cables to complex habitats be considered for each scenario. We recommend updating this section to include consideration of micrositing cables to minimize impacts to complex habitats.	Benthic habitat, EFH, Inverts, and Finfish	The FEIS quantifies impacts by benthic habitat type for each action alternative based on the best currently available information. BOEM is coordinating with NMFS on the specific WTG and cable segments that will comprise this alternative for the purpose of NEPA analysis. Section 3.4.2.2.5 of the FEIS is revised to quantify impacts by benthic habitat type and notes that micrositing would be used to further minimize impacts to complex benthic habitat to the extent practicable.
133	Pg 3-34_The alternative evaluation of impacts states that "additional micrositing," beyond the Proposed Action, could occur in addition to the installation of fewer WTGs. However, the evaluation of how this alternative would affect complex habitat only mentions a reduction in the number of WTGs and does not address further minimization of impacts that could occur as a result of micrositing. As previously commented, the extent that the Proposed Action would consider and implement micrositing has not been provided or discussed. This evaluation should be included in the relevant sections for the Proposed Action and referenced in this section as appropriate.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 132.
134	Pg 3-35_ The discussion on the use of artificial, engineered materials for scour and cable protection should either be expanded, or hyperlinked to the prior discussion on the benefits of artificial reefs. This discussion should also clearly distinguish between the assessment presented in the proposed action alternative that includes the placement of artificial substrates in complex, hard bottom habitats versus this alternative that avoids and minimizes such impacts to complex habitats.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your recommendation. Section 3.4.2.2.5 of the FEIS includes additional internal referencing to make this linkage more clear.
135	Pg 3-35_ Please see prior comments for the other action alternatives regarding the determinations that seafloor disturbances would be short-term and result in negligible to minor impacts. The evaluation for this alternative should fully and clearly present the long-term to permanent impacts within complex habitats that would be avoided or minimized compared to the other action alternatives.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 2. The significance determinations for the action alternatives are revised accordingly.
136	Pg 3-35_It is stated that the placement of pilings would be a " temporary adverse impact [is] considered negligible to minor, and a long-term beneficial impact could occur." The installation of pilings would not be temporary, but long-term to permanent and the evaluation should be revised appropriately. Further, the potential beneficial impact from proposed piling installation should be further evaluated and caveated. The prior assessment of adverse and beneficial effects of piling installation should be provided.	Benthic habitat, EFH, Inverts, and Finfish	The text in Section 3.4.2.2.5 of the FEIS is revised for clarity. The intent of the statement was to acknowledge the short-term adverse effects likely to result from project construction, and the long-term effects of the presence of structures on the environment. Those effects may be positive or negative depending on the species in question and the outcomes of some factors that are currently not well understood (as summarized by Degraer et al. 2020, van Berkel et al. 2020, etc.).
137	Pg 3-35_Please see prior comments regarding the assessment of adverse and beneficial effects from cable and scour protection. The presented EFH trade-offs	Benthic habitat, EFH, Inverts, and Finfish	Please see responses to Comments 91, 96, 113, and 136.

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	are not accurately presented and should be modified to reflect the differences between natural and artificial substrates as EFH for managed fish species		
138	Pg 3-35_As previously commented, the area of direct effects should be specific to the impact producing factors (IPFs) being analyzed, particularly for the evaluation of impacts to EFH. As expressed in our letter, it is not appropriate to address impacts that would not be expected to occur outside of the project area at a pre-defined larger impact area, particularly when the habitats have not been assessed in the pre-defined area.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 2 and subsequent related comments.
139	Pg 3-35_Please see our prior comments regarding the impact significance determinations for impacts to soft sediment habitats. Impacts to soft sediments should not be expected to be "negligible" based on your provided definitions as there would be measurable and unavoidable impacts.	Benthic habitat, EFH, Inverts, and Finfish	Significance determinations are revised, as discussed in our response to Comment 2 and subsequent related comments. Effects on non-complex benthic habitats extent and probable duration based on the type of impact. See responses to Comments 71 and 83 for examples of proposed updates.
140	Pg 3-36_Please see our prior comments regarding the assessments of reef effects for EFH and benthic habitats. It is also stated that maintenance activities would have minimal impacts to EFH. It should be clarified that any accrued recovery or reef effect benefits would be lost. This also appears to be the first time that the impact of maintenance is analyzed. The evaluation of maintenance activities should be consistent throughout each resource and action alternative.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 136. The statements regarding maintenance effects are revised to clarify that the only planned maintenance activities likely to affect EFH are underwater noise from twice-weekly crew transfer vessel trips between the SFWF and Montauk O&M facility, and annual maintenance dredging of the O&M facility.
141	Pgs 3-36 to 3-37_Please see prior comments regarding the evaluation of impacts to Invertebrates from the other action alternatives. The difference in expected impacts between this action alternative and the other action alternatives should be clearly presented for each IPF. Specifically, impacts to complex habitats would be avoided and/or minimized under this alternative and impacts to soft sediments would increase. The resulting effects on invertebrate species and communities within the project area should be fully evaluated.	Benthic habitat, EFH, Inverts, and Finfish	Please see responses to Comments 2 and 136.
142	Pg 3-37_Please see prior comment regarding the cumulative effects being "short-term." As with the other action alternatives, this project will result in long-term and permanent impacts.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 2.
143	Pg 3-37_The overall conclusion is that this alternative would have negligible to minor habitat impacts. Although we would expect that placing turbines and inter-array cables to minimize or avoid impacts to complex habitats would certainly reduce impacts in comparison to the Proposed Action, given the complexity of Cox Ledge development of any kind in this area is not likely to have an overall negligible impact. The conclusion of overall negligible impacts should be further explained and supported.	Benthic habitat, EFH, Inverts, and Finfish	Please see response to Comment 2.
144	Pg 3-38_As noted in various comments above, the conclusion that all the action alternatives would have negligible to minor impacts is not well supported by the analysis.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your constructive comments. Section 3.4 of the FEIS is revised to provide better support for the refined significance determinations for each action alternative.
296	Also in Table E-1, for describing the geographic analysis area for Benthic Resources, Finfish, EFH, and Invertebrates, please clarify why the table mentions both the Northeast Shelf LME and the 10 mile radius around the RI-MA	Benthic habitat, EFH, Inverts, and Finfish	The geographic area of analysis is now divided into two areas (see Figures E-4a and E-4b) to better reflect the impacts to benthic habitat which is smaller than for Finfish, EFH and invertebrates. The impact area is defined

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	WEA and SFEC. It is not clear the benthic habitat-specific impacts are at the smaller area, while overall finfish/EFH impacts are considered at the LME scale - they are all illustrated together in Figure E-4. It might be clearer to break these into two maps.		by the area directly impacted by the project for non-mobile species. For mobile species, such as finfish, the geographic analysis area where the species may be impacted is used, since the cumulative impacts to finfish or other mobile species include the project plus all other potential impacts to the species, including both potential offshore wind and other impacts such as climate change.
305	Tables 3.3-1, 3.4-1, and 3.11-1 should be revised to recognize that noise from ongoing construction of some adjacent wind projects (e.g., Revolution Wind, Sunrise Wind, Beacon Wind, and Mayflower Wind Phase 2) may overlap in time and could result in detectable impacts on Benthic Resources, Finfish, EFH, and Invertebrates and Commercial and Recreational Fishing activities. Also, Table 3.4-1 should include information included in Table 3.3-1 that is related to changes in predator/prey relationships due to habitat conversion and fish aggregation due to the presence of structures.	Benthic habitat, EFH, Inverts, and Finfish	The cumulative impact scenario (Table E-4) is updated to reflect the most recent schedules proposed by the developers and identifies where multiple projects may overlap during construction. South Fork is on schedule for construction in 2023, should BOEM approve the project. It is likely that Vineyard Wind will be in construction during that time frame, but not likely that the many other projects will be overlapping in construction since their environmental reviews are just beginning at the time of issue of this FEIS.
313	Figure F-7 is unreadable. Please revise for the FEIS.	Benthic habitat, EFH, Inverts, and Finfish	The figure is revised to be readable.
314	Table F-11 on page F-21 appears to be the first time in the document that the actual depths/depth ranges of the arrays are mentioned. That basic information should be more accessible and placed further up in the document.	Benthic habitat, EFH, Inverts, and Finfish	Thank you for your recommendation. The Affected Environment description for this resource (Section 3.4.2.1, p. 3-4) refers the reader to the relevant information in Table F-11. This organization was used to accommodate page constraints imposed on this NEPA document.
315	Pg F-21_ Table F-11 includes reference to “mobile” gravel and “patchy” cobble and boulders. We have previously raised concerns with this terminology during prior project communications. We recommend the term “mobile” be removed, or at a minimum clearly defined, and included with any definition of the term should be the methods used to make such a determination. If evidence of sand mobility is being used to assess the mobility, the terminology should be revised to accurately reflect this, such as “mobile sand with gravel.” We also recommend the removal of the term “patchy” as it is not our understanding that any evaluation of patchiness, or data to base this assertion upon was completed.	Benthic habitat, EFH, Inverts, and Finfish	Please see responses to Comments 30 and 66.
14	In Table 2.3.1-1, under the description of proposed action impacts to commercial and for-hire fisheries, revise “changes to fishing access, primarily through reduced fishing opportunity when construction activities are occurring,” to “changes to fishing access due to presence of turbines and through reduced fishing opportunity during construction activities.” Adverse impacts due to changes to fishing access would also occur after construction. Repeat this correction in the description of other alternatives in this table.	Commercial fishing	Text in Table 2.3.1-1 is changed as recommended.
111	Pg 3-28_Pg 3-28_ See papers in the special issue of the journal Oceanography 2020 that focused on offshore wind interactions with fish and fisheries. Currently, it is not clear why potential effects to recreational fishing are included in the discussion of reef effects for invertebrates. If potential disturbance of the invertebrate community by recreational fisherman is expected, such effects should be more clearly described. The discussion also does not address fouling	Commercial fishing	The reference to fish congregating around fish-aggregating devices and attracting recreational fishing activity was removed. Per NEPA regulations 40 CFR 1502.2, an EIS should be analytic rather than encyclopedic and provides an appropriate level of detail to meet the

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	versus natural community structures. We recommend the discussion be expanded to include these considerations.		disclosure requirements of NEPA. Therefore, a fouling discussion was not added to the EIS.
219	The DEIS states Tables 3.5.1-1 through 3.5.1-12 and Tables 3.5.1-17 through 3.5.1-19 were developed using NMFS 2020b. Please specify which links from the page cited were used, as well as indicate any separate data requests. Please provide a footnote for leases in the RI-MA areas. The following lease areas should be included if using the NMFS 2020b source: Bay State Wind 1 (0500) , Bay State Wind 2 (0500 remainder) , Beacon Wind (0520), Deepwater Wind (0487) , Liberty Wind 1 (0522) , Liberty Wind 2 (0522 remainder) , Mayflower Wind 1 (0521) , Mayflower Wind 2 (0521 remainder) , Revolution Wind (0486) , Vineyard Wind 1 (0501) , and Vineyard Wind 2 (0501 remainder) .	Commercial fishing	The reference to NMFS 2020b has been replaced with NMFS 2021. These tables now use requested data provided by NMFS in May 2021. With respect to the leases included in the RI-MA WEA, we have added a footnote (#15) stating that the “RI-MA WEAs include the lease areas for Revolution Wind (OCS-A 0486), Sunrise Wind (OCS-A 0487), and SFWF.”
220	Please include a citation for the following excerpt (page 3-69), “from 2017 through 2019, vessels with VMS accounted for a substantial portion (70% or greater) of landings in several federally permitted fisheries in the Mid-Atlantic and New England regions, including the Sea Scallop, Mackerel/Squid/Butterfish, Monkfish, Atlantic herring, Northeast Multispecies (large- and small-mesh), Skate, Summer Flounder/Scup/Black Sea Bass, and Surfclam/Ocean Quahog FMP fisheries.” NMFS 2019 is cited throughout the section however the only area found with the same citation does not match. NMFS 2019 refers to Kemp’s Ridley Turtle, not VMS.	Commercial fishing	The appropriate citation has been included in Section 3.5.1.1.1.
221	Within the “Regional Setting” section (starting page 3-70), include a description of the proposed construction timelines for the RI-MA WEA based on Table E-4. For example, four wind projects are proposed to be under construction within the area over 2022.	Commercial fishing	Planned wind energy projects in the RI-MA WEA are not part of the affected environment (i.e., the description of existing resource conditions and trends that may be affected by the proposed action or alternatives). The impacts of these projects are described in Section 3.5.1.2.2.
222	Footnote 10 (page 3-70) is missing the mention of Atlantic Wolffish to the species list. Please change redfish to Acadian redfish to be consistent with other species named in the list (according to NOAA Management Plans).	Commercial fishing	The two fish species have been added to the footnote.
223	In Table 3.5.1-1 (page 3-71) and where relevant in subsequent tables, explain that some fishery data cannot be disclosed due to confidentiality protection requirements. The most often used explanation, “Includes revenue from the Surfclam/Ocean Quahog, Red Crab, and River Herring FMP fisheries and species that are not included in the fisheries listed in the table, but which are harvested by federally permitted vessels" is incomplete and confusing.	Commercial fishing	Text has been revised and a footnote have been added to describe non-disclosure rules. Table notes for all FMP-based tables have been updated.
224	The citation NMFS 2020c (page 3-72) lists a website that is no longer available. Please update this source if possible; otherwise, the following can possibly be used instead: “ In 2017, seafood landings in New England and the Mid-Atlantic regions were valued at $1.8 billion. The region is also home to aquaculture production and research that provides employment and business opportunities for coastal communities. In New England, the seafood industry generated $5.6 billion in personal and proprietor income, while that impact totaled $3.8 billion in the Mid-Atlantic.” The Economic Importance of Seafood. Available at:	Commercial fishing	Text and citation revised as requested.

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	https://www.fisheries.noaa.gov/feature-story/economic-importance-seafood . Accessed February 1st, 2021.		
225	BOEM 2012a citation's listed website is no longer available. Please update this source.	Commercial fishing	Citation has been corrected.
226	Please specify which data were used on the site listed in BOEM 2020.	Commercial fishing	The raster files listed on BOEM (2020), as well as data embedded in the metadata in BOEM (2020), were used.
227	RI-MA WEAs In addition to revenue, add landing amounts to each applicable table in this section or provide such information in similar, but separate tables. Landings reflect contributions of an area toward food production and bait availability, and revenue information can often mask the importance of an area to a particular fishery when compared to other higher value fisheries.	Commercial fishing	Tables showing landings by species have been added to this section based on updated data provided by NMFS in May 2021.
228	For Table 3.5.1-9 (page 3-80), please correct and update for each port using the following source: https://www.greateratlantic.fisheries.noaa.gov/ro/fso/reports/WIND/ALL_WEA_BY_AREA_DATA .html .	Commercial fishing	Tables have been revised based on updated data provided by NMFS in May 2021.
229	In Table 3.5.1-5 (page 3-74), provide the correct peak revenue total, as the values do not add up to the same total for all gear types. The "all gear types - peak revenue" column appears to exclude dredge-clam, while the average annual revenue column includes it. If this is intentional, include the explanation of the difference in the notes for the table.	Commercial fishing	For each table that includes a peak revenue estimate with a total row, a note has been added stating that that "Peak revenues are calculated independently for all rows including the total row."
230	In Table 3.5.1-6 (page 3-74), include data for the percentage of each port's revenue generated by commercial fishing activity in the RI-MA WEAs. In addition to the percentage of vessel's dependence on commercial fishing revenue by port (16.6% Little Compton and 8.2% Westport), include the coastal/fishing community dependence (engagement and reliance) for the most affected ports based on https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0) and data/mapping tool here: https://www.st.nmfs.noaa.gov/data-and-tools/social-indicators/.	Commercial fishing	NOAA Fisheries Community Social Vulnerability Indicators, including a ranking for Commercial Engagement and Community Reliance, is added to the community descriptions in Table 3.5.1-3.
231	Correct the column heading in Table 3.5.1-7 (page 3-78) to be "Percentage of Average Total Revenue from the MidAtlantic and New England Regions." The same revision should be applied to other tables that use similar metrics to ensure the reader can differentiate between peak and average revenues.	Commercial fishing	Column headings in all tables have been changed to, "Annual Average Revenue as a Percentage of Total Revenue from the Mid-Atlantic and New England Regions."
232	On page 3-78, first paragraph, provide more detail to clarify the methods used to determine that most fisheries do not have a high intensity of revenue from BOEM 2020. In addition, either eliminate the reference to years of GIS data, or correct it to reflect that not all of the referenced figures include operations through 2018, and some only depict operations through 2012 (e.g., C-7, C-13, C-14, and C-18-28).	Commercial fishing	The discussion of fishing intensity in the Lease Area and offshore SFEC in terms of FMP fishery revenue has been expanded. In addition, text has been added indicating that additional details on the data and methodology used to develop the revenue intensity figures are available in Appendix F.

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233	SECTION 3.5.1.1.2 Affected Environment - For-Hire Recreational Fishing (page 3-87) Following the first sentence on page 3-87, please include a definition of both party and charter boats.	Commercial fishing	Text has been added to Section 3.5.1.1.2 of the FEIS stating that for-hire recreational fishing boats include both party (head) boats, defined as boats on which fishing space and privileges are provided for a fee, and charter boats, defined as boats operating under charter for a price, time, etc., and the participants are part of a pre-formed group of anglers.
234	Table 3.5.1-13 (page 3-87) refers to species targeted by for-hire recreational fishing boats in the Rhode Island Ocean Special Management Plan Area (OSAMP) from 2010, but does not include all the species listed in the OSAMP. Please provide a more inclusive species list and a more recent source . Please update this to a more recent year if possible.	Commercial fishing	The intent of the table is to show the top species targeted by for-hire recreational fishing boats within the Ocean SAMP area. It was based on recreational harvest and release data, sportfishing tournament information, and consultations with recreational anglers and party and charter boat fishermen. A more recent list based on a comparable range of sources is not available.
235	Recreational fishing tournaments and target species should be referenced in Section 3.5.1.1.2 (page 3-87). The bulk of recreational fishing takes place in the summer, during the migrations of top recreational fish like tuna, scup, bluefish, and striped bass. The Rhode Island Saltwater Anglers Association sponsors 15 tournaments per year, as well as a "yearlong" tournament targeting 15 species; all of the tournaments involve species found in the Ocean SAMP 2013 http://www.crmc.ri.gov/samp_ocean/reports/Ocean_SAMP_Practioners_Guide.pdf . These tournaments and these species should be referenced in this section.	Commercial fishing	Text has been added to Section 3.5.1.1.2 stating that many recreational fishermen participate in organized sportfishing tournaments during the year. For example, the Rhode Island Saltwater Anglers Association sponsors 15 tournaments per year, as well as a "Yearlong Tournament" targeting the majority of recreational species in the Rhode Island Ocean Special Management Plan Area.
236	Please clarify the source of the following information (page 3-88): "During the 2007–2012 period, annual for-hire boat revenue averaged $15.6 million in Rhode Island, $86.2 million in New York, $14.5 million in Connecticut, and $62.4 million in Massachusetts" This is not in the Kirkpatrick (2017) paper.	Commercial fishing	The source of the data is Table III-xii., p. 138 of Kirkpatrick et al. (2017) Socio-Economic Impact of Outer Continental Shelf Wind Energy Development on Fisheries in the U.S. Atlantic. Volume II—Appendices.
237	Update data to include VTR data through the most recent year available, which is available from NMFS upon request (we are working on integrating this into our socioeconomic reports, but it may not be ready for publication before the FEIS). Data used in this section reference 2010 RI OSAMP and BOEM 2012b and Kirkpatrick 2017 data.	Commercial fishing	Requested data from NMFS were inserted, and the text was revised where required.
238	Please include a description of affected communities that are dependent on recreational fishing (engagement and reliance) based on https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-) and data/mapping tool here: https://www.st.nmfs.noaa.gov/data-and-tools/social-indicators/. .	Commercial fishing	Based on the data available, Table 3.5.1 20reports levels of community engagement in terms of the number of angler trips of for-hire recreational fishing boats in the Lease Area by groups of affected communities.
239	The DEIS states in multiple sections that there is a lower potential for conflict due to fishing displacement among fishermen who target mobile species such as Atlantic herring, Atlantic mackerel, squid, tuna, and groundfish. This may not be true; please clarify in the text that due to the attractive effect of artificial reefs (the "reef effect") on highly migratory species. If mobile species are attracted to wind energy areas, fishing vessels will follow their target species to these areas and the potential for conflict may increase or at least offset any effort displacement.	Commercial fishing	Text has been added to Section 3.5.1.2.2 stating that the potential for vessel congestion and gear conflict may increase if mobile species targeted by commercial fishermen are attracted to offshore wind energy facilities by the artificial reef effect, and fishermen targeting these species concentrate their fishing effort in offshore wind farm lease areas as a result.

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240	The DEIS states the following in multiple sections: "However, vessels that chose to relocate could incur increased operating costs (e.g., additional fuel to arrive at more distant locations) and/or lower revenue." Please add that this can also add to increased days at sea, therefore lead to increased crew costs and changes in catch composition.	Commercial fishing	Text has been added to Section 3.5.1 that there may be additional crew compensation due to more days at sea.
241	The DEIS needs more support for the conclusion that the No Action Alternative's impacts on target species would have a negligible to minor impact on the CPUE or total catch of for-hire recreational and commercial fisheries (page 3-90). The document does not include any analysis of CPUE or any quantitative (or more than cursory qualitative) assessment of how overall wind energy development in the region would impact catch. The discussion in Section 3.5.1 does not support a conclusion of minor effects based on the definition in Table 3.5.1-15.	Commercial fishing	The CPUE rating is primarily based on the statement that the impacts from structures are not expected to result in population-level impacts (see Section 3.4.2 [Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish]). The total catch rating is based on the statement that the maximum exposed revenue, which occurs beginning in 2028 when construction on the last of the proposed projects begins, represents about 1.4% of the total regional revenue. As stated in the Conclusions section for the No Action alternative, BOEM anticipates that the range of impacts for reasonably foreseeable offshore wind activities would be moderate to major, depending on the IPF of offshore wind energy projects. As described in Appendix E, Attachment 3, BOEM anticipates that the range of impacts for ongoing activities and reasonably foreseeable activities other than offshore wind would be moderate to major, depending on the activity.
242	On page 3-91 in the discussion of the effect of the presence of cables and wind turbines on fishing gear, please address if and how different gear types would be impacted.	Commercial fishing	Text has been added to Section 3.5.1.2.2 describing the impacts of the presence of cables on different gear types.
243	At the top of page 3-92, identify the relative percentage of affected vessels or absolute number of vessels that derive more than 50% of their revenue within wind lease areas. This would help the reader appreciate the scale of anticipated major impacts from the no action alternative.	Commercial fishing	Text has been added to Section 3.5.1.2.2 identifying the average annual percentage of affected vessels that derived more than 50% of their revenue within wind lease areas during the 2008–2019 period.
244	Under "New cable emplacement/maintenance," (page 3-93) note that some vessel operators will not trawl or dredge over inter-array or export cables due to safety and gear loss concerns, which could result in reduced fishery revenue and landings.	Commercial fishing	Text has been added to Section 3.5.1.2.2 noting that some vessel operators will not trawl or dredge over inter-array or export cables due to safety and gear loss concerns, which could result in reduced fishery revenue and landings.
245	Under "climate change" (page 3-94), please also include a discussion of the affects climate change can have on fishing dependent communities based on Colburn et al. (2016) https://doi.org/10.1016/j.marpol.2016.04.030. Climate Change Vulnerability (Sea level rise and storm surge indicators) can be reported for affected fishing ports/communities based on (https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0). The mapping tool can be found here with the option to download data on these indices https://www.st.nmfs.noaa.gov/data-and-tools/social-indicators/. The DEIS states that climate change impacts would be considered moderate for fishing operations; however, due to the uncertainty of wind benefits combined with the large area of influence climate change has over important commercial and recreational species, this should be changed to be a moderate to major effect. Please provide additional information on which species are anticipated to show increases in population so a more informed conclusion is	Commercial fishing	Text has been added to Section 3.5.1.2.2 stating that the economies of communities reliant on marine species that are vulnerable to the effects of climate change could be adversely affected.

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	made for beneficial effects. Consider identifying species that may be affected (positively or negatively) by climate change to help the reader evaluate how the species primarily affected by this action would also be affected by climate change to assess the impacts of the proposed project (see Hare et al., 2016 available at https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0146756).		
246	Please add, where appropriate, in the discussion of the impacts of the presence of structures (starting page 3-90) discussion of the potential effects to quality of life in fishing communities. Specifically, the social cost of uncertainty in traditional business practices, more time away from home if displaced from fishing grounds/longer transit routes, wind engagement, etc	Commercial fishing	Text has been added to Section 3.5.1.2.3 stating that it is estimated that during Project O&M the revenue exposure for any given port would not exceed 2% of its total commercial fishing revenue from the Mid-Atlantic and New England regions. Considering this low revenue of risk across ports, together with the small amount of vessels and fishing activity that would be affected during Project O&M, the impacts to other fishing industry sectors, including seafood processors and distributors and shoreside support services, would be long term, minor to moderate.
247	Update references to Section 3.4.2.3.2 throughout the DEIS to the correct reference; that section does not exist.	Commercial fishing	The text has been corrected.
248	In Table 3.5.1-17 (page 3-96), either the scale of the peak values is wrong (1,000s vs. absolute number) or it references peak revenue for the entire region and not peak revenue for the maximum work area. Clarify and revise, or delete the peak value column, as appropriate. This does not appear to have occurred in Table 3.5.1-18. Also, clarify if the percentage is based on peak values or average values.	Commercial fishing	Table numbers in Table 3.5.1-17 have been corrected, and the labels in all tables have been revised to clarify that the percentage of total revenue estimates are based on average annual revenue.
249	In Table 3.5.1-19 (page 97), include data for the percentage of each port's revenue generated by commercial fishing activity in the RI-MA WEAs.	Commercial fishing	BOEM does not believe it would be appropriate to use an arbitrary fishing location such as the RI-MA WEA as a reference area for estimating the impacts of the Proposed Action on commercial fisheries. The RI-MA WEA per se is of no particular importance to any FMP fishery, gear type, or port, and there was no a priori reason to include them in the impact analysis. The lease areas were included in Section 3.5.1.1.1 of the DEIS only to provide further geographical context for the commercial fisheries operating in the SFWF and along the offshore SFEC, and to describe the process by which BOEM excluded a large portion of Cox Ledge from the lease areas because of its importance as a fishing ground for commercial and recreational fisheries.
250	Under "Potential impacts to fishing gear," (page 3-99) provide a more explicit description of the "financial compensation policy" and where it can be found in the Construction and Operation Plan, including a hyperlink if possible or another term that could be searched for in the document, as we were not able to find it in the referenced document (CH2M Hill 2018) or the updated version of that document (Jacobs 2020). Whenever possible, the DEIS should clearly describe any mitigation and compensation plans used to reduce potential impacts of the proposed action.	Commercial fishing	Text has been added to Section 3.5.1.2.3 of the FEIS regarding Appendix B [South Fork Wind Farm Fisheries Communication and Outreach Plan] of Jacobs (2020).

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251	Under “Potential impacts to target species,” (page 3-99) note that construction activities may result in intermediate and potentially long-term negative impacts to commercial and recreational fishing opportunities for certain species if spawning and recruitment is disrupted and negatively impacted over several years due to the cumulative localized impacts of several adjacent projects. This would seem more consistent with the “moderate” impact level based on the definition in Table 3.5.1-15 rather than “minor” impact if realized. Remove reference to CPUE unless future analysis in the FEIS includes an evaluation and more thorough discussion of CPUE.	Commercial fishing	The analysis in the referenced section of the DEIS (Section 3.5.1.2.3) only considers impacts to commercial fisheries and for-hire recreational fishing resulting from the proposed Project. The impacts of the proposed Project in combination with the impacts of other offshore wind energy projects are addressed in the cumulative impacts section. References to changes in CPUE have been removed in the impact analysis for commercial fisheries and for-hire recreational fishing.
252	Operations and Maintenance (page 3-100) Under “Potential Impacts to Fishing Access,” (page 3-100) maneuverability within the SFWF is described as dependent on “vessel size, fishing gear or method used, and/or environmental conditions.” Please add to this text that operating within a wind array with other vessels & gear types are also a challenge to maneuverability.	Commercial fishing	Text has been added to Section 3.5.1.2.3 of the FEIS stating that operating within an offshore wind energy area when other vessels and gear types may restrict vessel maneuverability.
253	Under “Potential impacts to fishing access,” (page 3-100 and 3-101) clarify the fishing access impact conclusions for consistency. Impacts are classified as negligible, minor, moderate (maybe a cut-and-paste error), and major. Per the definitions in Table 3.5.1-15, the impacts are expected to be more than negligible because the document measures the expected revenue exposed for certain fisheries, notes that operations would need to adjust due to the project, and highlights that some individuals are heavily dependent on the area. The next section concludes that adverse impacts would be long-term minor to moderate to some fishery operations. Therefore, the impacts should be classified as “overall minor, but up to major for some individuals.”	Commercial fishing	Text has been added to Section 3.5.1.2.3 clarifying that impacts in the offshore SFEC area during O&M are expected to be negligible because SFW would bury all cables to a target depth of 4 to 6 feet beneath the seabed. The Conclusion for the Proposed Action has been revised to state that it is conceivable that some of the small number of fishing operations that derive a large percentage of their total revenue from areas where Project facilities would be located will choose to avoid these areas once the facilities become operational. In the event that these fishing operations are unable to find suitable alternative fishing locations, they could experience long-term, substantial disruptions. However, it is estimated that the majority of vessels would only have to adjust somewhat to account for disruptions due to impacts.
254	At the top of page 3-102 provide a more recent source than NEFMC 1996 for the statement that WTGs would be laid out in rows that run from east to west in order to “avoid gear conflict between fishermen who use mobile gear and those who use fixed gear.”	Commercial fishing	Text has been added to Section 3.5.1.2.3 of the FEIS that Table G-1 in Appendix G indicates that SFW is committed to a spacing of approximately 1.15 mile (1.8 km), or one nautical mile (nm), between turbine rows. The reference to NEFMC (1999) has been removed.
255	On page 3-102 and wherever else it is relevant, please clarify if the compensation policies will be different for varying states/ jurisdictions.	Commercial fishing	As stated in Section 3.5.1.2.3 of the DEIS, SFW has developed a financial compensation policy to be used when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing gear. In addition, BOEM is open to working with state partners and the commercial and recreational fishing industries to investigate alternative strategies to negotiate compensatory mitigation agreements. South Fork Wind, LLC has negotiated with the State of New York, the State of Rhode Island, and the Commonwealth of Massachusetts to determine compensation packages for fishermen.
256	Under “Cumulative Impacts,” note at the top of page 3-104 (presence of structures) that the $13 million impact to commercial fishing revenue would be on an annual basis.	Commercial fishing	Text has been added to Section 3.5.1.2.3 of the FEIS stating that the revenue at risk estimate is per year.

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257	Consider adding in page 3-104 that the potential impacts to fishing access can be further mitigated by potentially scheduling construction during low commercial fishing seasons.	Commercial fishing	Appendix G of the Final EIS has been updated to include modifications and/or additional mitigation and monitoring measures that BOEM could choose to incorporate into the Record of Decision. Additional mitigation and monitoring measures may arise from consultations and coordination with Federal and State resource agencies. These additional mitigation measures could be considered by decision-makers and incorporated into the Record of Decision.
258	Under “Presence of structures and new cable emplacement/maintenance” (page 3-103) please verify the reference to Table A-4 and whether it should be “E-4 Future Offshore Wind Project Construction Schedule (dates shown as of July 2020 to be updated by BOEM)” instead. Also clarify the start date in which these foundations are counted.	Commercial fishing	The cumulative impacts section referenced in the comment has been revised to reflect updated data from BOEM on future offshore wind projects as detailed in Table E-4 and Table A-4 in Appendix E.
259	Under “Conclusions,” (page 3-104) note that impacts could be up to major for some individual entities that rely heavily on fishing within wind energy areas even though overall impacts may be moderate.	Commercial fishing	The Conclusion for the Proposed Action in Section 3.5.1.2.3 has been revised to state that it is conceivable that some of the small number of fishing operations that derive a large percentage of their total revenue from areas where Project facilities would be located will choose to avoid these areas once the facilities become operational. In the event that these fishing operations are unable to find suitable alternative fishing locations, they could experience long-term, substantial disruptions. However, it is estimated that the majority of vessels would only have to adjust somewhat to account for disruptions due to impacts.
292	Mean annual revenue in FMP Specific maps (Figures C-7 through C-17) should be on different scales. Using the same scales as aggregated FMP groups and across FMPs makes it difficult to discern where fishing activity occurs for fisheries that generate less revenue than Scallops or when FMPs are aggregated by gear type.	Commercial fishing	Changing the scaling to match the revenue of each fishery could lead to misperceptions by reviewers when comparing between figures. The scaling as it is currently provided shows existing variations within the harvesting patterns for each of the FMPs shown and at the same time allows reviewers to see differences in fishing patterns and revenues across FMPs.
300	Because Jonah crab is mentioned in the analysis of Commercial Fisheries, consider adding a sentence to the end of the first paragraph on page E-19, similar to the American Lobster sentence, that describes the cooperative management structure of Jonah crab between NMFS and the ASMFC and the creation of the Jonah Crab Interstate Fishery Management Plan in 2015 and implementing federal regulations in 2019.	Commercial fishing	Text has been added on page E-19 noting that the lobster and Jonah crab fisheries are cooperatively managed by the states and the NMFS under the framework of the ASMFC.
294	The Cumulative Activities Scenario on page E-1 notes in the third paragraph that construction of the SFWF will start in 2021. While we understand that specific start dates are unknown given the changing landscape of the offshore wind industry, it is not feasible that the project will start in 2021 given the timeline of this document. Please consider changing the date to 2022 or later. Table E-4 also notes that construction of SFWF will start in 2021, as does text in the second paragraph of page 3-96. Related, many of the Project Names and construction dates in Table E-3 do not match what is presented in Table E-4. Please update to match or provide an explanation for the differences between tables.	Cumulative	Thank you for your comment. Table E-3 and E-4 are updated in the Final EIS with the most recent schedule.

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295	We strongly recommend providing hyperlinks in the text to the maps that illustrate the geographic analysis area described in Table E-1.	Cumulative	Thank you for your comment. Hyperlinks to the maps were added.
298	Table E-4 should read that Vineyard Wind will construct 62 foundations given the most recent information. Also in Table E-4 (pg. E-14), it isn't clear what projects are Phase 1 & 2 of "Orsted (RI-MA WEA Phase 3)." Is this Revolution (Phase 1) and Sunrise Wind (Phase 2)? If so, this remaining area of OCS-0486/0487 seems small for a proposed 83 turbines. Including lease area #'s in Table E-4 would be helpful. The reported number of turbines for US Wind Maryland Phase 3 and Empire Wind Phase 3 seems high for the remaining acreage of these two lease areas.	Cumulative	Thank you for your comment. Table E-4 has been updated in the Final EIS.
299	On page E-18, in the description of reasonably foreseeable non-offshore wind activities, consider adding 1-2 sentences noting the continued science research surveys NOAA NMFS will be completing in the region, even with the changes required with the installation of offshore wind projects.	Cumulative	The following text was added, "Current fisheries management and ecosystem monitoring surveys conducted by or in coordination with the NEFSC could overlap with offshore wind lease areas in the New England region and south into the Mid-Atlantic region. Surveys include 1) the NEFSC Bottom Trawl Survey, a more than 50-year multispecies stock assessment tool using a bottom trawl; 2) the NEFSC Sea Scallop/Integrated Habitat Survey, a sea scallop stock assessment and habitat characterization tool, using a bottom dredge and camera tow; 3) the NEFSC Surfclam/Ocean Quahog Survey, a stock assessment tool for both species using a bottom dredge; and 4) the NEFSC Ecosystem Monitoring Program, a more than 40-year shelf ecosystem monitoring program using plankton tows and conductivity, temperature, and depth units. These surveys are anticipated to continue within the region, regardless of offshore wind development."
311	Table A-4 is very challenging to read and navigate. We suggest making it easier to find and read the footnotes. You could make them a part of the header (at the top of the table); provide them on each page of the table, and/or put this information in full-size font. These footnotes include important assumptions and background that is key to interpreting the information that is presented . Table A-4 also reports Offshore Export Cable Operating Seabed Footprint (acres). For South Fork, the total reported Offshore Export Cable footprint states 7.4 acres. This variable seems to be a calculation of the "Offshore Export Cable Installation Tool Width (ft)" x cable length (ft) and converted to acres. If so, South Fork should be 65 acres. Please correct or explain otherwise.	Cumulative	Relevant footnotes have been moved to the bottom of each table under Attachment 4 of Appendix E. The Offshore Export Cable Operating Seabed Footprint acreage is pulled directly from the COP. For a detailed description of assumptions used to develop the footprint estimates, see Tables 3.2-2 and 3.2-3 in the COP.
3	The following language (or similar) needs to be inserted in this section or elsewhere in the first Chapter: The National Marine Fisheries Service (NMFS) has multiple roles in the NEPA process and EIS for this major Federal action. First, NMFS has a responsibility to serve as a cooperating agency based on its technical expertise and legal jurisdiction over multiple trust resources. NMFS' role is to provide expert advice regarding the action's impact with respect to essential fish habitats as defined in the Magnuson-Stevens Fishery Management and Conservation Act (MSA), listed threatened and endangered species and designated critical habitat listed under the Endangered Species Act (ESA), marine mammals protected by the Marine Mammal Protection Act of 1972 (MMPA), and commercial and recreational fisheries managed under the MSA.	Decision Process	This language was added to Appendix A, under the National Marine Fisheries Service heading.

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	Second, NMFS intends to adopt the EIS in support of its authorization decision after reviewing it and determining it to be sufficient. NMFS is required to review applications for Incidental Take Authorizations (ITAs) under the MMPA, as amended (16 USC 1361 et seq.), and issue an ITA if appropriate. [Company] [plans to submit/has submitted] an application to NMFS for an ITA in conjunction with the COP, for take, as defined by the MMPA, of marine mammals incidental to the proposed project construction and associated activities. The decision to issue an ITA under the MMPA is considered a major federal action requiring NEPA review. Therefore, NMFS has an independent responsibility to comply with NEPA. Consistent with the regulations published by the Council on Environmental Quality (40 CFR 1501.7(g)), NMFS intends to rely on the information and analyses in BOEM's Environmental Impact Statement (EIS) to fulfill its NEPA obligations for ITA issuance, if applicable. NMFS intends to adopt the final EIS for this purpose.		
13	Page 2-16_Multiple activities and events are presented in this section, and it is stated that the impacts from such events are described in Chapter 3. While that may be appropriate, many of the events listed are not covered in Chapter 3, and some of the listed maintenance activities are not considered in the impact analysis. Each listed activity and event should be cross-referenced in Chapter 3 to ensure impacts are appropriately evaluated.	Effects Analysis (general)	Section 2.2 of the FEIS provides a brief summary of potential Project impacts associated with non-routine activities and low probability events. This analysis is consistent with BOEM's approach for the Vineyard Wind EIS. To avoid reader confusion, the following sentence was deleted from Section 2.2, "Impacts from these activities would be as described for the Proposed Action (described in Chapter 3)."
16	The text in the second to last paragraph on page 3-1 does confirm that the resource-specific impact levels in the tables at the beginning of each resource chapter are adverse impacts - but adding adverse to the title of each table in sections 3.3-3.5 would remind the reader (add "adverse" between "assess" and "impacts" in each title).	Effects Analysis (general)	The FEIS includes a detailed analysis of potential impacts and the use of the impact levels applied to the adverse and beneficial impacts. Beneficial impacts are explicitly called out, all other impact levels are adverse as clearly explained. The resource specific sections include information related to the magnitude, duration, geographic extent, and/or frequency of potential impacts, as appropriate, to support impact determinations. BOEM has reviewed impact determinations in response to public comments on the DEIS and has revised, as appropriate, within the FEIS. The change was not made.
17	We urge BOEM to clarify how it is currently interpreting "reasonable and/or unreasonable interference with existing ocean uses" and detail how it is applying its FEIS findings to those standards.	Effects Analysis (general)	The Memorandum M-37059 was revoked in April 2021. A decision that balances these different goals and that does not hold one as controlling all others is consistent with the opinion recently issued by the Solicitor, M-37067, "Secretary's Duties under Subsection 8(p)(4) of the Outer Continental Shelf Lands Act When Authorizing Activities on the Outer Continental Shelf" (M- 37067). M-37067 provides that "subsection 8(p)(4) of OCSLA and similar statutes require only that the Secretary consider the relevant portions of the record and strike a rational balance between various congressional goals. In making this determination, the Secretary retains wide discretion to weigh those goals as an application of her technical expertise and policy judgment." M-37067, p. 2.
18	Page 3-1_The duration definitions provided are not consistently applied in the impact determinations for this section or across Chapter 3. In particular, the term temporary is used inconsistently to describe the duration of an impact or effect. For example, seabed disturbance from anchoring is described as "temporary,"	Effects Analysis (general)	BOEM has reviewed impact determinations in response to public and cooperating agency comments on the DEIS and has revised, as appropriate, within the FEIS.

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	minor, and localized. However, the recovery from the impacts of anchoring is then noted to be “short-term” to “long-term” or permanent. In another example, under the evaluation of the impacts to invertebrates, when discussing the introduction of novel hard surfaces the document suggests “temporary impacts” to individuals and predators would occur until the area could recolonize. However, an impact that requires recovery over time does not meet your definition of temporary effects (i.e. ends when action ceases). If defined, temporary should be used consistently throughout the chapter. Further, a duration of time is not defined for “short-term” effects. Temporary is defined as ceasing with the activity and long-term as years, decades, or longer, so it can be surmised that short-term means less than a year. However that does not appear to be consistently applied throughout the section. For example, the stated recovery of benthic habitats from seafloor disturbances from anchoring is 18 months to 2 years; however it is not included under the evaluation of recovery from long-term effects. The duration of “short-term” effects should be clearly defined and consistently applied.		
19	This is more general to impacts across all resources. As noted in the letter, there are inconsistencies in the descriptions of impacts across the resource analysis. The preferred approach to describing impacts includes directionality, time frame, and level of impact. We do recognize there is text in Section 3.1 that notes if directionality is not mentioned, then the reader should assume the impact is adverse. Ideally, every time an impact is being discussed each of these factors should be included, but they should especially be included in all alternative conclusion paragraphs (where alternative impacts are summarized and bolded). Resource chapters with a consistent use of descriptive impacts include Commercial Fishing, Demographics/Employment, and Environmental Justice. The chapters on Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish and Marine Mammals could benefit from more thorough impact descriptions.	Effects Analysis (general)	BOEM has reviewed impact determinations in response to public and cooperating agency comments on the DEIS and has revised, as appropriate, within the FEIS.
278	Please provide reference for citation EPA 2020b (potentially: https://www.epa.gov/ejscreen).	EJ	Reference for citation has been updated.
279	Please provide reasoning for using 5 km as a metric. If 5 km is used because this is what is used in the EPA’s EJSCREEN tool please include the following explanation in a footnote: A distance of 5 km was chosen to capture the great majority of facilities or sites that could have a significant impact on local residents. (https://www.epa.gov/sites/production/files/2015-05/documents/ejscreen_technical_document_2015 0505.pdf)	EJ	Text added stating that 5-km zones encompass the majority of onshore Project activities during construction, O&M, and conceptual decommissioning that could have a potential impact on local residents.
280	Consider providing a description of affected fishing communities/ports and Community Social Vulnerability Indicators in the Environmental Justice section. The indicators include a Housing, Poverty, Population Composition and Personal Disruption vulnerability index for over 4,000 coastal communities in the U.S. (https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0). The mapping tool can be found here with the option to	EJ	NOAA Fisheries Community Social Vulnerability Indicators, including a ranking for Poverty, Population Composition, and Personal Disruption, will be added to the community descriptions in Table 3.5.4 1.

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	download data on these indices https://www.st.nmfs.noaa.gov/data-and-tools/social-indicators/		
281	On page 3-140, Table 3.5.4-3, please clarify where in Appendix A public outreach information is mentioned. In addition, it is inappropriate to state that underrepresentation of minority/low-income populations in the public process is “not applicable” - it is possible that these populations may be underrepresented due to constraints in their ability to attend stakeholder meetings. Please correct the impact indicator with an appropriate description for this issue.	EJ	See the discussion of scoping in Appendix A for information on public involvement.
282	Section 3.5.4.2.3 assumes that fishermen will be able to adjust their transit and fishing locations to avoid conflicts with construction activities, therefore limiting adverse effects to minority and low-income populations within the industry. It may not be possible for some fishermen to move fishing grounds and make up lost income within alternative or non-traditional fishing grounds. Future Activities planned and according to the project schedule sheet in Appendix E, projects in the RI-MA WEA (Revolution Wind, Sunrise Wind & Vineyard Wind) could be under construction during the same time period in 2022, with 3 other WEA under construction outside the RI-MA WEA. Please note that fishermen could be further displaced and land in other ports as a result. This could affect low-level employees (deckhands and/or process workers) which consist of high percentages of low-income and minority populations.	EJ	As described in Section 3.5.4.2.3, considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with past, present, and reasonably foreseeable activities would result in moderate adverse impacts. No change to text.
283	Please provide more details on the financial compensation plans and how they will ensure lower-level workers such as deckhands and seafood processor workers are receiving compensation for disruption of fishing activities/displacement of effort/loss of income to conclude that it would minimize adverse impacts to minority and low-income populations engaged in commercial fisheries, fishing industries, and for-hire recreational fishing. If more information exists, please cite or refer to the section within EIS.	EJ	As stated in Section 3.5.1.2.3 of the DEIS, SFW has developed a financial compensation policy to be used when interactions between the fishing industries and Project activities or infrastructure cause undue interference with fishing gear. In addition, BOEM is open to working with state partners and the commercial and recreational fishing industries to investigate alternative strategies to negotiate compensatory mitigation agreements. South Fork Wind, LLC has negotiated with the State of New York, the State of Rhode Island, and the Commonwealth of Massachusetts to determine compensation packages for fishermen.
284	Section 3.5.4.2.4 (page 3-145) states that “the establishment of a vessel lane alternative could simplify navigation through the SFWF and potentially reduce conflicts between the Project and businesses involved in commercial fisheries and for-hire recreational fishing.” If this is to be used to explain why the Transit alternative will have a lower adverse impact on minority and low-income communities who work in fisheries, please provide additional information to support this conclusion.	EJ	Text added stating that the Transit alternative would be less disruptive to fishing activities in the SFWF in comparison to the Proposed Action.
145	Overarching/General Protected Species Comments NMFS biological opinions (e.g. NMFS 2020) should not be used as a reference unless referring to specific conclusions for the particular project that the biological opinion was issued for. We do not recommend relying on NMFS Biological Opinions to support conclusions reached by BOEM for other projects that were not the subject of that Opinion.	Marine Mammals	The references to the Vineyard Wind biological opinion are removed, however BOEM restated relevant conclusions that can be applied to the SFWF supported by reference citations and/or rationale as presented in the BiOp as appropriate.

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146	In the FEIS, any numbers in tables associated with project details should be consistent between all relevant documents (e.g, FEIS, current proposed or draft IHA, Biological Opinion, COP, etc.).	Marine Mammals	FEIS project details are revised for consistency with the project Biological Assessment and IHA.
147	Ensure that findings for each effect/species are supported by references where possible and in context of the proposed Project, therefore allowing for a well reasoned and defensible document.	Marine Mammals	All references were reviewed and added where appropriate.
148	p. 3-38 - The statements regarding the overlap of project/effects with NARW critical habitat are not true unless all vessel traffic routes from ports in the Gulf of Mexico, Canada and/or Europe are specifically routed to avoid the Northeast and Southeast critical habitat areas. Please update text to confirm vessels will route around critical habitat or remove the text that vessel routes will not overlap critical habitat.	Marine Mammals	Section 3.4.4.1 of the FEIS is revised. and statements limiting the potential project impacts to just the project area are removed.
149	p. 3-38/39 - The description of distance to critical habitat is true, the absence of critical habitat from the project area should not be presented as support for the area not being important for these species. Critical habitat has a specific regulatory definition and may not include all current biologically important areas for these species.	Marine Mammals	Section 3.4.4.1 of the FEIS is revised and statements limiting the potential project impacts to just the project area are removed.
150	p. 3-39 - Clarify which analysis area is being referred to here as it is unclear which one is referred to here as “Figure E-5. Marine mammals geographic analysis area” overlaps with North Atlantic right whale critical habitat.	Marine Mammals	Section 3.4.4.1 of the FEIS is revised to clearly state that NARW critical habitat exists within the geographic area of analysis.
151	p. 3-39 - Last paragraph - Reference to Table F-6 Appendix F appears to be referencing the wrong table - perhaps it should be Appendix E.	Marine Mammals	The correction is made
152	p. 3-39 - The Programmatic EIS for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf (MMS 2007) is outdated as a reference for detailed species descriptions and life history information and should be replaced. It is important that the FEIS reflect and cite the best available information on all topics including species descriptions and life history information.	Marine Mammals	The reference to the 2007 EIS is replaced with the project Biological Assessment and IHA request.
153	p. 3-39 - Blue whales would not be expected to be found in the defined area of direct effects; they are uncommon in this area. However, they would be expected to be found in the Geographic Analysis Area.	Marine Mammals	Blue whale has been removed from Table 3.4.4-2, and text will be revised to clarify that occurrence is unlikely.
154	p. 3-42 - Table 3.4.4-2 - We recommend that in the FEIS this table reflects the most recent population estimates, given the anticipated timing of the FEIS we expect that the 2021 SARS may not be available for reference but there may be Tech Memos available with population updates. Please plan to coordinate with NMFS prior to finalization of this table in the FEIS so that we can ensure they reflect the best available information at the time. Please note that we anticipate that the new population estimate for NARWs will be significantly lower than the value included in the 2020 SAR and reflected in this table (see, as an indication the 2020 NARW Report Card: https://www.narwc.org/uploads/1/1/6/6/116623219/2020narwcreport_cardfinal.pdf .	Marine Mammals	The Table 3.4.4-2 is updated with the most recently available population estimates.

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155	p. 3-43, p. 3-66 - As noted in the letter, the definition of “minor” indicates impacts could be avoided but “if impacts occur, the loss [mortality] of one or a few individuals of a population could represent a minor impact, depending on the time of year and number of individuals involved.” Therefore, a minor impact could include mortality to individual(s) and presumably, similar to “moderate”, would not result in population level consequences. It is unclear how the time of year of the loss of an individual(s) is relevant to marine mammal population level impacts. In addition, presumably “moderate” also includes the loss of individuals but this is not included in the definition. As defined in the DEIS, it is difficult to distinguish the difference between minor and moderate impacts. Also, as noted in our cooperating agency comments, the introduction of the potential for mitigation measures to reduce impacts introduces further confusion and uncertainty into these definitions, particularly as to be characterized as “minor” it is only necessary that mitigation could avoid the impacts not necessarily that such mitigation would be required or would reasonably be expected to reduce those impacts. BOEM has identified that the project could result in negligible to moderate impacts which implies there could be mortality of marine mammals incidental to the project. This is inconsistent with the analysis in the DEIS. For comparison, the significance criteria in BOEM’s Atlantic G&G EIS were the following: ● Negligible: Little or no measurable/detectable impact. ● Minor: Impacts are detectable, short-term, extensive or localized, but less than severe. ● Moderate: Impacts are detectable, short-term, extensive, and severe; or impacts are detectable, short-term or long-lasting, localized, and severe; or impacts are detectable, long-lasting, extensive or localized, but less than severe. ● Major: Impacts are detectable, long-lasting, extensive, and severe. We recommend that alternate definitions that are clearly distinguishable from each other be used in the FEIS.	Marine Mammals	The FEIS incorporates the revised significance criteria provided by NMFS. All impact determinations were reviewed for consistency.
156	p. 3-44 - Specify if the 5,779 miles of cable is AC or DC.	Marine Mammals	The cable is most likely to be AC.

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157	p. 3-45, 3-47, 3-60, 3-63, etc - Throughout the document, sound sources are not described accurately. The information under “Intermittent, Non-impulsive Noise” discusses vessel and aircraft noise, vibratory pile driving, operational noise from WTG, etc. These sources are continuous, non-impulsive noise sources. Intermittent, non-impulsive noise sources are sources like echosounders and sub-bottom profilers. The “intermittent” refers to the signal characteristic, not if a vessel passes by and then leaves. There are also several places (e.g., page 3-52) that refer to vibratory pile driving as intermittent noise when it is a continuous noise source. Sources such as the ones we are concerned with here are generally characterized in the following two ways: by its temporal (continuous or intermittent) and pulse properties (impulsive or non-impulsive). Continuous sounds are those whose sound pressure level remains above that of the ambient sound, with negligibly small fluctuations in level (NIOSH, 1998; ANSI, 2005), while intermittent sounds are defined as sounds with interrupted levels of low or no sound (NIOSH, 1998). Sounds can also be characterized as either impulsive or non-impulsive. Impulsive sounds are typically transient, brief (< 1 sec), broadband, and consist of a high peak pressure with rapid rise time and rapid decay (ANSI, 1986; NIOSH, 1998). Impulsive sounds, by definition, are intermittent. Non-impulsive sounds can be broadband, narrowband or tonal, brief or prolonged, and typically do not have a high peak sound pressure with rapid rise/decay time that impulsive sounds do (ANSI 1995; NIOSH 1998). Non-impulsive sounds can be intermittent or continuous. There are 3 combinations relevant here: (1) impulsive, intermittent (e.g., impact pile driving, airguns); (2) non-impulsive, continuous (e.g., vibratory pile driving, vessel and aircraft noise); and (3) non-impulsive, intermittent (e.g., HRG equipment). Under the Impulsive Noise headings in the DEIS, there are discussions on impacts from aircraft, vessels, and HRG surveys which are sources that do not contain impulsive noise signatures and are not intermittent. These activities should be described as generating non-impulsive noise and are continuous. The FEIS should accurately describe the nature of the sound sources in question throughout the document.	Marine Mammals	The FEIS is revised to ensure consistent use of terminology as recommended.
158	p. 3-46 - Suggest reframing discussion of G&G surveys throughout to exclude or, at least, minimize references to airguns, as that acoustic source will not be utilized in OSW site characterization/assessment. Suggest centering the discussion on G&G tools that actually will be used in OSW rather than those that won’t, given that the suite of high-resolution geophysical tools typically used for site characterization is now well established.	Marine Mammals	Section 3.4.4.2.2 of the FEIS is revised to remove the comparison of high-resolution surveys to air guns.
159	p. 3-46 - The level of detail provided here is not sufficient to evaluate impacts. The qualitative comparison to G&G noise is not particularly relevant - what is needed is a quantification of the noise levels from this particular activity. If this is provided elsewhere, please provide references to the appropriate table(s) or figure(s).	Marine Mammals	Section 3.4.4.2.2 of the FEIS considers potential underwater noise impacts from windfarm development that are likely to occur in the absence of the project under the no-action alternative. While the potential number and distribution of WTGs in the region can be estimated based on leased area and typical turbine spacing, the projects in question have not been designed yet and the information required to quantify these noise effects (e.g., foundation type, pile diameter, hammer strength, etc.) is not available. Underwater noise impacts resulting from construction and operation of the proposed action are quantified in Section 3.4.4.2.3.

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160	p.3-46, etc. To avoid public confusion, please avoid referring to TTS as an “injury”. Any reference to “recoverable auditory injuries” should be replaced with temporary hearing impairment or temporary threshold shift (TTS).	Marine Mammals	The FEIS text is revised to avoid referencing TTS as an injury.
161	p. 3-46 - There isn’t enough information in this text to evaluate this statement (“As explained above, the use of measures to mitigate exposure is expected to reduce the potential for injury, and most individuals would only be exposed to noise that would result in recoverable auditory injuries and behavioral impacts”).	Marine Mammals	Please see response to Comment 159. The statement in question references the typical range of mitigation and monitoring requirements imposed by BOEM and in IHAs issued by NMFS for individual projects.
162	p. 3-47 - It is unclear if the discussion of potentially concurrent pile driving (i.e., multiple projects installing piles in the same construction season) is still accurate based on the delay of the Vineyard Wind project and the current timelines for permitting of other OSW projects. The FEIS should reflect the best understanding of future construction scenarios that is available at that time and should be written with enough flexibility to reflect evolving project timelines.	Marine Mammals	Table E-4 of the FEIS is updated with schedule information available on June 1, 2021.
163	p. 3-47 - Additional information should be provided in the discussion of concurrent pile driving and neighboring projects. The assumptions that are built in to estimating the amount of time that pile driving noise may occur during a particular year need to be clearly laid out. It is also not clear if overlapping sound fields are anticipated and how the movement of individuals is accounted for in this analysis. There does not seem to be a clear analysis or conclusions regarding the exposure of an individual to multiple sources of pile driving noise over a day or season.	Marine Mammals	Section 3.4.4.2.2 of the FEIS is updated with the most recent schedule of pile driving and incorporates by reference the detailed discussion in the VW FEIS.
164	p. 3-48 - 3rd paragraph, first sentence - Consider rephrasing from “limited” to “it could include” to more accurately reflect the potential consequences of exposure to vessel noise.	Marine Mammals	Section 3.4.4.2.2 of the FEIS is revised to change “limited” to “it could include.”
165	p. 3-48 - With regards to assessing OSW vessel traffic during construction, use of the terminology "short term" and "brief" is not appropriate here. There will be heightened vessel activity for 9 years, with a peak in activity spread over a few years of peak construction. Also, Cholewiak et al. 2018 could be cited for a study that builds on the Hatch et al. 2012, modeling loss in communication space for multiple baleen whale species due to multiple vessel types, in a nearby habitat (SBNMS).	Marine Mammals	Thank you for the reference recommendations. Section 3.4.4.2.2 of the FEIS is revised accordingly and will incorporate this important context.
166	p. 3-48 - The following text does not contain enough detail to substantiate this claim: “However, BOEM expects that these brief responses of individuals to passing vessels would be unlikely given the patchy distribution of marine mammals; no stock or population-level effects would be expected.” Particularly in the MA/RI WEAs, there are frequent documented aggregations of right whales; the document would need to demonstrate that the anticipated vessel traffic patterns don't overlap with RW use of that region to make such a claim. A paper in press (at least part of which has been forwarded to BOEM) indicates that this area has been a recent hotspot for right whale distribution.	Marine Mammals	Section 3.4.4.2.2 of the FEIS is revised to reflect a greater degree of uncertainty about the potential effects and significance of construction vessel noise relative to baseline conditions.

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167	p. 3-49 - Port Utilization: This paragraph contains numerous conclusory statements with no substantive analysis or citations. The conclusions that resulting impacts of port utilization and port expansion would be “short term, localized..and therefore, negligible” is not supported by the information presented in the paragraph. Please update text with reference information to support conclusions. If no reference information is available it should be explained why conclusory statements are valid.	Marine Mammals	Section 3.4.4.2.2 of the FEIS is revised to acknowledge that future offshore wind projects may include port improvements but as of now, no such improvements have been proposed and therefore can't be quantified.
168	p. 3-49 - The presence of structures section references Section 3.4.2.2.2. Within this section the discussion of potential effects (pg 3-13) on large whales is inadequate. See comment earlier in this document.	Marine Mammals	The reference is removed.
169	p. 3-49 - We recommend noting in the beginning of the second paragraph of this section that while harbor porpoises could be attracted to turbines for feeding opportunities, available information indicates that they also appear to have been displaced by wind farms in some areas.	Marine Mammals	Section 3.4.4.2.2 of the FEIS is revised to reflect the findings of Tougaard et al. (2009, 2015).
170	p. 3-49 - In addition to the citations listed in a below comment for ship strikes, we would recommend citing Corkeron et al. 2018. Also, the most up to date stats show 83% of observed individuals showing evidence of at least one entanglement and 59% showing evidence of multiple entanglements, see Knowlton et al. 2012 in Marine Ecology Progress Series.	Marine Mammals	Section 3.4.4.2.2 of the FEIS is updated with the Knowlton reference. For the purposes of NEPA analysis, and to meet page limitations, multiple citations supporting similar conclusions are unwarranted.
171	p. 3-49 - We recommend that BOEM consider increasing the annual number of inspections for ghost gear as there is potential animals could use these areas for foraging and thus pose a persistent interaction risk. At least in the beginning of the project operation, the turbines should be checked more frequently to get a sense of how often ghost gear gets tangled in the turbine structures and then that information could be used to develop a long term inspection schedule.	Marine Mammals	Thank you for your recommendation. BSEE will work with SFW to determine an appropriate inspection schedule, which may be modified based upon the results of the inspections to be more or less frequent as needed.

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172	p. 3-50, first paragraph. It is unclear if BOEM anticipates displacement of ESA listed marine mammals or large whales generally from the project site following construction. The text in this paragraph should be clarified so that BOEM's conclusions are clear.	Marine Mammals	The FEIS text is revised for clarity. BOEM does not anticipate broad displacement of marine mammals based on typical 1-nm WTG spacing, but recognizes that long-term monitoring of offshore wind effects on marine mammals has been limited and considerable uncertainty remains. As stated, Long (2017) summarized preliminary monitoring of two Scottish wind farm installations pre- and post-construction and found that marine mammal use appeared to return to normal, noting that marine mammals displacement has not been associated with other types of offshore structures like oil drilling platforms. Wind farms have been associated with both displacement and attractive effects on marine mammals, varying by species. For example, Tielmann and Carstensen (2012) documented the apparent long-term (> 10 year) displacement of harbor porpoises from previously occupied habitats in the footprint of Danish wind farms. However, others have questioned the influence of other factors on this apparent effect. In contrast, Russell et al. (2014) observed an attractive effect on gray and harbor seals drawn by the concentration of prey resources created by the reef effect around turbine and OSS foundations. Allen (2020) and Copping et al. (2020) summarized the state of the science on the effects of offshore wind facilities on marine mammals and other marine species. The collectively conclude that monitoring efforts to date have not provided a consistent evaluation of displacement effects and additional research and monitoring is needed. BOEM concurs with this conclusion.
173	p. 3-50, second paragraph - If the "NMFS 2020" citation is a reference to the Vineyard Wind biological opinion, this reference should be removed and replaced with appropriate scientific literature. The conclusions that the presence of structures "would not adversely affect marine mammal populations" is not well supported by the information presented in this paragraph and the final sentence noting long-term impacts that will persist until decommissioning appears to contradict that conclusion. Please also see other comments on the effects of structures on NARW prey.	Marine Mammals	References to the Vineyard Wind biological opinion are removed and restated with relevant conclusions that can be applied to the SFWF supported by reference citations and/or rationale as presented in the biological opinion as appropriate. Effects on prey species are discussed in more detail with internal referencing to effects on finfish and EFH in Section 3.4.2.2.
174	p. 3-50 - Second to last sentence of "Traffic" paragraph appears to be missing a word, perhaps "detection": "Weather conditions (e.g., fog, rain, and wave height) and nighttime operations also reduce marine mammal"	Marine Mammals	The change is made in the FEIS.
175	p. 3-50 - Suggestion to reference (Kelley et al. 2020 - Assessing the lethality of ship strikes on whales using simple biophysical models) as the paper demonstrates small vessels pose a serious vessel strike risk to large whales, Laist et al. 2001 is dated in regards to vessel size impacts.	Marine Mammals	Modelled assessment of risk may be useful for considering how different assumptions might affect outcomes in a general sense. However, modelled risk is only an assessment of the users' assumptions, not a reporting of scientific understanding or observations. Our assessment is based on the best available science and observation.
176	p. 3-50 - More information is needed to describe the baseline vessel traffic and the baseline risk of vessel collision. Additional context is necessary to support the vessel traffic risk analysis.	Marine Mammals	The baseline level of vessel traffic associated with the RI/MA WEA and surrounding area is described in detail in Section 3.5.1.1 (commercial and

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			recreational fishing activity) and Appendix H, Section 3.5.6.1 (navigation and vessel traffic). Internal reference has been added to the FEIS.
177	p. 3-50, last paragraph, third sentence - The conclusion that the risk of marine mammals collisions with OSW project vessels is negligible is not well supported by the information provided. This paragraph does not appear to account for transit vessels for crew and maintenance (only construction vessels are mentioned here) and does not assess the risk from vessels operating at speeds greater than 10 knots. As was noted in an earlier comment, these smaller vessels could result in serious injury (Kelley et al. 2020). It is also unclear what "other mitigation measures" are being considered in this context and how they may reduce risk.	Marine Mammals	Section 3.4.4.2.2 of the FEIS is revised to acknowledge that impacts for increased vessel traffic could be moderate considering all future activities.
178	p. 3-51 - It is not clear why interactions with commercial and recreational fishing activity are included in the Vessel Traffic section. The FEIS should clearly address whether these interactions are expected to be vessel interactions or gear interactions.	Marine Mammals	Fishing vessels (i.e., vessels, not their gear) are included as a component of baseline vessel traffic and the associated collision risk assessment. Entanglement risk (i.e., is addressed under Accidental Releases and Discharges at the beginning of Section 3.4.4.2.2. Additional clarification has been added.
179	p. 3-51 - It is not clear why interactions with commercial and recreational fishing activity are included in the Vessel Traffic section. The FEIS should clearly address whether these interactions are expected to be vessel interactions or gear interactions.	Marine Mammals	Duplicated comment. Please see response to Comment 178.
180	p. 3-51 - The section on Noise, beginning at the bottom of the page, should also include G&G acoustic sources (excluding airguns).	Marine Mammals	Section 3.4.4.2.3 of the FEIS is updated to include a discussion of G&G surveys the developer may conduct as part of the proposed action.
181	p. 3-51 - We agree that the Dec 31-May 1 construction window would reduce effects to NARW compared to a construction schedule that included those months, however, recent surveys have found NARW increasingly prevalent in southern New England during other seasons, particularly late summer into fall. It would be prudent to consider expanding enhanced mitigation measures to months when NARWs are prevalent or explaining how mitigation measures will reduce effects when NARWs are prevalent.	Marine Mammals	The FEIS incorporates additional mitigation measures required to comply with the IHA, including additional timing restrictions as appropriate.
182	p. 3-52 - It is our understanding that South Fork is proposing to install the cofferdam between October-May so the sentence about the in-water construction window and subsequent effects on marine mammals should be amended to include this.	Marine Mammals	Agreed, FEIS text is revised accordingly.
183	p. 3-53 - Table 3.4.4-4 - As it will likely be unclear to the public, suggest explicitly describing how the values shown in the table are derived from the Denes et al. (2020). Please include metric equivalents for all distances to injury and behavioral harassment thresholds in text and tables.	Marine Mammals	Thank you for your recommendation. The Table 3.4.4-4 description will be refined to include a description of the detailed site-specific information Denes et al. (2020) used to characterize the potential extent of underwater noise effects on different marine mammal hearing groups.
184	p. 3-54 - South Fork's application and the proposed IHA include a maximum 30-day timeframe for installation of the WTGs and OSS, versus the 48-day window analyzed by CSA Ocean Sciences, Inc. (2020). This inconsistency should be addressed in the FEIS.	Marine Mammals	The FEIS is revised to be consistent with the IHA.

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185	p. 3-54, second full paragraph: Throughout this section, it would be more clear to specifically note the mitigation measures that are being relied on to reduce effects. For example, it is difficult to assess the potential risk reduction associated with the phrase “NOAA and BOEM are likely to require additional mitigation measures.”	Marine Mammals	At the time of the preparation of the DEIS, BOEM also submitted a biological assessment for the project. The biological opinion was not available. All mitigation measures identified in the biological opinion are incorporated in the FEIS, Appendix G, Table G-2, and the FEIS text is revised accordingly.
186	p. 3-54, second full paragraph, last sentence - This is in direct conflict with the previous statements in the paragraph that some individual animals could suffer permanent hearing injuries, and that depending on the severity of the injury, they may be less able to feed effectively, identify predators etc. It is not clear how these statements relate to the conclusion that impacts are likely to dissipate in hours-days. Additionally, please replace NMFS 2020 (the Vineyard Wind biological opinion) with a more appropriate primary source.	Marine Mammals	The intent of the last sentence is to state that TTS, auditory masking, and related physiological and behavioral effects will dissipate after the exposure ceases. PTS effects would be permanent by definition and may have the associated effects on survival as stated. The statement is revised in the FEIS for clarity and consistency with the exposure estimates presented in Table 3.4.4-5. BOEM has removed all references to the Vineyard Wind biological opinion but may rely on the same reasoning as appropriate.
187	p. 3-54 and 3-55 - We encourage you to supplement the information presented on the CSA 2020 modeling with a discussion of anticipated effects to, and responses of marine mammals to pile driving noise that are available in the literature. Without the context of the assumptions and information that informed the modeling and a summary of other available literature on this topic, the text could be criticised as being overly reliant on the model results and lacking an independent or additional analysis that would support BOEM’s position that the modeling represents the best available scientific information. Examples of other literature include Bailey et al. 2010 and Russell et al 2016 (Journal of Applied Ecology 2016, 53, 1642–1652); if BOEM does not believe that the other available literature on marine mammal responses to pile driving is relevant or representative of what is anticipated in association with the South Fork project, that should be explained.	Marine Mammals	CSA Ocean Sciences Inc. (2020) developed estimates of the number of marine mammals that could be exposed to potential adverse noise-related effects to support MMPA compliance for the Proposed Action alternative. They used a sophisticated exposure model to estimate the number of individuals by species that could be exposed to PTS (i.e., permanent hearing injury), temporary threshold shifts (TTS, i.e., a temporary and recoverable loss of hearing sensitivity), and other short-term physiological and behavioral effects from construction noise exposure. The modeled scenario included the planned use of the 10-dB noise attenuation system and timing restrictions to protect NARW, but did not account for other measures to reduce exposure risk (i.e., clearance zone monitoring using PSOs and PAM, soft starts, and shutdown procedures) BOEM considers this a reliable analysis for use in the FEIS. Section 3.4.4.2.3 is updated with this text.
188	Table 3.4.4-5 - Please correct modeled exposure numbers in the TTS or Physiological Behavioral Effects column to the following: common bottlenose dolphins (43); common dolphins (197); Risso’s dolphin (1).	Marine Mammals	Table 3.4.4-5 is updated with the numbers provided.
189	p. 3-55 - Retained old language that equates a MMPA negligible impact definition “Therefore, the adverse effects of airborne noise on seals are unlikely to impact annual rates of recruitment or survival of the species and would be negligible.” Please remove.	Marine Mammals	The statement has been revised as requested, with additional context provided.
190	p. 3-55 - last paragraph - Seals are not particularly easy to spot, and they certainly can not be spotted if they are underwater. Adding some qualifications to this sentence (“..marine mammal observers would be able to spot seals…”) would be worthwhile.	Marine Mammals	The statement has been revised to state that marine mammal observers would monitor for seals.
191	p. 3-56 - The non-impulsive noise category also includes certain types of G&G equipment (e.g., CHIRPS). This comment applies to page H-65 as well.	Marine Mammals	Section 3.4.4.2.3 in the FEIS to include geophysical equipment such as CHIRPS under non-impulsive noise.

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192	p. 3-56, 3-63 - The DEIS indicates the airborne noise threshold for seals in 90dBA. This is incorrect. A-weighting is for human hearing and should not be applied here. The airborne noise threshold for harbor seals in 90dB unweighted. The airborne noise threshold for all other pinnipeds (including gray seals) is 100dB unweighted.	Marine Mammals	Section 3.4.4.2.3 in the FEIS is corrected to use the correct current thresholds for pinnipeds are 90 dBRMS for harbor seals and 100 dBRMS for all other seals.
193	p. 3-56 - A citation should be included for the distances cited (22.8 miles and 0.9 miles) and sufficient information should be provided for a reader to understand how these distances were calculated.	Marine Mammals	Citation added.
194	p. 3-56 - The following sentence needs a citation or some sort of support, otherwise it is based on assumptions that may not be valid. It also assumes there are suitable alternatives where seals can haul out if they are displaced from an area: "It is unlikely that highly mobile species like whales and seals would remain so close to a source of behavioral disturbance for an entire construction day, meaning that the likelihood of permanent hearing injury is low." We note that there are numerous statements about the mobility of marine mammals and their anticipated avoidance of noisy areas, but no citations or scientific evidence is included to support those claims.	Marine Mammals	Ellison et al. (2012) and Dunlop et al. (2017) have documented marine mammal aversion responses to underwater noise indicative of the types of behavioral response anticipated here. Section 3.4.4.2.3 of the FEIS is revised to include this additional support.
195	p. 3-57, first sentence - Suggestion to include a citation or specifically identify the "marine mammal behavioral thresholds."	Marine Mammals	Section 3.4.4.2.3 of the FEIS is revised as follows: "Denes et al. (2020) modeled the distance required for construction vessel noise to drop below the 120 dBRMS marine mammal behavioral threshold for non-impulsive noise sources (see Table 3.4.4-3)."
196	p. 3-57, first paragraph - Additional information is needed to support the conclusions in this paragraph. There is no information provided to either explain the consequences of an individual being exposed to non-injurious levels of construction vessel noise and no explanation of why it is expected that an animal would avoid that noise, including consideration of foraging resources that may occur within that area, or what the consequences of such avoidance would be. It is also unclear how many vessels will be producing noise that will be above the marine mammal behavioral thresholds and for what duration each day and for how many days. This additional information is necessary to fully assess these effects.	Marine Mammals	Section 3.4.4.2.3 of the FEIS is updated to include information from the biological assessment concerning the levels of construction activities.
197	p. 3-57 - An analysis of effects of dredging and installing 5 24" steel piles (for a dock) at Lake Montauk Harbor should be included in the FEIS.	Marine Mammals	The FEIS is revised to reflect refined project information made available after the DEIS was released

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198	p. 3-57, 3-58 - In the first sentence of the Vessel Traffic section, project vessel traffic appears to have been limited to construction vessels. The Vessel section and subsequent analysis should include all project related vessel traffic including crew transport, maintenance and repair, and survey vessels, not just the large vessels, as of now it only briefly describes construction vessel use. Smaller, fast moving vessels pose a similar risk to large whales. Additionally, a more thorough explanation as to how the effect determination, based on mitigation and monitoring measures, was made is needed. The phrase "generate disturbance" should also be explained.	Marine Mammals	Please note that the discussion in question specifically addresses construction effects. This section was updated to include HRG survey vessels supporting project construction. With regard to O&M vessels, the revised project design specifies that the SFWF will be serviced by a single 95-foot-long crew transport vessel making an average of two transits to and from the wind farm each week, for a total of 2,500 vessel trips over the 30-year lifespan of the project. The Vessel Traffic component of the Operations, Maintenance, and Conceptual Decommissioning analysis will be revised accordingly. The sentence containing "generate disturbance" was eliminated as part of other section revisions.
199	p. 3-58 - Vessel traffic: Why are only trips from New London, CT mentioned if more regional ports will be used? Please add in trips from MA and RI or explain why vessel trips are not incorporated from these ports. Additionally, the use of the term "MA/RI WEA" is misleading here because the MA/RI WEA does not include the coastal ports in MA, RI, or CT, it is the name of the WEA. Please change the reference MA/RI WEA reference to a more geographically accurate area The number of vessel trips do not align with Table 2 in the South Fork biological assessment, please clarify which vessel numbers are accurate. This comment applies to page H-72 as well.	Marine Mammals	The FEIS is revised to include the vessel trip information presented in the biological assessment, which presented the most current estimates provided by the applicant.
200	p. 3-58 - 1st full paragraph - Please remove discussion of conclusions from the Vineyard Wind biological opinion; they are not necessarily relevant to the South Fork project.	Marine Mammals	Reference to the Vineyard biological opinion has been removed as requested.
201	p. 3-58 - It is unclear how BOEM is relying on voluntary speed restrictions as a mitigation measure. The FEIS should ensure that any reference to voluntary speed restrictions clearly explains whether BOEM is intending to require compliance with measures that would otherwise be voluntary (e.g., reducing speed in Dynamic Management Areas) or is relying on voluntary compliance. Voluntary speed restrictions only work when the vessel operator decides to voluntarily comply. Evidence to date (see NMFS 2020 NARW Vessel Speed Rule Assessment, https://www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-vessel-strikes-no rth-atlantic-right-whales) suggest that voluntary compliance with speed restrictions is generally lower than needed to achieve conservation targets.	Marine Mammals	As stated in Appendix G, Table G-1, the applicant will require project vessels to adhere to NOAA guidance for avoiding marine mammal collisions. In addition, BOEM has included measures provided by NMFS in the biological opinion. These measures will be considered by the decision-maker and could be incorporated in the Record of Decision.
202	p. 3-58 - The first paragraph in the Operations and Maintenance and Conceptual Decommissioning section mentions vessel traffic twice.	Marine Mammals	Thank you for your comment. Text revised.
203	p. 3-58 and 3-62 - We recommend that in the FEIS, the final paragraph of the Vessel Traffic section be replaced with a discussion of the conclusions in the eventual biological opinion produced for the South Fork project rather than relying on conclusions reached for Vineyard Wind. It is also important to note that any conclusions reached in a biological opinion are only relevant for ESA listed large whales and do not necessarily apply to all marine mammals.	Marine Mammals	The FEIS incorporates the biological opinion. All references to the Vineyard Wind biological opinion are removed.

Comment #	Comment Text	Comment Category	Comment Response
204	p. 3-59 - We request that in the FEIS, BOEM avoid relying on conclusions reached in the Vineyard Wind Biological Opinion to support determinations regarding the South Fork project. We recommend that statements in the discussion of the effects of structures be replaced with a discussion of the conclusions in the eventual biological opinion produced for the South Fork project rather than relying on conclusions reached for Vineyard Wind. It is also important to note that any conclusions reached in a biological opinion are only relevant for ESA listed large whales and do not necessarily apply to all marine mammals.	Marine Mammals	The reference to the Vineyard Wind biological opinion has been removed. However, BOEM believes that the rationale presented regarding barrier effects applies equally well to the SFWF based on planned turbine spacing of 1-nm and is therefore retained.
205	p. 3-59 - Hydrodynamic effects may be different for cumulative impacts of multiple wind farms. Also, this region is documented as a right whale habitat hotspot, so local impacts may matter.	Marine Mammals	Section 3.4.4.2.2, which discusses all potential future activities includes a discussion of hydrodynamics. The section referenced in the comment pertains to the proposed action.

Comment #	Comment Text	Comment Category	Comment Response
206	p. 3-59/60 - The characterization of the potential impacts of structures is misleading or inappropriate in a number of ways. The quote from the Vineyard Wind BiOp appears to be discussing potential impacts of individual turbines and is misleading with regards to potential impacts from a full shelf-wide build out, which does have the potential to impact zooplankton distributions and prey for many organisms, including the North Atlantic right whale. The quote provided in this DEIS is from the biological opinion, and some key omitted text precedes the text provided in this DEIS. It states p. 3-59/60 - The characterization of the potential impacts of structures is misleading or inappropriate in a number of ways. The quote from the Vineyard Wind BiOp appears to be discussing potential impacts of individual turbines and is misleading with regards to potential impacts from a full shelf-wide build out, which does have the potential to impact zooplankton distributions and prey for many organisms, including the North Atlantic right whale. The quote provided in this DEIS is from the biological opinion, and some key omitted text precedes the text provided in this DEIS. It statesp. 3-59/60 - The characterization of the potential impacts of structures is misleading or inappropriate in a number of ways. The quote from the Vineyard Wind BiOp appears to be discussing potential impacts of individual turbines and is misleading with regards to potential impacts from a full shelf-wide build out, which does have the potential to impact zooplankton distributions and prey for many organisms, including the North Atlantic right whale. The quote provided in this DEIS is from the biological opinion, and some key omitted text precedes the text provided in this DEIS. It states that "We note that as the scale of offshore wind development in the Mid-Atlantic Bight increases and the area occupied by wind turbines increases, the scope and scale of potential impacts may also increase and this issue may require additional research and analysis to support future assessments. However, this consultation only considers the effects of the proposed Vineyard Wind project." The thinking on this question has also evolved recently, and there is more concern about the potential impacts of large scale offshore wind build-out on shelf-wide oceanography and associated prey fields. There is an additional concern about turbine-related effects for the South Fork project since that area has recently been proved to be a hotspot for right whale foraging during the spring (this is in an upcoming paper, a portion of which was shared with BOEM). So, a comparison to Vineyard Wind with regards to individual turbine impacts is not appropriate. Lastly, the discussion with regards to the oceanographic and prey impacts implies much more certainty than we currently have on this issue. There is a high degree of uncertainty as to what the impacts would be. This document needs to reflect the increased concern over changes to oceanography and prey distribution relative to the planned shelf-wide build out, it needs to reflect the uncertainty in knowledge on this issue, and also needs to reflect the fact that the comparison between Vineyard Wind and South Fork is not appropriate with regards to individual turbine/wind farm effects.	Marine Mammals	The reference to the Vineyard Wind biological opinion has been removed. Section 3.4.2.2.3 discusses potential implications for primary and secondary production from localized changes in circulation and stratification patterns due to the presence of WTGs in detail. Implications of a full shelf-wide build out of wind farms are discussed in Section 3.5.1.2.2 and are summarized in Table E-4 of Appendix E.
207	p. 3-61, 3-65 - Under "Artificial Lighting", the DEIS reiterates the conclusion of Orr et al (2013) but does not identify/summarizes what the recommended design or operating practices are or if South Fork would implement such designs or practices.	Marine Mammals	Section 3.4.4.2.3 of the FEIS is updated to describe the applicant committed environmental protection measure to use the minimum amount of light.

Comment #	Comment Text	Comment Category	Comment Response
208	p. 3-62 - Vessel traffic - Any reference to mitigation measures should clearly identify which measures are being referred to and which vessels they will apply to (e.g., construction vessels vs. crew transfer vessels).	Marine Mammals	Section 3.4.4.2.3 of the FEIS is updated to include the mitigation measures from the biological opinion.
209	p. 3-62 - Has 330 feet been shown as the minimum distance to avoid additive EMF effects? No citation is provided. This comment applies to page H-64 as well.	Marine Mammals	Please see response to Comment 42.
210	p. 3-64 - There is no mention of vibratory pile driving in the intermittent non-impulsive noise section.	Marine Mammals	Vibratory pile driving is a continuous non-impulsive noise source (not intermittent). No change made.
211	p. 3-65 - Presence of Structures - The potential impact to oceanography and prey fields should be mentioned, also that there is a lot of uncertainty as to the potential impact. Also, the statement that the long-term impacts will be negligible to minor beneficial is species dependent. In instances where the significance would be different to different marine mammal species or groups of species we recommend identifying those differences.	Marine Mammals	Sections 3.4.4.2.2 and 3.4.4.2.3 of the FEIS are updated to include a more detailed discussion of potential impacts to prey species.
212	p. 3-65 - When mentioning that the structures could attract fishing, it should be mentioned that an increase in seal bycatch may occur as well - gray seal bycatch in the Northeast is currently highest in nation, and the draft 2019 annual level was over PBR, with a large portion of the bycatch attributed to fishing in southern New England. So, the potential for increased bycatch could have population level impacts and cause gray seals to be listed as “strategic” under the MMPA which would then trigger the formation of a Take Reduction Team to reduce mortality, and this may have fishery management implications.	Marine Mammals	Sections 3.4.4.2.2 and 3.4.4.2.3 are updated to disclose that increased fishing around the structures could lead to seal bycatch.
213	p. 3-65 - Correction to a reference and statistic: Knowlton et al. (2012) report that 83% of NARWs show evidence of past entanglements.	Marine Mammals	Section 3.4.4.2.3 of the FEIS has been revised to reflect the more recent findings of Knowlton et al. (2012) (i.e., as of 2009, 83% of NARW had been entangled in fishing gear at least once, and 53% showed evidence of multiple entanglements).
214	p. 3-66 - Under Traffic, the first paragraph mentions an additional 13 construction vessels, while the second paragraph estimated five to nine vessels. Please correct for consistent numbers.	Marine Mammals	Section 3.4.4.2.3 of the FEIS is updated with the most recent vessel numbers to be consistent with the biological assessment.
215	p. 3-66 - It is unclear how a total of 13 vessels was calculated or how the negligible determination was made just because 13 additional construction vessels would occur. Additionally, are these construction vessels operating during operations or crew transfer vessels? Further details (how large are these vessels, what speeds will they operate, where will they operate) and context are needed to inform the conclusion.	Marine Mammals	Section 3.4.4.32.3 of the FEIS is updated with the most recent vessel numbers to be consistent with the biological assessment. The construction period is evaluated separately from the operations and maintenance period. Additional information is in Section 3.5.6, Navigation and Vessel Traffic, in the FEIS, and in Section 3.1-6 of the COP.
216	p. 3-66 - Under Climate Change, it is unclear how the analysis led to a moderate impact.	Marine Mammals	Further analysis is in the no action alternative. The cumulative analysis for climate change is identical to the no action alternative because the incremental contribution of this project does not change the overall impact determination.

Comment #	Comment Text	Comment Category	Comment Response
217	p. 3-66, Conclusions - Some of the potential impacts discussed in the body of the text above are non-recoverable, therefore this statement ("the resources would be able to recover completely") does not appear to be appropriate.	Marine Mammals	The conclusion refers to the proposed action and is consistent with the discussion of impacts from the proposed action and the impact definitions.
289	p. 4-3 - It is unclear why the marine mammal entry in Table 4.2.1-1. "Irreversible and Irretrievable Commitment of Resources by Resource Area" is limited to ESA species. In addition, the analysis in Chapter 3 does not discuss mortality of marine mammals as being likely to occur so the discussion here appears irrelevant.	Marine Mammals	ESA species are called out because of their status and the irreversible harm to the population should an individual be severely injured or killed. While mortality is highly unlikely, NEPA regulations require the disclosure of this potential outcome.
301	p. E1-5- Figure E-5 "Marine mammals geographic analysis area" does not include the Gulf of Mexico where project vessels may transit from.	Marine Mammals	As stated in the response to Comment 199, construction vessels could theoretically be sourced from ports in the Gulf of Mexico under unusual circumstances but the applicant believes this is highly unlikely. The geographic analysis area for marine mammals is defined based on the collective range of marine habitats used by the stocks and populations considered potentially significantly impacted by the proposed action.
317	General - There are several marine mammal mitigation measures that are inconsistent with those provided in South Fork's MMPA application and NMFS' proposed IHA. It appears that BOEM adopted several measures from the Vineyard Wind project that are not reflected in the South Fork COP or MMPA application. Additional clarification is necessary to identify which measures are to be considered part of the proposed action and which measures BOEM views as possible mitigation measures that could be imposed as a result of other regulatory processes (e.g., ESA, MMPA). Please contact NMFS to identify those measures that should be carried forward in the FEIS and which ones BOEM intends to require so that NMFS may identify the potential impacts to marine mammals in consideration of those measures.	Marine Mammals	The FEIS is updated with the South Fork Biological Opinion mitigation measures.
318	General - Project EPMs (Table G-1 in Appendix G) and associated text references Table G-1 refer to measures that neither South Fork nor NMFS have discussed. For example, the measures indicate that all pile driving is restricted to May 1- December 30 while page 3-52 indicates this time period is the in-water construction window (implying no in-water construction may occur outside this window). However, non-impact pile driving activities such as vibratory driving to construct the cofferdam and transmission line installation may occur year-round. South Fork's IHA application states "A cofferdam may be installed [2 days] for the sea-to-shore cable connection and, if required, would be installed between October 1st and May 31st." Before finalizing the EIS, BOEM should consult with South Fork and NMFS to align EMPs.	Mitigation	Table G-1 in Appendix G presents the environmental protection measures that SFW is proposing to adopt (COP, Table ES-1) and additional measures provided by SFW based on their application to NMFS for an IHA. BOEM recognizes that during the review process of the IHA, these measures may be modified and the Final EIS will be revised with the latest version.
319	Pg G-3_Table G-1 in Appendix G which outlines mitigation measures proposed by the applicant states "DWSF has designed the Project to account for site-specific oceanographic and meteorological conditions within the Lease Area; therefore, no additional measures are necessary". It would be helpful to include more information or references to information that describe how the project was designed to account for oceanographic and meteorological conditions. It is not clear how this would mitigate effects to water quality.	Mitigation	Table G-1 in Appendix G presents the environmental protection measures that SFW is proposing to adopt (COP, Table ES-1). The COP includes a detailed discussion of the environmental considerations in Chapter 4. This is the basis for SFW's determination that no additional measures are necessary.

Comment #	Comment Text	Comment Category	Comment Response
320	Pg G-3_Table G-1 in Appendix G which outlines mitigation measures proposed by the applicant states “The SFWF and SFEC offshore would minimize impacts to important habitats for finfish species.”; however, no details are provided on how this will be done. It is difficult to access the effectiveness of the effectiveness of this as a mitigation measure without further details. Consider adding details or referencing to where in the document the mitigation measure is evaluated.	Mitigation	Table G-1 in Appendix G presents the environmental protection measures that SFW is committing to adopt (COP, Table ES-1). The COP includes a detailed discussion of the environmental considerations in Chapter 4. This is the basis for their conclusion that SFWF and SFEC would minimize impacts with these measures in place BOEM, in consultation with NMFS, has included in the FEIS additional mitigation measures. These additional mitigation measures could also be considered by decision-makers and incorporated into the Record of Decision.
321	Pg. G-5 - The following measure needs to be clarified, as currently written its meaning and outcome is unclear: “A noise mitigation system (NMS) would be used, and if the NMS extends beyond the EZ, then the EZ would be the extent of the NMS.”	Mitigation	Appendix G of the Final EIS has been updated to include modifications and/or additional mitigation and monitoring measures that BOEM could choose to incorporate into the Record of Decision. These mitigation and monitoring measures were developed by NMFS through the ESA consultation process or through the Incidental Harassment Authorization process. BOEM incorporated them as provided by NMFS.
293	The individual maps in C-29 should be bigger, or the maximum work area should be represented by a polygon with a color that has greater contrast to the background color. For the AIS Fishing Track Logs panel in particular, it is difficult to see the difference between the work area and the background (the absence of vessel tracks)	Navigation	An additional figure (C-29a) is added to highlight tracks of fishing vessels. This is a full-page figure showing just fishing vessel tracks.
322	Include VMS data in addition to AIS data in the navigation and vessel traffic assessment in Section 3.5.6 of Appendix H. Alternatively, more clearly note the limitations of relying exclusively on AIS data to represent fishing vessel operational patterns. Reliance upon older AIS data underrepresents commercial fishing vessel traffic that may be affected within this area.	Navigation	Thank you for your comment. Please reference the Commercial Fisheries section 3.5.1 for a discussion of VMS data used for commercial fishing vessels.
1	Table ES-1_NEFSC had communicated to BOEM that we disagreed with their analysis that the South Fork project would have negligible to moderate impacts on scientific surveys. As we discussed, relative to North Atlantic right whales NMFS had requested the following language be added, “the proposed wind farm has the potential to restrict a survey plane’s ability to provide critical air support during disentanglement events for North Atlantic right whales. With less than 400 individuals, any lost opportunity to prevent entanglement mortality, particularly on a reproductive female can have major population level impact. In such disentanglement cases, disruptions to NMFS current survey and safety protocols could result in “major” impacts”. We recommend the FEIS be updated to reflect this language.	Other Marine Uses	Thank you for your comment. The level of impact under “other uses” scientific research has been clarified where we are addressing NMFS surveys versus other surveys that may occur in the project area. Please note that we maintain a major impact rating under the cumulative impact analysis, because as you have noted, this is an overall program-level, determination by NMFS. Regarding the disentanglement information, we have included this under search and rescue, as this is not scientific research but search and rescue of entangled marine mammals.

Comment #	Comment Text	Comment Category	Comment Response
285	The analysis for impacts to scientific research and surveys has incomplete assessments and descriptions of impacted surveys and the effects on management advice. Please refer to the Vineyard Wind SEIS and FEIS for appropriate treatment of this topic. In addition, the language used to analyze effects is inaccurate. The document states "Regular fisheries management and ecosystem monitoring surveys conducted by or in coordination with the NEFSC could overlap with offshore wind lease areas in the New England region and south into the Mid-Atlantic region." These surveys do overlap with the project and all other offshore wind lease areas to varying extents, depending on the survey and survey strata. In addition, the following statement is inaccurate: "As future wind development continues, alternative platforms, sampling designs, and sampling methodologies could be needed to maintain surveys conducted in or near the Project." Based on the analyses already completed for the VW SEIS, a federal survey mitigation program is needed to maintain survey time series for a number of NMFS long-term scientific surveys. The text should be modified to reflect this. Furthermore, these statements are inconsistent with other sections of the DEIS outlining a federal survey mitigation program. These comments apply to all sections where "other uses" have been evaluated and analyzed in the document.	Other Marine Uses	Section 3.5.7.1 is updated to change "could" to "would". The VW FEIS is referenced for additional information.
286	Under "Scientific research and surveys," add a reference to NOAA's Atlantic Marine Assessment Program for Protected Species aerial and shipboard survey and the North Atlantic Right Whale Sighting Advisory System aerial survey.	Other Marine Uses	The surveys are added to Section 3.5.7.1.
287	The paragraph describing the impact of the presence of structures on scientific surveys does not accurately reflect the impacts on NMFS scientific surveys, nor the concomitant impacts on management advice. We request that the authors incorporate an accurate description of the impacts as had previously been developed for the Vineyard Wind SEIS, DEIS, and FEIS. For example, the presence of structures will impact the safe operation of survey vessels within wind energy infrastructure (e.g., turbine arrays or submarine cable corridors); in addition, it is important to be clear that survey statistical designs employing randomized sampling will also be impacted. Further, changes in the variance structure of important biological metrics of stocks and habitats are likely to be different between wind energy areas and outside wind energy areas. This comment should be applied to all sections of the document in which scientific survey effects and impacts are discussed.	Other Marine Uses	Section 3.5.7.2.2 is updated with a reference to the VW FEIS.
288	Insert a description of any DWSF-funded survey mitigation program anticipated or reference such a description if it is included elsewhere in the document. Without such a description, there is no information upon which to base any conclusion that long-term adverse impacts to NOAA's scientific surveys would be lessened.	Other Marine Uses	Section 3.5.7.2.2 is revised to reference the regional Federal Survey Mitigation Program approach agreed to by NOAA.
290	In Table 4.2.1-1, revise the "other marine uses" description to include an irretrievable loss for NOAA survey operations. This is similar to the description of commercial fishing areas.	Other Marine Uses	BOEM does not agree that this is an irretrievable loss since surveys may be conducted with modern survey techniques.

Comment #	Comment Text	Comment Category	Comment Response
297	In Table E-1, "Other marine uses" correctly includes scientific research and surveys, but incorrectly states that the study area is the same as the aviation and land-based radar systems. The study area includes the Scotian Shelf, the Northeast Shelf, and the Southeast Shelf LMEs, the same range as for Marine Mammals.	Other Marine Uses	Table E-1, Other marine uses geographic area is based on the area impacted by the proposed action, which is the construction and operation the SFWF and SFEC. The description is not changed.
304	Figure E-15 (Other Uses) should be expanded to include broader geographic areas covered by existing NMFS survey efforts (see above).	Other Marine Uses	Figure E-15. Other marine uses geographic area is based on the area impacted by the proposed action, which is the construction and operation the SFWF and SFEC. The map is not changed.
316	In Table G-2 please specify that the Scientific Survey Mitigation measure is specific to "NMFS scientific surveys." Also in Table G-2, please define the duration of monitoring of the cable, foundation, and scour protection. For monitoring of the foundation and scour protection, it is stated that "20% of locations" will be monitored. Please clarify what is meant by "location" in this instance. Additionally, explain why monitoring will begin only in year 3 after construction.	Other Marine Uses	Table G-2 is revised to include the regional Federal Survey Mitigation Program approach, as agreed to with NOAA.
6	Pages 2-1 to 2-2_As previously commented on during the Cooperating Agency review, it is not clear what the total impact area calculations are based upon. While it is noted that Table 3.1-1 in the COP provides a detailed description of assumptions used to develop the footprint estimates presented, the totals presented in this table do not align with other calculations presented in the document (e.g. Table 3.4.2-2). Further, a hyperlink to the information in the COP should be provided, or the information should be included in the document as an appendix or included within the section.	Proposed Action	BOEM has provided a sufficient description of the proposed action in the EIS. Hyperlinks have not been added, but the EIS does provide detailed section references to the COP where applicable. Further, the organization of content is consistent with precedent set under the Vineyard Wind EIS.
7	Page 2-2_This section does not provide a description or detail of the WTG foundations, rather only refer to a figure in the COP, and multiple other citations are provided. The information should either be presented in the section, or included as an appendix in the document. There is also no description of the proposed scour protection for the WTGs and foundations provided within this subsection. If scour protection is proposed it should be included either in this section, or as a subsection of its own.	Proposed Action	BOEM has provided a sufficient description of the proposed action in the EIS. Hyperlinks have not been added, but the EIS does provide detailed section references to the COP.
8	Pages 2-2 to 2-3_As previously commented on during the Cooperating Agency review, it is not clear what the total impact area calculations are based upon. While it is noted that Tables 3.2-2 and 3.2-3 in the COP provide detailed descriptions of assumptions used to develop the footprint estimates, the totals presented in this table do not align with other calculations in the document (e.g. Table 3.4.2-2). Further, a hyperlink to the information in the COP should be provided, or the information should be included in this section of the document or as an appendix.	Proposed Action	Table 3.4.2-2 was reviewed, and the calculations are updated. The COP is available on the BOEM website and references are provided in sufficient detail to find the information.
9	Page 2-3_The discussion of the dredge footprint should also include information related to water depth and specify if the dredging is considered maintenance or new dredging.	Proposed Action	Additional details regarding anticipated dredging depths, locations, and volumes have been updated throughout the EIS. Please see Sections 2.1.1.1.5, 3.3.2.2.3, and 3.5.5.2.3 for information specific to the O&M facility at Montauk Harbor.

Comment #	Comment Text	Comment Category	Comment Response
10	Page 2-5_This section of the document includes multiple references to sections of the COP that provide details on the proposed construction and installation. The information should either be provided in the text, as an appendix, or be hyperlinked to the appropriate sections of the COP.	Proposed Action	The EIS COP references provide sufficient detail to find the information in the COP.
11	Reference to maintaining the 1-nm East-West turbine spacing should be inserted.	Proposed Action	Section 2.1.1.3.1 was revised to include reference to a uniform east–west and north–south grid with 1 × 1–nautical-mile (nm) spacing between WTGs.
12	Page 2-7_This section of the document includes multiple references to sections of the COP that provide details on the proposed construction and installation. The information should either be provided in the text, as an appendix, or be hyperlinked to the appropriate sections of the COP.	Proposed Action	The EIS COP references provide sufficient detail to find the information in the COP.
366	On page H-99, in Table 3.5.8-1 please include how the source data was collected, such as whether or not this was a separate data request as the information is not clearly found on the cited website.	Recreation	The following text was added to the table source notes, “Obtained from NOAA Economics: National Ocean Watch (ENOW) database.”
367	Please update ocean economy findings to a more current year (should be able to access up to 2019).	Recreation	Ocean economy data was updated to the latest publicly available data on the ENOW database.
368	Include clarification on how the estimate of 10-minute delay (or less) was found.	Recreation	The sentence was revised in Section 3.5.8.2.3 to state that “Recreation and tourism users driving on Montauk Highway could experience temporary delays from onshore SFEC construction activities along the highway.”
369	If possible please include relevant studies from Block Island Wind; the following is a suggested report on tourism from the University of Rhode Island: https://www.crc.uri.edu/projects_page/analyzing-of-the-effects-of-the-block-island-wind-farm-on-rh ode-island-recreation-and-tourism-activities/	Recreation	Section 3.5.8.2.3 of the DEIS includes the Block Island study of recreation impacts associated with viewshed changes and changes to recreational fishing and vessel congestion. No change made.
218	It is our understanding that additional information regarding sea turtles in the project area and anticipated effects of exposure to pile driving noise is being developed. We look forward to reviewing that information and seeing it incorporated into the FEIS. We also note that the marine mammal section contains consideration of concurrent pile driving and neighboring projects; similar analysis does not appear in the sea turtle section and should be added for the FEIS.	Sea turtles	The FEIS is consistent with updated information presented in the BA. Reference to the marine mammal discussion has been added to the section.
302	p. E1-7- Figure E-7 “Sea turtles geographic analysis area” does not include the Gulf of Mexico where project vessels may transit from.	Sea turtles	Thank you for your comment. Reasonable bounds have been drawn around the cumulative effects analysis area. The applicant concluded that construction vessels might be sourced from the Gulf of Mexico but that the chance was unlikely and if it happened, the number of trips would be small (on the order of 1 per year at most for the life of the project). Upon NMFS’s request, BOEM further considered these trips in the biological assessment and confirmed these trips would be discountable and unlikely to adversely affect listed species for consultation purposes.

Comment #	Comment Text	Comment Category	Comment Response
306	p.E3-23 “Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities have the potential to result in some impacts including potential auditory injuries, short-term disturbance, behavioral responses, and short-term displacement of feeding or migrating leatherback sea turtles and possibly loggerheads, if present within the ensonified area (NSF and USGS 2011). The potential for PTS and TTS is considered possible in proximity to G&G surveys, but impacts are unlikely as turtles would be expected to avoid such exposure and survey vessels would pass quickly (NSF and USGS 2011). No significant impacts would be expected at the population level.” If this text is just referencing G&G surveys for offshore wind (so no airguns considered) then the text regarding potential for PTS and TTS should be removed. Also statements should not be limited to just leatherbacks and loggerheads.	Sea turtles	Thank you for your comment. The text will be updated to clarify that the potential for PTS and TTS would occur when G&G surveys are completed utilizing air guns. Additionally, the statement will be revised to include all sea turtles that may occur within the geographic analysis area.
307	p. E3-23 (Operational Noise) - “Furthermore, no information suggests that such noise would affect turtles (NMFS 2015).” Please replace NMFS 2015 reference with a primary source that would be appropriate to support the conclusion.	Sea turtles	The text will be revised to rely on appropriate primary literature to support the statement that operational noise would have limited impacts to sea turtles.
308	p. E3-23 (Noise: Pile Driving) - This statement is not wholly correct: ”BOEM and NMFS have adopted the following thresholds based on current literature: Potential mortal injury: 210 dB cumulative SPL or greater than 207 dB peak SPL (Popper et al. 2014) Potential mortal injury: 180 dB re 1 µPa RMS (SPL; NMFS 2016) Behavioral harassment: 166 dB to175 dB referenced to 1 µPa RMS.” NMFS has not adopted the Popper et al. 2014 criteria for sea turtles and the NMFS 2016 reference is outdated. Please replace with the appropriate criteria as reflected in Table 3.4.6-2 (p. H-63).	Sea turtles	The statement has been updated for consistency with Table 3.4.6-2 (Appendix H).
309	p. E3-24 (Presence of Structures/Entanglement) - The first and last sentences in this paragraph appear to be contradictory.	Sea turtles	Agreed. Text will be revised for consistency.
310	p. E3-25 (Traffic: Vessel Collisions) - The final sentence, “Vessel speed may exceed 10 knots in such waters, and those vessels travelling at greater than 10 knots would pose the greatest threat to sea turtles.” is not supported by the available literature.	Sea turtles	Text will be revised to be consistent with information presented in Appendix H and available literature.
323	p. H-58 - The combined effect of potential northward distribution of sea turtles due to climate change and the addition of new structures needs to be considered here and how it may result in increased interaction rates over the life of the project. In general the document does not often incorporate potential shifts in turtle distribution due to climate change, some of which have already been documented.	Sea turtles	We appreciate your comment. The text will be revised to reflect the potential for a northward shift in distribution for sea turtle species, while also acknowledging the uncertainty associated with potential interactions between climate change effects and other impact mechanisms. Although there has been documentation of sea turtles or suitable habitat occurring farther north, it is hard to predict how this distribution shift may result in increased interactions between sea turtles and offshore wind farms. The FEIS will be revised to indicate this uncertainty.

Comment #	Comment Text	Comment Category	Comment Response
324	p. H-59 - Lutcavage and Lutz reference should be updated, and the statement is also flawed because it only pertains to loggerheads, not other species. With regards to an updated reference, there is this document: https://repository.library.noaa.gov/view/noaa/3879/noaa_3879_DS1.pdf . For just loggerheads in the Mid-Atlantic: "The median percent surface time during the Mid-Atlantic South stratum aerial survey time period (7–11 Aug 2010) was 67%, with an interquartile range of 57–77%."	Sea turtles	Thank you for your comment. The citation will be updated and text clarified to indicate species-specificity.
325	p. H-59, second paragraph - This paragraph is a bit confusing, how does dive behavior relate to long-distance migrations? Also, preliminary loggerhead abundance estimates have different surface availability estimates (NEFSC & SEFSC 2011 doc). Though there may not be any ESA critical habitats in the area, the Project area is a very important habitat for sea turtles, one that supports foraging, which occurs frequently in this area.	Sea turtles	Text will be revised for clarity. Additionally, refer to the response to Comment 324 regarding an update to the surface availability estimate.
326	p. H-59, third paragraph, first sentence - This should include tag data.	Sea turtles	Text will be revised based on recommendation.
327	p. H-59 - The sentence about cold-stunned hawksbill sea turtles is not clear.	Sea turtles	Text will be revised for clarity.
328	p. H-59 - NMFS 2020 should not be used as a reference for sea turtle occurrence. A formal request should be made to the NMFS Sea Turtle Stranding and Salvage Network for this information and should be cited as such.	Sea turtles	Thank you for your comment. Sea turtle occurrence and density information presented in the FEIS is based on observation, stranding, tag, and bycatch data. The citation will be updated to indicate that the information came from the Sea Turtle Stranding and Salvage Network.
329	p. H-59 - The referenced citation in this statement should be replaced with a primary source, “There are no nesting beaches or other critical habitats in the vicinity of the SFWF (GARFO 2020).”	Sea turtles	Thank you for your comment. The referenced citation directs the reader to a summary table that acts as a repository from which the primary information can be accessed.
330	p. H-60 - As noted in the cooperating agency review comments, we disagree with the characterization of green sea turtle presence in the project area as “unlikely.” Please refer to the comments and references provided with those comments.	Sea turtles	Thank you for your comment. Available literature and data have been reviewed to determine the potential for occurrence of green sea turtles within the analysis area. The lack of observations by Kraus et al. (2016) and limited sightings reported in the OBIS-SEAMAP database support the determination that green sea turtles would be uncommon within the analysis area. While they have been observed in the vicinity (i.e., Long Island Sound), these locations have very different habitats than those within the wind farm area and are not considered to indicate use or occurrence in the analysis area.
331	p. H-61 - Consider revising this sentence as it seems to imply that Long Island is part of Massachusetts: “Juveniles and subadults are occasionally observed in Atlantic coastal waters as far north as Massachusetts (NMFS and USFWS 1991), including Long Island Sound and Cape Cod Bay (Cetacean and Turtle Assessment Program 1982).”	Sea turtles	Text will be revised for clarity.
332	p. H-61, Leatherbacks - what other information is this referring to: “..which is consistent with other available information on sea turtle occurrence in the vicinity.” Please add citations.	Sea turtles	The statement was simply meant to refer to the occurrence information already cited within the text. The sentence will be revised to clarify.

Comment #	Comment Text	Comment Category	Comment Response
333	p. H-61 - Loggerheads also range north into Canada (further than the Gulf of Maine). A few potential references: https://www.sciencedirect.com/science/article/pii/S016578360700361X#fig1 https://www.nature.com/articles/s41598-017-17206-3 https://esajournals.onlinelibrary.wiley.com/doi/pdfdirect/10.1890/ES14-00230.1	Sea turtles	Thank you for your comment. Text will be revised accordingly and references added.
334	p. H-62 - Kemp's ridley also has an offshore neritic stage, they are not just coastally oriented (see https://www.int-res.com/abstracts/meps/v654/p143-161/).	Sea turtles	Thank you for your comment. Text will be revised accordingly to clarify.
335	p. H-62 - This sentence (“The highest likelihood of occurrence is in coastal nearshore areas adjacent to Long Island where the SFEC is anticipated to make landfall”) is likely intended to be relative to the project area, but as written that is not clear.	Sea turtles	Text will be revised for clarity.
336	p. H-62 - Likely occurrence sentence about Kemp’s Ridley doesn’t reflect uncertainty about NMFS knowledge of their distribution, and it also does not address the likely shifts in distribution due to climate change over the life of the project.	Sea turtles	Thank you for your comment. The statement regarding occurrence of Kemp's ridley sea turtles within the analysis area will be revised to indicate an appropriate level of uncertainty, given documented observations and survey effectiveness. The Affected Environment section is meant to provide an understanding of the current distribution of the species; information about the potential for shifts in distribution of sea turtle species is included in Section 3.4.6.2, Environmental Consequences.
337	Table 3.4.6.2 - In regards to the “minor” significance criteria, as noted in the cooperating agency review comments, it is not always clear how mitigation measures have been factored into conclusions regarding significance. By noting that “most impacts to species could be avoided with EPMs” it remains unclear if those EPMs will in fact be required and if so, whether the impacts can reasonably be expected to be avoided. Minor also encompasses a scenario where there is loss of up to “a few” individuals - however, consideration of the time of year of when those deaths occur is irrelevant to the impact to the population. We recommend clarifying how EPMs factor into the conclusion of “minor” and removing the reference to time of year. We also note that given the current definitions, it is difficult to understand the difference to a particular sea turtle species of a “minor” vs. a “moderate” impact as the end result of both is potentially the mortality of individuals without population level impacts; the only differential seems to be if those impacts “could” at least in part, be avoided with EPMs (but not that they necessarily will be avoided).	Sea turtles	Thank you for your comment. The significance criteria for sea turtles will be revised to remove reference to EPMs, as they are considered to be part of the Proposed Action, and to be consistent with the NMFS recommendations on significance criteria for other biological resources. The difference between minor and moderate significance levels is dependent on the potential for population-level effects. Revisions to the text clarify this dependency. We also agree that the time of year does not change the level of significance; reference to timing will be removed from the criteria definition.
338	p. H-63 - The statement that “Entanglement in lost fishing gear is the primary anthropogenic cause of mortality in both juvenile and adult sea turtles” appears to be a mischaracterization of the statements in NRC 1990 and Shigenaka et a. 2010. NRC 2010 acknowledges that sea turtles are particularly vulnerable to lost or abandoned fishing gear and that entanglement in such gear is a significant source of mortality for juveniles and adults but does not identify this as the primary anthropogenic cause of mortality. We recommend replacing “the primary…” with “a significant cause…”	Sea turtles	Thank you for your comment. The text will be revised as recommended.

Comment #	Comment Text	Comment Category	Comment Response
339	p. H-63 - The NMFS sea turtle recovery plans should be reviewed and referenced to describe threats in the project area. Also, the primary reference (NRC 1990) used here is 30 years old and may no longer be accurate and thus, should be reviewed to ensure it still represents the best available scientific information.	Sea turtles	The text will be revised to reflect current knowledge regarding threats to sea turtles from entanglement. Duncan et al. (2017) found through a global review that 5.5% of turtles encountered were entangled and 90.6% of these were dead. Experts believed that entanglement could be resulting in population-level effects in some locations, and rated entanglement as a greater threat than many of the other threats considered (e.g., oil pollution, climate change, etc.). This information will be incorporated appropriately.
340	p. H-64 - If the effects of EMF are not well studied, more context is necessary to support the statement that “current construction and mitigation methods would limit projected EMF effects below levels that are likely to cause significant biological effects.”Additional support is also necessary for the next sentence: “Deviations in migration therefore would be small and would not be expected to significantly impact energy expenditure in sea turtles.”	Sea turtles	Thank you for your comment. The text has been revised to provide consistency with the information presented in the BA and to provide more context for the statements regarding expected effects.
341	p. H-65 - Please replace the “NMFS 2020” reference in paragraph two under “Impulsive Noise” as this sentence is referencing BOEM’s conclusions regarding potential impacts of exposure of sea turtles to G&G noise.	Sea turtles	Reference has been removed as suggested.
342	p. H-66 - First paragraph - Consider replacing “would be negligible” with “would be expected to be negligible” to capture the uncertainty	Sea turtles	Text has been revised as recommended.
343	p. H-66 - More information and citations are necessary to support the conclusions regarding the effects of vibratory pile driving. Any reliance on mitigation measures that rely on visible observation should clearly note limitations of effectiveness that may result from an inability to detect turtles underwater.	Sea turtles	Thank you for your comment. The paragraph was intended to reference the following section (Section 3.4.6.2.3) that provides additional details about the expected effects of vibratory pile driving. The information is not repeated here for the sake of brevity.
344	p. H-66 - The statement that turtles are “relatively insensitive to sound” should be replaced by a statement summarizing the available information on sea turtle hearing and noise sensitivity and be supported by appropriate citations.	Sea turtles	Thank you for your comment. The statement that turtles are "relatively insensitive to sound" has been revised to state “Sea turtles have hearing abilities limited to low frequencies” and is followed by a reference to a subsequent section in which the current information on turtle noise sensitivity is discussed. Additional information has been provided in the referenced section to support the statement regarding turtles' insensitivity to sound.
345	p. H-66 - Additional information is necessary to support the statement that, “No significant effects on sea turtles are anticipated from intermittent non-impulsive noise resulting from WTG operation.” It should also be explained why this noise source is considered intermittent if the WTGs will be operating continuously.	Sea turtles	Although there may be variation in operating status depending on wind speeds and direction, we agree that operational noise from WTGs overall would not be intermittent. Text will be revised to reflect this clarification.

Comment #	Comment Text	Comment Category	Comment Response
346	p. H-67 - Port Utilization - More information is necessary to support the statement that port expansions would likely occur in subprime areas for foraging. We also note that the potential risk for interactions between sea turtles and dredges is highly dependent on location, season, and dredge type. These variables should be included in this analysis.	Sea turtles	Thank you for your comment. The environmental effects of future port expansions would be addressed under a separate NEPA analysis and regulatory approval process. The text will be clarified to indicate that port expansion is only expected to occur in subprime areas for foraging due to regulatory protections in place. Additionally, the text notes that dredging impacts to sea turtles in the United States have been closely tied to certain equipment and locations; these dependencies are considered in the determination of the potential impacts to sea turtles from potential port expansions under the No Action Alternative.
347	p. H-67 - Presence of Structures - It is unclear what impacts to sea turtles BOEM anticipates from the effect of WTG structures on incidental hooking/entanglement. Recreational fishery interactions with sea turtles are well documented in the southeast, both from piers and offshore oil and gas platforms.	Sea turtles	Thank you for your comment. The text will be revised to provide context for the expected effect from incidental hooking/entanglement associated with the potential increase of recreational fishing around the WTG structures. References will be reviewed and cited, as appropriate. Additional details with respects to entanglement risks can be found in the “Accidental releases and discharges” subsection of Section 3.4.6.2.2.
348	p. H-67 - Presence of Structures - It is unclear what impacts to sea turtles BOEM anticipates from the effect of WTG structures on conditions that could impact primary productivity. While we agree that there is a high degree of uncertainty, we recommend that this analysis identify the range of potential impacts based on the best available scientific information.	Sea turtles	Thank you for your comment. The text will be revised to convey the range of possible effects that are currently understood regarding impacts to sea turtles through changes to primary productivity.
349	p. H-67 - Presence of Structures - While we agree that it is theoretically possible that structures could result in localized increases in sea turtle foraging opportunities, this is highly dependent on species and prey preference/selection. For example, if the preferred prey is scallops, offshore structures are unlikely to help that food supply. This is an example of where generalizing impacts to all sea turtles may not be appropriate. Further, the statement that an Increase in primary and secondary production will lead to increased sea turtle prey needs to be supported by additional analysis. Please update text with reference information to support conclusions. If no reference information is available it should be explained why conclusory statements are valid.	Sea turtles	Thank you for your comment. The text will be revised to clarify the species specificity of certain benefits anticipated from the presence of wind farm structures. We agree that increased primary and secondary production does not necessarily lead to an increase in prey resources for sea turtles, but a general increase in production has the potential to support an increased abundance of prey. The text will be clarified to indicate an appropriate level of uncertainty associated with the expected benefits to sea turtle prey species.
350	p. H-67 - Presence of Structures - This part of the analysis should consider not only a potential increase in entanglements but also an increased potential for vessel strikes.	Sea turtles	Thank you for your comment. Additional context will be added to the Traffic section to acknowledge the potential for increased vessel traffic associated with increased commercial and recreational fishing activity.
351	p. H-68 - In the second paragraph on this page, there appears to be a disconnect between various statements and the first two sentences do not support the conclusion. It is unclear what the connection is between displacement of sea turtles out of the lease area and into areas of higher potential for interactions with ships or fishing gear and increased productivity due to structures and how those combine to equal impacts that are not biologically significant. This paragraph should be reviewed and revised.	Sea turtles	Agreed. The text will be revised for clarity.

Comment #	Comment Text	Comment Category	Comment Response
352	p. H-68 - Traffic - There is not enough context provided to support the conclusion that vessel traffic resulting in fatalities will not result in population-level impacts.	Sea turtles	Thank you for your comment. The text will be revised to add context and support for the statement that vessel collisions are not expected to have population-level effects based on the potential exposure of sea turtles.
353	p. H-68 - Climate change - Climate change coupled with an increase in structures and subsequent foraging habitat could shift distribution and abundance of sea turtles. Additionally, a number of potential impacts are mentioned with no references.	Sea turtles	Thank you for your comment. The text will be revised to include appropriate citations regarding climate change effects on sea turtles and to indicate that potential risks associated with climate change are further complicated by possible interactions with other IPFs.
354	p. H-68 - Conclusions - Suggest adding language that acknowledges the degree of uncertainty regarding potential effects.	Sea turtles	The text will be revised to add appropriate qualifiers regarding the uncertainty associated with predicting the effects of future activities based on current understanding and science.
355	p. H-69 - Port Utilization - This paragraph should mention that no capture, impingement, or entrainment of any sea turtles is anticipated during the dredging at Lake Montauk due to the type of dredge to be used.	Sea turtles	Thank you for your comment. Text will be added to clarify this detail.
356	p. H-71 - Impulsive Noise - The FEIS should include supporting information for the statement that "low numbers of sea turtles expected in the area of direct effects."	Sea turtles	Thank you for your comment. Sea turtle density information is provided in Section 3.4.6.1 and will be updated in the FEIS based on the best available science.
357	p. H70-72 - Noise - Throughout this section there are numerous references to risk or impacts being reduced due to incorporation of minimization measures. While we do not disagree with the conclusions, this section would benefit from clear identification of which measures are being relied on to reduce risk and how those measures will be implemented for this action.	Sea turtles	Text will be added to clarify which mitigation measures and EPMs are being referred to. Details on each measure and how they would be implemented are available in Appendix G.
358	p. H-72 - This first paragraph is confusing; discussing hearing, vision, and back and forth on issues. Also, the FEIS should reflect that habituation to noise may increase risk as vessel collision may be more likely, and may not decrease potential impacts.	Sea turtles	The paragraph is meant to indicate that avoidance behavior may result more from visual cues than auditory ones. Text will be revised to clarify. Additionally, a statement will be added to the Vessel Traffic section to indicate that habituation to noise may increase the risk for vessel strike.
359	p. H-72 - Vessel traffic - Suggestion to add context of where the MARIPARS study area is.	Sea turtles	Text will be added to provide context.
360	p. H73 - We recommend that in the FEIS, the final sentences of the Vessel Traffic section be replaced with a discussion of the conclusions in the eventual biological opinion produced for the South Fork project rather than relying on conclusions reached for Vineyard Wind.	Sea turtles	Thank you for your comment. Support for the determination based on the conclusions in the Vineyard Wind biological opinion will be removed. The text will consider the potential exposure of sea turtles to vessels strikes associated with the small proportional increase in vessel traffic related to the Project, as compared to the baseline.

Comment #	Comment Text	Comment Category	Comment Response
361	p. H74-77 - Operations and Maintenance and Conceptual Decommissioning - A discussion of the impacts to sea turtles from displacement of fishing and non-project vessel activity should be included here as well as consideration of effects of the project on oceanographic and atmospheric conditions that may affect sea turtles. Additionally, this section does not appear to consider how a reef effect could lead to an increase in recreational or commercial fishing in the project footprint and what effect that may have on sea turtles.	Sea turtles	Thank you for your comment. The information regarding the various effects due to the presence of the WTG structures (including vessel displacement, changes to hydrodynamics, and reef effects) associated with the Proposed Action will be revised and reorganized to more clearly communicate the anticipated effects to sea turtles. A discussion of the potential for vessel displacement outside of the SFWF and potential impacts on sea turtles is provided within the Vessel Traffic subsection of Section 3.4.6.2.3 (Operations and Maintenance and Conceptual Decommissioning). Regarding oceanographic and atmospheric impacts, additional context will also be added based on the current knowledge to indicate potential anticipated effects.
362	p. H-77 - EMF & Heat section - The text should clearly define “sensitive life stage.” One might argue that juveniles that could be in the area would be a sensitive and important life stage as their survivorship is key for a robust population.	Sea turtles	Thanks for your comment. The sensitivity of different sea turtle life stages to EMF effects is not currently well-understood. The reference to "sensitive life stage" will be removed and statement clarified to indicate that the significance conclusion for sea turtles and EMF is based on the limited extent of measurable magnetic field levels and likelihood of sea turtles occurring in the area of direct EMF effects.
363	p. H-70 etc. Noise - The analysis should include information about the consequences of avoidance behavior - while this may result in avoidance of injury there are consequences to individual behavior (e.g., loss foraging opportunity) that should be addressed.	Sea turtles	Thank you for your comment. In addition to the potential for injury, the possibility of foraging cessation or expenditure of extra energy in response to underwater noise is noted in Section 3.4.6.2.3.
364	p. H-80, Presence of structures - The benefits of a reef effect may depend on the species of turtle. For example, it may not benefit leatherbacks eating jellyfish or salps, and may not benefit a loggerhead that might prefer to feed on scallops. As such, we recommend that the FEIS reflect that any potentially beneficial effects are likely to be species dependent. Any consideration of beneficial effects due to increased prey availability or foraging opportunity must be considered in the context of potential increases in fishing activity.	Sea turtles	Thank you for your comment. Please refer to the response to Comment 349 for revisions clarifying the species specific benefits of reef effects.
365	p. H80-81 - Conclusions - Additional context should be provided to support the statement that sea turtles would be expected to recover completely without remedial or mitigating action, particularly if BOEM anticipates that individuals may be killed due to vessel strike.	Sea turtles	The conclusion statement will be revised to reflect the updated significance criteria based on individual versus population-level effects. The resource would be expected to recover completely without remedial or mitigating action because there are no population-level effects anticipated.
260	The description for Table 3.5.3-1 states that the table “also lists the ports that are cited in Section 3.5.1 (Commercial Fisheries and For-hire Recreational Fishing) as deriving a substantial amount of commercial fishing revenue from the Lease Area or along the offshore SFEC (see Table 3.5.1-9 and Table 3.5.1-11).” Table 3.5.1-11 does not show data by Port for SFEC - please correct to Table 3.5.1-12. In addition, based on Table 3.5.1-12, New Shoreham, RI should have an “X” under commercial fishing as this represents the highest revenue at 3.31% along the offshore SFEC.	Socioeconomics	Text corrected. An “X” was added under commercial fishing for New Shoreham.

Comment #	Comment Text	Comment Category	Comment Response
261	In Table 3.5.3-1, note that Shinnecock/Hampton Bays has commercial fishing that is affected by this project and export cable even though it was not disclosed in Table 3.5.1-9. Also in Table 3.5.3-1, note the source of data used for the for-hire recreational fishing engagement. The description states that the table "also lists the ports that are cited in Section 3.5.1 (Commercial Fisheries and For-hire Recreational Fishing) as deriving a substantial amount of commercial fishing revenue from the Lease Area or along the offshore SFEC." This section does not reflect for-hire ports. The port of New Bedford supports for-hire recreational activity (party and charter vessels) and should have an "X" in the table. Most for-hire vessels are located on Pope's Island, an island in New Bedford, MA between the border of New Bedford, MA and Fairhaven, MA within the shared port. Westport, MA also has for-hire fishing businesses/vessels.	Socioeconomics	An "X" was added under commercial fishing for Shinnecock Fishing Dock. An "X" was added under for-hire recreational fishing for New Bedford and Westport.
262	Please update the following in Table 3.5.3-1: Add citation to footnote (not all information listed can be found in COP), verify that Sparrows Point is in the City of Edgemere (City is listed as Baltimore in the COP), verify that Port Judith is in the City of Narragansett (City is listed as Point Judith in the COP), New Bedford Marine Terminal should be updated to New Bedford Marine Commerce Terminal to match COP, Port of Norfolk should be added to Norfolk International Terminal to match COP.	Socioeconomics	New Bedford Marine Terminal revised to New Bedford Marine Commerce; Port of Norfolk added to Norfolk International Terminal.
263	Please add Fairhaven, MA to Table 3.5.3-1. Communities in both Fairhaven and New Bedford have revenue from SFWF and along the offshore SFEC according to Tables referenced.	Socioeconomics	Fairhaven was added to Table 3.5.3-1.
264	The DEIS states that Providence county in Rhode Island has the highest population density (1,550) however it should state that Suffolk County, NY does (1,631), according to Table 3.5.3-2.	Socioeconomics	Text corrected.
265	It is mentioned that commercial fishing is important to the coastal communities by "generating employment and income for vessel owners and crew as well as by creating demand for shoreside products and services to maintain vessels and process seafood products." The reader is referred to Section 3.5.1 Commercial Fisheries and For-Hire Recreational Fishing, but there is no analysis of the shoreside products and service effects. Please provide more information about shoreside infrastructure and support services/industries that may be affected by this action or an appropriate citation describing this segment of the community. Sources such as the 2011 report by Cornell Cooperative Extension (see link) preparing a Rhode Island seafood industry profile could inform such text. We are also exploring data for shoreside support services and may be able to assist further evaluations.	Socioeconomics	For each port in Table 3.5.1 3 additional information has been added regarding the level of commercial fishing engagement and reliance of the community in which the port is located. These rankings portray the level of dependence of commercial fishing to the community. In addition, the "Snapshots of Human Communities and Fisheries in the Northeast" website developed by the NMFS Northeast Fisheries Science Center has been incorporated by reference.
266	On page 3-130, please provide a table/section reference for the following statement in DEIS "Together, these wind farms could add over 25,000 MW of renewable energy by 2030 into the energy grid from Massachusetts to North Carolina, using the same geographic ranges of ports specified in the COP for the SFWF Project."	Socioeconomics	Text has been added that references the figure in Appendix E that describes the reasonably foreseeable scenario with a total of 21.8 GW of offshore wind development and the list of projects in Table E-3 and Table E-4.

Comment #	Comment Text	Comment Category	Comment Response
267	Please revise or add a follow up sentence on pg. 3-130 to make it clear that there are 30 projects proposed for construction. As it reads now, “As shown in Appendix E, approximately 20 separate offshore wind development projects are in planning phases through 2030” does not highlight this.	Socioeconomics	The text has clarified that there are 20 offshore wind projects with as many as 30 construction phases.
268	It should be noted that future wind development (and the Proposed Action) could compete with the commercial fishing industry for marine workers during the construction phase. The commercial fishing industry faces challenges with a lack of young people entering and graying of the fleet phenomenon. The competition for marine workers may also result in higher prices for services. With an increase in service prices, marine sectors may seek services elsewhere.	Socioeconomics	Text added to Section 3.5.3.2.1: “In communities with ports that will be used for staging and fabrication of offshore wind facilities, offshore wind development could temporarily compete with the local commercial fishing industry for marine workers. Recent studies (e.g., Johnson and Mazur 2018) show that some commercial fisheries in the New England and Mid-Atlantic regions face workforce challenges with a lack of young people entering the industry. The competition for marine workers during the construction phase of offshore wind facilities may also result in higher prices for certain local shoreside support services. With an increase in service prices, some businesses in the commercial fishing industry and other marine sectors may seek services in ports not supporting offshore wind development here.” Text added to Section 3.5.3.2.3: “In communities with ports that will be used for staging and fabrication of the Project, Project-related construction activities could temporarily compete with the local commercial fishing industry for marine workers. As described in Section 3.5.3.2.1, some commercial fisheries in the New England and Mid-Atlantic regions face workforce challenges with a lack of young people entering the industry. The competition for marine workers during Project construction may also result in higher prices for certain local shoreside support services. With an increase in service prices, some businesses in the commercial fishing industry and other marine sectors may seek services in ports not supporting Project construction.”
269	On page 3-130, the DEIS incorrectly says that “the JEDI Offshore Wind Model using the construction phases” are described in Table E-4 and E-5 of Appendix E. However Table E-5 within Appendix E is “Other Fishery Management Plans.”	Socioeconomics	The references have been corrected to point to Tables E-3 and E-4.
270	In the conclusions please note that projected job creation from offshore wind development projects is not likely to be equitably distributed and therefore not inherently beneficial to all populations especially in positions which require specialized labor. Consider providing more detail on the nature and distribution of economic benefits resulting from new jobs created by this and other projects.	Socioeconomics	Text added to Section 3.5.3.2.2 stating that BVG Associates, Ltd. (2017) analyzed the specific occupations required for offshore wind energy development in the U.S. The main finding was a significant requirement for technician-level workers in production roles, particularly high-value manufacturing positions; installation and commissioning positions, vessel and offshore equipment operation, and commissioning and testing turbines, cables, and substations; and O&M roles, particularly turbine technicians. The report notes that a particular value of offshore wind jobs is that many are created in industrialized coastal areas, which have suffered from economic decline in recent years in many cases. Offshore wind can play an important part in reversing that situation.

Comment #	Comment Text	Comment Category	Comment Response
271	The DEIS states that Table F-6 in Appendix F, local CapEx for development and construction of the SFWF are expected to inject between $178.9 and 237.5 million into the regional economy. Please change this to Table F-8, “Estimated Average Local Spending for CapEx and OpEx for South Fork Wind Farm by Landing Sites and Capacity.”	Socioeconomics	Table reference has been corrected.
272	Please provide additional information on why a two year period is used in calculating CAPEX. When referring to Table F-8 the DEIS states the following: “For purposes of the EIS, it is assumed that local expenditures and employment during development and construction would occur over a 3-year period from 2020 to 2022.” Using the prior stated information the values should be updated to $59.6 and $79.2 million to reflect a 3-year period.	Socioeconomics	Text in Section 3.5.3.2.3 has been correct to reflect a 3-year construction and development period.
273	Please change Table F-7 to Table F-9 in the following statement: “The impact of the Project CapEx on FTE jobs and income would be beneficial throughout the analysis area. Table F-7 in Appendix F indicates that depending on the total Project capacity, direct FTE jobs in the analysis area over the 2-year period would range from 326 to 428, whereas indirect FTE jobs in the supply chain would range from 518 to 686.” Please remove “over a two year period” from the sentence mentioned above and add the following footnote: “It is important to note that the total number of jobs does not account for the timing of the work or the duration of the work.”	Socioeconomics	Table reference has been corrected. Text added stating that the estimate of the number of jobs created does not account for the timing or the duration of the work.
274	On page 3-132, the DEIS states DWSF would establish a construction schedule to minimize economic impacts to local communities during the summer tourist season. Please clarify the scheduling priorities, as there may be conflict with other initiatives such as commercial fishing.	Socioeconomics	The statement refers to ensuring the construction activities do not occur during the summer tourist season. No revisions made.
275	On page 3-132, second to last paragraph, please add that demand for infrastructure will vary in magnitude depending on location.	Socioeconomics	Text has been added to indicate that demand for infrastructure will depend on which port/ports are selected as fabrication and staging centers.
276	The DEIS states “Section 3.2.1.5 of the COP states the O&M activities would be based in either Quonset Point in North Kingstown, Rhode Island, or in Montauk/East Hampton, New York.” The section number should be 4.6.7.1.	Socioeconomics	Section reference has been corrected.
277	Appendix F states conceptual decommissioning costs are expected to range from $110.9 million to $133.7 million. Please update what is currently listed in this section.	Socioeconomics	Cost estimates have been corrected.
303	Figure E-12 (Socioeconomics/EJ) does not include a blue line “bubble” to indicate the geographic analysis area. The map could highlight that the analysis is examining relevant counties that will experience impacts from the proposed project.	Socioeconomics	The figure has been revised as suggested.
312	Please clarify below the table that the units of Table F-5 are in the $1,000s.	Socioeconomics	Table heading corrected.

Comment #	Comment Text	Comment Category	Comment Response
4	Page 1-4_The last sentence of page 1-4 describes important information that is relevant, but not provided in this document (additional lease specific terms, conditions, and stipulations that BOEM must consider when reviewing a COP). Please either provide a hyperlink to Addendum C, or include it in one of the EIS Appendices and refer to the Appendix here.	Tech Editing	The language is revised and the reference to Addendum C is removed. The lease is available on BOEM's website https://www.boem.gov/sites/default/files/uploadedFiles/BOEM/Renewable_Energy_Program/State_Activities/Commercial%20Lease%20OCS-A%200486.pdf.

SUBMITTER INFORMATION

Table I-388. Submissions

Letter #	Commenter	Form Letter (FL) or Other Applicable Information
BOEM-2020-0066-0002	Ziogas, Allison	
BOEM-2020-0066-0003	Hersey Egginton	
BOEM-2020-0066-0004	Steven DeCarlo	
BOEM-2020-0066-0005	Ben Hooker	
BOEM-2020-0066-0006	Mark Donahue	
BOEM-2020-0066-0007	Phillip Risko	
BOEM-2020-0066-0008	Katharine Kollins	
BOEM-2020-0066-0009	James Miller	
BOEM-2020-0066-0010	Anonymous Todd	
BOEM-2020-0066-0011	Edison Chouest Offshore	
BOEM-2020-0066-0012	JUDITH HOPE	
BOEM-2020-0066-0013	Christopher Muchow	FL7
BOEM-2020-0066-0014	Barnhardt Selina	
BOEM-2020-0066-0015	Michael Hansen	
BOEM-2020-0066-0016	James Dignan	FL7
BOEM-2020-0066-0017	Micaela Salazar	
BOEM-2020-0066-0018	Virginia Maritime Association	
BOEM-2020-0066-0019	Nacho Pup	
BOEM-2020-0066-0020	Kristin Urbach, The North Kingstown Chamber of Commerce	
BOEM-2020-0066-0021	Kim Cook,	FL7
BOEM-2020-0066-0022	Roger Clayman, Long Island Federation of Labor	
BOEM-2020-0066-0023	Adam Harkin	FL7
BOEM-2020-0066-0024	Frank Van Zant	FL7
BOEM-2020-0066-0025	Tim Guinee	
BOEM-2020-0066-0026	Thomas Whooley	
BOEM-2020-0066-0027	MICHAEL CAVANAUGH	
BOEM-2020-0066-0028	The Building and Construction Trades Council of Nassau & Suffolk Counties, AFL-CIO	
BOEM-2020-0066-0029	Anthony Guerrero	FL7
BOEM-2020-0066-0030	Stephen Coan	
BOEM-2020-0066-0031	Madeline Rose	FL7
BOEM-2020-0066-0032	Robert Becker	
BOEM-2020-0066-0033	Sarah Dolinar	
BOEM-2020-0066-0034	TRC Companies Anonymous	
BOEM-2020-0066-0035	Kevin Bone	

Letter #	Commenter	Form Letter (FL) or Other Applicable Information
BOEM-2020-0066-0036	Kelly Andreuzzi	FL3
BOEM-2020-0066-0037	Slawomir Tylutki	
BOEM-2020-0066-0038	Peter Sepe	FL3
BOEM-2020-0066-0039	stephen koch	
BOEM-2020-0066-0040	howard Levy	
BOEM-2020-0066-0041	Mary Kerins	
BOEM-2020-0066-0042	Richard Kite	FL3
BOEM-2020-0066-0043	Alix Keast	
BOEM-2020-0066-0044	Elisabeth Youngclaus	FL4
BOEM-2020-0066-0045	Justin Sher	FL3
BOEM-2020-0066-0046	Robin Spiegelman NYLCV	FL3
BOEM-2020-0066-0047	Dion Kliner	FL3
BOEM-2020-0066-0048	Larry Reilly	FL3
BOEM-2020-0066-0049	Leslie Aiuto	FL3
BOEM-2020-0066-0050	JOEL KURTZBERG	FL3
BOEM-2020-0066-0051	JOSHUA CHAIKEN	FL3
BOEM-2020-0066-0052	Carol Capper	FL3
BOEM-2020-0066-0053	Scott Thomas	FL4
BOEM-2020-0066-0054	Kathleen Gerard	
BOEM-2020-0066-0055	Stanley Scharf	FL3
BOEM-2020-0066-0056	Kiirstin Calister-Kuhi	FL4
BOEM-2020-0066-0057	Marion Lakatos	FL4
BOEM-2020-0066-0058	James Ewing	
BOEM-2020-0066-0059	Georgia LaMair	FL3
BOEM-2020-0066-0060	Carol Lipsky	FL3
BOEM-2020-0066-0061	Rick Olanoff	
BOEM-2020-0066-0062	Ian Smith	
BOEM-2020-0066-0063	B. R. Lemonik	
BOEM-2020-0066-0064	Kajal Below	
BOEM-2020-0066-0065	Anonymous Anonymous	Anonymous; excluded from Appendix
BOEM-2020-0066-0066	James Mulder	FL4
BOEM-2020-0066-0067	Geoffrey Peckover	
BOEM-2020-0066-0068	Beth Jane Freeman	
BOEM-2020-0066-0069	Franklin LaVoie	
BOEM-2020-0066-0070	brenda lee	FL3
BOEM-2020-0066-0071	Steve Strauss	FL4
BOEM-2020-0066-0072	Sharon King Hoge	
BOEM-2020-0066-0073	Harry Harrison	FL4
BOEM-2020-0066-0074	Douglas Bateson	FL3

Letter #	Commenter	Form Letter (FL) or Other Applicable Information
BOEM-2020-0066-0075	Judith Ackerman	
BOEM-2020-0066-0076	Katherine Schoonover	FL3
BOEM-2020-0066-0077	Dave Corr	
BOEM-2020-0066-0078	Astrid Jarvis	
BOEM-2020-0066-0079	Nicole Zeiss	
BOEM-2020-0066-0080	Mary Wade	
BOEM-2020-0066-0081	Robert Verity	
BOEM-2020-0066-0082	Nancy Romer	
BOEM-2020-0066-0083	Jane Selden	FL4
BOEM-2020-0066-0084	William Wellman	
BOEM-2020-0066-0085	Cullen Howe	FL3
BOEM-2020-0066-0086	Carol Rosenthal	
BOEM-2020-0066-0087	Walker Everette none	FL3
BOEM-2020-0066-0088	william mckeever	FL4
BOEM-2020-0066-0089	Richard Stern	FL3
BOEM-2020-0066-0090	Anonymous Anonymous	FL3
BOEM-2020-0066-0091	Perry Sheffield	FL4
BOEM-2020-0066-0092	Lucian Cohen	FL4
BOEM-2020-0066-0093	Edward Mitchell, Bronx River Bicycle Works	
BOEM-2020-0066-0094	Sam Hoyt	
BOEM-2020-0066-0095	Steven Lowenthal	
BOEM-2020-0066-0096	Robert Fanniff	
BOEM-2020-0066-0097	Acadia Cutschall	
BOEM-2020-0066-0098	Adam Koranyi	
BOEM-2020-0066-0099	Kirk Lawrence	
BOEM-2020-0066-0100	Rose Marie Wilson	FL3
BOEM-2020-0066-0101	Lauren Tartaglia	FL3
BOEM-2020-0066-0102	Jeff Grabner	FL2
BOEM-2020-0066-0103	Molly Braverman	FL4
BOEM-2020-0066-0104	Guillaume de Jenlis	FL2
BOEM-2020-0066-0105	Jack Lupo	FL3
BOEM-2020-0066-0106	John Szalasny	FL2
BOEM-2020-0066-0107	Anonymous Anonymous	Anonymous; excluded from Appendix
BOEM-2020-0066-0108	Diego Perez	FL2
BOEM-2020-0066-0109	Elaine Weir	
BOEM-2020-0066-0110	Janet Pacella	FL7
BOEM-2020-0066-0111	Doug Bogen	FL2
BOEM-2020-0066-0112	Kevin McAleer	FL4
BOEM-2020-0066-0113	Anonymous Anonymous	Anonymous; excluded from Appendix

Letter #	Commenter	Form Letter (FL) or Other Applicable Information
BOEM-2020-0066-0114	North America's Building Trades Unions (NABTU)	
BOEM-2020-0066-0115	Miles Maier	FL7
BOEM-2020-0066-0116	Edith Allen	
BOEM-2020-0066-0117	John Schenone	
BOEM-2020-0066-0118	Ken Canty	FL2
BOEM-2020-0066-0119	Abby Watson, Siemens Gamesa Renewable Energy, Inc.	
BOEM-2020-0066-0120	Elizabeth Waters	FL2
BOEM-2020-0066-0121	Pauline Rosen	
BOEM-2020-0066-0122	Tobi Petrocelli	FL2
BOEM-2020-0066-0123	Francesca Rheannon	
BOEM-2020-0066-0124	Jennifer Schneider	FL7
BOEM-2020-0066-0125	Tim McCarthy IBEW LU 25	FL7
BOEM-2020-0066-0126	Michael Yee	FL7
BOEM-2020-0066-0127	Bill Draves	FL7
BOEM-2020-0066-0128	JOHN MOONEY	FL7
BOEM-2020-0066-0129	Jeremy Markman	FL7
BOEM-2020-0066-0130	Joel Whitman	
BOEM-2020-0066-0131	Michael Welsh	
BOEM-2020-0066-0132	Sea Fresh USA Inc.	
BOEM-2020-0066-0133	Citizens Campaign for the Environment	
BOEM-2020-0066-0134	Sallie Donkin	FL2
BOEM-2020-0066-0135	Jeff Andreini	
BOEM-2020-0066-0136	Anonymous Anonymous	Anonymous; excluded from Appendix
BOEM-2020-0066-0137	David Holt, Consumer Energy Alliance	
BOEM-2020-0066-0138	Helen Chardack,	FL3
BOEM-2020-0066-0139	Cori Bishop,	FL2
BOEM-2020-0066-0140	Rhode Island Building and Construction Trades Council	
BOEM-2020-0066-0141	EPA	
BOEM-2020-0066-0142	Burns & McDonnell	
BOEM-2020-0066-0143	Riggs Distler & Co, Inc.	
BOEM-2020-0066-0144	Rhode Island Saltwater Anglers Association	
BOEM-2020-0066-0145	Eastern Long Island Chapter of the Surfrider Foundation	
BOEM-2020-0066-0146	Manora USA	
BOEM-2020-0066-0147	Francesca Bochner-Brown, Win with South Fork Wind, Inc.	
BOEM-2020-0066-0148	Waterson Terminal Services, LLC	
BOEM-2020-0066-0149	NIC Holding Corp.	
BOEM-2020-0066-0150	Singer, Joshua	
BOEM-2020-0066-0151	Hinton, Daniel	
BOEM-2020-0066-0152	vyce, justin	

Letter #	Commenter	Form Letter (FL) or Other Applicable Information
BOEM-2020-0066-0153	Smultea Environmental Sciences	
BOEM-2020-0066-0154	Rhode Island Coastal Resources Management Council Fishermen's Advisory Board	
BOEM-2020-0066-0155	West Dublin Neighbors	
BOEM-2020-0066-0156	Jake Kunitser, Grand Valley State University	
BOEM-2020-0066-0157	Surfside Foods, LLC	
BOEM-2020-0066-0158	Center for Economic Growth	
BOEM-2020-0066-0159	rob Larson,	
BOEM-2020-0066-0160	EEW- American Offshore Structures Inc.	
BOEM-2020-0066-0161	David Hubbard, Law firm representing community group	
BOEM-2020-0066-0162	Drew, rick	
BOEM-2020-0066-0163	Janet Coit,	
BOEM-2020-0066-0164	Richard Hine, ThayerMahan	
BOEM-2020-0066-0165	Suffolk County, NY	
BOEM-2020-0066-0166	New England Fishery Management and Mid-Atlantic Fishery Management Councils	
BOEM-2020-0066-0167	The National Ocean Industries Association	
BOEM-2020-0066-0168	Scheid, Kasey	FL7
BOEM-2020-0066-0169	Allco Renewable Energy Limited	
BOEM-2020-0066-0170	Egan, Kevin	
BOEM-2020-0066-0171	Haran, John	
BOEM-2020-0066-0172	Mahoney, Michael	
BOEM-2020-0066-0173	IAM&AW	
BOEM-2020-0066-0174	McIntyre, Ryan	
BOEM-2020-0066-0175	Terchunian, Aram	
BOEM-2020-0066-0176	Drake, Jarrett	
BOEM-2020-0066-0177	Hannah Anderson,	
BOEM-2020-0066-0178	Sarah Provost	
BOEM-2020-0066-0179	Joseph Pepe	
BOEM-2020-0066-0180	Samantha Orszulak	FL4
BOEM-2020-0066-0181	Margaret Vernon	FL3
BOEM-2020-0066-0182	Leland Griffin Jr	
BOEM-2020-0066-0183	Anshul Gupta	FL4
BOEM-2020-0066-0184	William Roberson	FL3
BOEM-2020-0066-0185	Wendy Fast	FL4
BOEM-2020-0066-0186	Stephen Mead	FL3
BOEM-2020-0066-0187	Pat Wagner	
BOEM-2020-0066-0188	Kevin Costa	FL3
BOEM-2020-0066-0189	Elizabeth Schwartz	FL4
BOEM-2020-0066-0190	Anonymous Anonymous	Anonymous; excluded from Appendix

Letter #	Commenter	Form Letter (FL) or Other Applicable Information
BOEM-2020-0066-0191	Jim Tappon	
BOEM-2020-0066-0192	Samantha Lewis	
BOEM-2020-0066-0193	Misha Fredericks	FL3
BOEM-2020-0066-0194	Daniel Attila	
BOEM-2020-0066-0195	Myles Hunt	
BOEM-2020-0066-0196	Michelle Santantonio	FL3
BOEM-2020-0066-0197	Kevin Oldham	FL3
BOEM-2020-0066-0198	Marjorie Hart	FL3
BOEM-2020-0066-0199	Daniel M	
BOEM-2020-0066-0200	Jill Simon	
BOEM-2020-0066-0201	Susan Wald	FL3
BOEM-2020-0066-0202	margaret scripp	
BOEM-2020-0066-0203	Jon Lamberton	FL3
BOEM-2020-0066-0204	Ilya Speranza	FL4
BOEM-2020-0066-0205	Christine Romero, Lower East Side Ecology Center	FL3
BOEM-2020-0066-0206	Judy Fitzgerald	
BOEM-2020-0066-0207	MONICA schenk	
BOEM-2020-0066-0208	Jared Brenner	FL4
BOEM-2020-0066-0209	Marilyn Van Scoyoc	
BOEM-2020-0066-0210	Gerald Levine	
BOEM-2020-0066-0211	Peter Klosterman	FL3
BOEM-2020-0066-0212	Sarah Pope	FL3
BOEM-2020-0066-0213	Mike Anthony	
BOEM-2020-0066-0214	Gene Sprouse	
BOEM-2020-0066-0215	Helen Anbinder	FL4
BOEM-2020-0066-0216	Richard Brown	
BOEM-2020-0066-0217	Jerome McNerney	FL3
BOEM-2020-0066-0218	Sarah Gallagher	
BOEM-2020-0066-0219	Judith Nelson	
BOEM-2020-0066-0220	Jim Jones	
BOEM-2020-0066-0221	Mary Sullivan	FL4
BOEM-2020-0066-0222	Jennifer Freeman	
BOEM-2020-0066-0223	Morgan Davies	FL3
BOEM-2020-0066-0224	Joseph M. Varon	FL3
BOEM-2020-0066-0225	Emily Stewart	FL2
BOEM-2020-0066-0226	Brian Linder	
BOEM-2020-0066-0227	Jean Naples	FL3
BOEM-2020-0066-0228	James Ward	
BOEM-2020-0066-0229	Lilli Ross	FL4

Letter #	Commenter	Form Letter (FL) or Other Applicable Information
BOEM-2020-0066-0230	Cary Appenzeller	
BOEM-2020-0066-0231	Mary Thorpe	FL3
BOEM-2020-0066-0232	Sharon Daly	
BOEM-2020-0066-0233	Joshua Wallman	FL4
BOEM-2020-0066-0234	Anonymous Anonymous	Anonymous; excluded from Appendix
BOEM-2020-0066-0235	s ho	FL4
BOEM-2020-0066-0236	Sheila Out	FL3
BOEM-2020-0066-0237	Deborah Wetzel	FL4
BOEM-2020-0066-0238	Robin Chappelle	
BOEM-2020-0066-0239	Mark Gorsetman	FL4
BOEM-2020-0066-0240	Lynn Capuano	FL3
BOEM-2020-0066-0241	Eliseo Labayen	FL3
BOEM-2020-0066-0242	Jerry Cornwell	
BOEM-2020-0066-0243	Michelle Vespa	FL4
BOEM-2020-0066-0244	Katherine Slawinski	
BOEM-2020-0066-0245	Mary McGeary	FL3
BOEM-2020-0066-0246	Mitchell Bacharach	FL3
BOEM-2020-0066-0247	Rachel Neuburger	FL3
BOEM-2020-0066-0248	Thomas Boman	
BOEM-2020-0066-0249	Robert Figueroa	
BOEM-2020-0066-0250	Lorraine Farina	FL3
BOEM-2020-0066-0251	Tina Lembke	
BOEM-2020-0066-0252	Susan McGraw-Keber	FL3
BOEM-2020-0066-0253	Ross Pinkerton	FL3
BOEM-2020-0066-0254	Mikey Lampel	FL4
BOEM-2020-0066-0255	Sandra Naidich	
BOEM-2020-0066-0256	Michael Madden	FL4
BOEM-2020-0066-0257	Anonymous Anonymous	Anonymous; excluded from Appendix
BOEM-2020-0066-0258	ruthe nepf	FL3
BOEM-2020-0066-0259	Zack Westgate	
BOEM-2020-0066-0260	John Day	FL4
BOEM-2020-0066-0261	Emily Labes	FL4
BOEM-2020-0066-0262	Patrick Yacco	FL4
BOEM-2020-0066-0263	Guy Merckx	FL4
BOEM-2020-0066-0264	Curtis Walter	FL2
BOEM-2020-0066-0265	Len Copicotto	
BOEM-2020-0066-0266	Gerald Grantz	
BOEM-2020-0066-0267	Jennifer Barton	FL3
BOEM-2020-0066-0268	Vicky Anonymous	FL3

Letter #	Commenter	Form Letter (FL) or Other Applicable Information
BOEM-2020-0066-0269	Dan Fast	
BOEM-2020-0066-0270	Steven Rosenberg	FL4
BOEM-2020-0066-0271	Alan Belensz	
BOEM-2020-0066-0272	Ronald Isla	FL2
BOEM-2020-0066-0273	Lilia Salimova	FL2
BOEM-2020-0066-0274	Steven King	
BOEM-2020-0066-0275	Kate D	FL4
BOEM-2020-0066-0276	Chaz Goodman	
BOEM-2020-0066-0277	Kapell David	Duplicate of 155; not coded
BOEM-2020-0066-0278	Krupski Jr. Legislator Albert J.	
BOEM-2020-0066-0279	American Saltwater Guides Association	
BOEM-2020-0066-0280	Cunningham Zach	
BOEM-2020-0066-0281	Climate Jobs New York	
BOEM-2020-0066-0282	Inc. Village of Port Jefferson	
BOEM-2020-0066-0283	Scola, Chris	
BOEM-2020-0066-0284	The Nature Conservancy	
BOEM-2020-0066-0285	Cultural Heritage Partners, PLLC on behalf of the Southeast Lighthouse Foundation	
BOEM-2020-0066-0286	Long Island Association and Long Island Builders Institute	
BOEM-2020-0066-0287	Ellis, Harry	
BOEM-2020-0066-0288	Peterson, Wesley	
BOEM-2020-0066-0289	Hitachi ABB Power Grids	
BOEM-2020-0066-0290	UFCW Local 1500	FL7
BOEM-2020-0066-0291	CARIAN	
BOEM-2020-0066-0292	Haugland Energy Group	
BOEM-2020-0066-0293	Villa, Anthony	
BOEM-2020-0066-0294	Seafreeze Ltd.	
BOEM-2020-0066-0295	Seafreeze Ltd.	Duplicate of 294; not coded
BOEM-2020-0066-0296	Rhode Island Coastal Resources Management Council	
BOEM-2020-0066-0297	SLR International	
BOEM-2020-0066-0298	INSPIRE Environmental	
BOEM-2020-0066-0299	Business Network for Offshore Wind	
BOEM-2020-0066-0300	Plumbers Local Union #200	
BOEM-2020-0066-0301	South Fork Wind, LLC	
BOEM-2020-0066-0302	Anonymous	Anonymous; excluded from Appendix
BOEM-2020-0066-0303	Virginia Department of Mines Minerals and Energy	
BOEM-2020-0066-0304	Faga, jennifer	
BOEM-2020-0066-0305	Bently Nevada, a Baker Hughes business	
BOEM-2020-0066-0306	SCOLA, SARAH	
BOEM-2020-0066-0307	Okoniewski, Mike	

Letter #	Commenter	Form Letter (FL) or Other Applicable Information
BOEM-2020-0066-0308	Gendron, Michael	FL7
BOEM-2020-0066-0309	Teamsters Local 1205	FL7
BOEM-2020-0066-0310	MA Division of Marine Fisheries	
BOEM-2020-0066-0311	RENEW Northeast, Inc.	
BOEM-2020-0066-0312	TEAMSTERS LOCAL 1205	FL7
BOEM-2020-0066-0313	Congressman Thomas R. Suozzi	
BOEM-2020-0066-0314	KUMPA, GARY	
BOEM-2020-0066-0315	Northeast Clean Energy Council (www.necec.org)	
BOEM-2020-0066-0316	Garden State Seafood Assoc	
BOEM-2020-0066-0317	American Bird Conservancy	
BOEM-2020-0066-0318	Vanasse Hangen Brustlin, Inc.	
BOEM-2020-0066-0319	New York Offshore Wind Alliance	
BOEM-2020-0066-0320	WindServe Marine, LLC.	
BOEM-2020-0066-0321	White, Jerome	
BOEM-2020-0066-0322	Town of East Hampton	
BOEM-2020-0066-0323	WindServe Marine, LLC	
BOEM-2020-0066-0324	Cobb, Gary	
BOEM-2020-0066-0325	National Wildlife Federation Action Fund	
BOEM-2020-0066-0326	Mysticetus, LLC	
BOEM-2020-0066-0327	Durand, Jamie	
BOEM-2020-0066-0328	Hoh, Nick	FL7
BOEM-2020-0066-0329	Kempton, Willett	
BOEM-2020-0066-0330	Concerned Citizens of Montauk	
BOEM-2020-0066-0331	Sierra Club	
BOEM-2020-0066-0332	Levine, Jay	
BOEM-2020-0066-0333	Nordic Fisheries	
BOEM-2020-0066-0334	valenti, Robert	Duplicate of 339; not coded
BOEM-2020-0066-0335	Northeast Seafood Coalition	
BOEM-2020-0066-0336	Empire Fisheries, LLC	
BOEM-2020-0066-0337	Pyrke-Fairchild, Lyndsey	
BOEM-2020-0066-0338	New York State Departments of State and Environmental Conservation	
BOEM-2020-0066-0339	Fisheries Advisory Committee	
BOEM-2020-0066-0340	Johnson, Christopher	
BOEM-2020-0066-0341	East Hampton Town Fisheries Advisory Committee	Duplicate of 339; not coded
BOEM-2020-0066-0342	Weeks Marine, Inc.	
BOEM-2020-0066-0343	Kinsella, Simon	
BOEM-2020-0066-0344	Sullivan, Erin	
BOEM-2020-0066-0345	Mayflower Wind Energy LLC	
BOEM-2020-0066-0346	New York League of Conservation Voters	

Letter #	Commenter	Form Letter (FL) or Other Applicable Information
BOEM-2020-0066-0347	Massachusetts Office Coastal Zone Management	
BOEM-2020-0066-0348	East Hampton Town Fishery Advisory Committee	Duplicate of 339; not coded
BOEM-2020-0066-0349	National Wildlife Federation et al.	
BOEM-2020-0066-0350	Hanecak, Karen	
BOEM-2020-0066-0351	Evans, Captain Julie	
BOEM-2020-0066-0352	Lund's Fisheries, Inc.	
BOEM-2020-0066-0353	Fulcher, Mitchell	
BOEM-2020-0066-0354	The Bridgeport and Port Jefferson Steamboat Company and McAllister Towing	
BOEM-2020-0066-0355	The Town Dock	
BOEM-2020-0066-0356	Linxon	
BOEM-2020-0066-0357	Cohen, Zachary	
BOEM-2020-0066-0358	WSP USA Inc.	
BOEM-2020-0066-0359	Nexans High Voltage USA Inc.	
BOEM-2020-0066-0360	American Clean Power Association	
BOEM-2020-0066-0361	Mike Conroy, PCFFA	
BOEM-2020-0066-0362	Citizens for the Preservation of Wainscott	
BOEM-2020-0066-0363	Responsible Offshore Development Alliance	
BOEM-2020-0066-0364	Save the Sound	
BOEM-2020-0066-0365	Wampanoag Tribe of Gay Head (Aquinnah)	
BOEM-2020-0066-0366	Bonnie Brady	
BOEM-2020-0066-0367	USCG	
BOEM-2020-0066-0368	Daniel Boon	
BOEM-2020-0066-0369	Debra Foster	
BOEM-2020-0066-0370	Rebecca Spinar	
BOEM-2020-0066-0371	Mila Buckner, Trustees	
BOEM-2020-0066-0372	NMFS	
BOEM-2020-0066-0373	Louis Petrizzo	
BOEM-2020-0066-0374	Patrick Guidice	
BOEM-2020-0066-0375	Kevin Casey	
BOEM-2020-0066-0376	Brian McAllister	
BOEM-2020-0066-0377	Eleni Beyko	
BOEM-2020-0066-0378	Mary Boatman	Meeting 1 Transcript
BOEM-2020-0066-0379	Mary Boatman	Meeting 2 Transcript
BOEM-2020-0066-0380	Mary Boatman	Meeting 3 Transcript
BOEM-2020-0066-0381	Nadja Knoulton	
BOEM-2020-0066-0382	Susan Tuxbury	
BOEM-2020-0066-0383	Jeff Willis	
BOEM-2020-0066-0384	Simon Kinsella	
BOEM-2020-0066-0385	Simon Kinsella	

Letter #	Commenter	Form Letter (FL) or Other Applicable Information
BOEM-2020-0066-0386	Simon Kinsella	
BOEM-2020-0066-0387	Simon Kinsella	
BOEM-2020-0066-0388	ACHP	
BOEM-2020-0066-0389	FWS	

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APPENDIX J

Incomplete or Unavailable Information

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INTRODUCTION

In accordance with Section 1502.22[1] of the Council on Environmental Quality regulations implementing the National Environmental Policy Act (NEPA), when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement (EIS) and there is incomplete or unavailable information, the agency shall make clear that such information is lacking.

Given the substantial geographic and temporal scale of the cumulative impacts analysis, some information regarding ongoing activities is unavailable or only available in qualitative or summary form—in particular, for many offshore resources. Concerning reasonably foreseeable construction and operations plans (COPs), specific information is available only for COPs that have submitted for BOEM review (Appendix E). Considering that such information is lacking for other offshore wind activities considered reasonably foreseeable, and several of the COPs submitted are currently under review to determine whether they contain complete and sufficient information for environmental review, a series of assumptions were necessary to conduct the cumulative impacts analysis. These assumptions are listed in Appendix E. Although these assumptions were necessary to allow the analysis to proceed with a reasonable degree of certainty, it is not known whether or to what extent future offshore wind activities will proceed according to these assumptions.

In addition to the uncertainty regarding future activities contemplated in the cumulative impacts analysis, there is also incomplete or unavailable information regarding the likely consequences of various activities on the resources analyzed. When incomplete or unavailable information was identified, BOEM considered whether the information was relevant to the assessment of impacts and essential to a reasoned choice among alternatives. If essential to a reasoned choice among the alternatives, BOEM considered whether it was possible to obtain the information and if the cost of obtaining it was unreasonable. If information could not be obtained due to exorbitant costs, BOEM applied acceptable scientific methodologies to inform the analysis in light of this incomplete or unavailable information. For example, conclusive information on many impacts of the offshore wind industry may not be available for years and would therefore not be available within the contemplated time frame of this NEPA process. In its place, subject matter experts (SMEs) have used the scientifically credible information available and accepted scientific methodologies for proxy indicators or data to evaluate impacts on the resources while this information is unavailable.

INCOMPLETE OR UNAVAILABLE INFORMATION ANALYSIS FOR RESOURCE AREAS

Air Quality

Any action alternative for the Project would lead to air quality impacts that range from minor to moderate and minor beneficial. Although a quantitative emissions inventory analysis of the region over the next 30 years has not been completed, the final EIS does disclose annual emissions that could have been avoided by using non–fossil fuel energy sources within the analysis area as well as the health impacts from those avoided emissions. In addition, the differences among action alternatives with respect to direct emissions due to construction, operations and maintenance, and decommissioning of the Project would likely be small. As such, the analysis provided in the EIS is sufficient to support sound scientific judgements and informed decision-making related to the use of onshore and offshore portions of the analysis area. In summary, BOEM does not believe that there is incomplete or unavailable information on air quality that is essential to a reasoned choice among alternatives.

[1] 40 CFR 1502.21 in regulations implanted on September 14, 2020.

Water Quality

There is no incomplete or unavailable information related to the analysis of impacts on water quality.

Bats

Habitat use and distribution varies between season and species, and as a result, there will always be some level of incomplete information on the distribution and habitat use of migratory bats in the offshore portions of the analysis area. In addition, because U.S. offshore wind is in its infancy, with only two offshore wind projects having been constructed at the time of this analysis, there is some level of uncertainty regarding the potential collision risk to individual bats that may be present within the offshore portions of the analysis area. However, empirical data, including regional bat acoustic studies conducted from coastal, island, vessel, or offshore structure locations and regional telemetry data from recent studies focusing on listed species, were used to assess the likelihood of offshore occurrence, seasonal patterns, and bat species composition.

Information on collision risk to migratory bats is also available from observations collected at land-based U.S. wind facilities and, based on a number of assumptions regarding the applicability to offshore environments, was used to analyze and evaluate the potential for collisions associated with the wind turbine generators (WTGs) analyzed in the final EIS. In addition, and as described in Section 3.4.1 (Bats) of the final EIS, the likelihood of an individual migratory bat encountering the rotor swept zone (RSZ) of one or more operating WTG is negligible. As such, the analysis provided in the final EIS is sufficient to support sound scientific judgments and informed decision-making related to the distribution and use of the offshore portions of the analysis area as well as to the potential for collision risk of migratory bats. Further, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM does not believe that there is incomplete or unavailable information on bat resources that is essential to a reasoned choice among alternatives.

Benthic Habitat, Essential Fish Habitat, Invertebrates, and Finfish

Although there is some uncertainty regarding the temporal distribution of benthic resources and periods during which they might be especially vulnerable to disturbance, site-specific benthic habitat mapping by Inspire Environmental (2020) and other broadscale studies (e.g., Guida et al. 2017; Inspire Environmental 2019, 2019; Fugro 2019, 2021; Stantec 2020) provided a suitable basis for predicting the species, community composition, and distributions of benthic resources in the cumulative analysis area. Some uncertainty also exists about the effects of some impact-producing factors (IPFs) on benthic resources. For example, the available information on invertebrate sensitivity to electromagnetic fields (EMFs) is equivocal (Hutchinson et al. 2020), and sensitivity to sound pressure and particle motion effects is not well understood for all species (e.g., low-level acoustic effects on Atlantic cod communication). However, information from monitoring studies of European wind facilities and, more recently, the Block Island Wind Farm in the United States provide no indication of biologically significant adverse effects. There is broader uncertainty about the long-term effects of changes in biological productivity resulting from the creation of new habitat types on the mid-Atlantic OCS in the form of a distributed network of artificial reefs. The nature and significance of secondary synergistic effects, such as changes in diet and predator-prey interactions resulting from habitat modification in combination with other IPFs, are not fully known. Lastly, the nature, extent, and significance of potential spillover effects on broader ecosystem functions, such as larval dispersal, are not fully understood (van Berkel et al. 2020).

As stated, ongoing monitoring studies at European wind facilities and the Block Island Wind Farm in the United States provide a useful basis for evaluating the combined effects of these IPFs on the biological community as a whole, even if effects on individual species cannot be predicted with specificity. On balance, the current scientific information is sufficient to support sound scientific judgements and informed decision-making because relevant studies monitoring changes at wind farms have not observed significant changes to finfish over years of study. Further, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM does not believe that there is incomplete or unavailable information that is essential to a reasoned choice among alternatives. There is uncertainty regarding the spatial and temporal occurrence of finfish, invertebrates, and essential fish habitat throughout the entire analysis area. This is especially true for Atlantic cod use of the Cox Ledge area, which is part of an ongoing study funded by BOEM examining the movements of commercial fish species in southern New England (https://www.fisheries.noaa.gov/feature-story/scientists-collecting-data-commercial-fish-species-wind-energy-lease-areas-0). However, broadscale information is available from sources such as federal fisheries management plans, and surveys completed to support COP submission. There is also uncertainty regarding behavioral effects from each IPF individually and cumulatively. Again, BOEM is able to draw on existing scientific findings, as presented in Section 3.4.2 of the final EIS and references therein, in the essential fish habitat assessment (BOEM 2021a), and in the National Marine Fisheries Service (NMFS) biological assessment (BA) (BOEM 2021b). The available information is suitable for characterizing the likely effects of each IPF and has been used to analyze potential impacts resulting from the proposed Project and past, present, and reasonably foreseeable actions. As such, the analysis provided in the final EIS is sufficient to support sound scientific judgments and informed decision making related to the proposed uses of the offshore portions of the analysis area. Further, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM believes that the available information about potential impacts on benthic habitats supports a reasoned choice among alternatives.

Birds

Habitat use and distribution of marine birds varies between seasons, species, and years, and as a result, there will always be some level of incomplete information on the distribution and habitat use of marine birds in the offshore portions of the analysis area. However, survey findings for the Project (see Table A in Appendix D of COP Appendix M [biological resources report] [VHB 2018]) were used to inform the predictive models and analyze the potential adverse impacts on bird resources in the final EIS. In addition, because U.S. offshore wind is in its infancy, as described above for bats, there will always be some level of uncertainty regarding the potential for collision risk and avoidance behaviors for some of the bird species that may be present within the offshore portions of the analysis area.

Bird mortality data are available for onshore wind facilities and, based on a number of assumptions regarding their applicability to offshore environments, were used to inform the analysis of bird mortality associated with the offshore WTGs analyzed in the final EIS. However, uncertainties exist regarding the use of the onshore bird mortality rate to estimate offshore bird mortality rate due to differences in species groups present and life history and behavior of species as well as differences in the offshore marine environment compared to onshore habitats. Similarly, the U.S. Fish and Wildlife Service (USFWS) BA (BOEM 2021c) also provides an estimate of potential mortality using the Band (2012) collision risk model for Endangered Species Act species. Modeling is commonly used to predict the potential mortality rates for marine bird species in Europe and the United States (BOEM 2015, 2021b). Due to inherent data limitations, these models often represent only a subset of species potentially present. However, the datasets used by both South Fork Wind, LLC (SFW) and BOEM to assess the potential for exposure of marine birds to the wind development area (WDA) represent the best available data and provide context at both local and regional scales. Further, sufficient information on collision risk and avoidance behaviors observed in related species at European offshore wind projects is available and was used to analyze and corroborate the potential for these impacts as a result of the proposed Project (e.g., Petersen et al. 2006; Skov et al. 2018). As such, the analysis provided in the final EIS is sufficient to support sound scientific judgements and informed decision-making related to distribution and use of the offshore portions of the analysis area as well as to the potential for collision risk and avoidance behaviors in bird resources. Further, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM does not believe that there is incomplete or unavailable information on avian resources that is essential to a reasoned choice among alternatives.

Marine Mammals

Although there is some uncertainty regarding the temporal distribution of marine mammals and periods during which they might be especially vulnerable to Project disturbance, the NMFS BA (BOEM 2021b) provides detailed species descriptions and life history information. The National Oceanic and Atmospheric Administration (NOAA) has summarized the most current information about marine mammal population status, occurrence, and use of the region in their 2019 stock status report for the Atlantic OCS and Gulf of Mexico (Hayes et al. 2020, 2021). These studies provided a suitable basis for predicting the species, abundances, and distributions of marine mammals in the analysis area.

Uncertainty also exists in regard to the effects of some IPFs on marine mammals.

For example, there is still some uncertainty regarding the impacts on marine mammals from EMF produced by submarine cables. This uncertainty is due in part to difficulties in evaluating population-scale impacts around these deployments (Taormina et al. 2018), and the large size and high mobility of marine mammals, in addition to other logistical constraints, make experimental studies infeasible. As a result, no scientific studies have been conducted examining the effects of altered EMF on marine mammals. However, although scientific studies summarized by Normandeau et al. (2011) demonstrate that marine mammals are sensitive to and can detect small changes in magnetic fields, as described in Section 3.4.4 (Marine Mammals), those potentially detectable impacts would only occur within a few feet of select cable segments. There is no basis to conclude that the potential detection of EMF would lead to any measurable change in behavior. As such, the analysis provided in the final EIS is sufficient to support sound scientific judgments and informed decision-making related to the proposed uses of the offshore portions of the analysis area.

Some uncertainty also exists regarding the cumulative acoustic impacts associated with pile-driving activities. The available information relative to impacts on marine mammals from pile driving associated with offshore wind development is primarily limited to information on harbor porpoises and seals, as the vast majority of this research has occurred at European offshore wind projects, where large whales are uncommon. At this time, it is unclear if marine mammals would cease feeding and when individuals would resume normal feeding, migrating, breeding, etc. behaviors once daily pile-driving activities cease, or if secondary impacts would persist. Under the cumulative impact scenario, individual whales may be exposed to acoustic impacts from multiple projects in 1 day or to acoustic impacts from one or more projects over the course of multiple days. The consequences of these exposure scenarios have been analyzed with the best available information, but a lack of real world observations on species’ responses to pile driving result in uncertainty. Additionally, it is currently unclear how sequential years of construction of multiple projects would impact marine mammals. Future projects will undergo a project-specific analysis under NEPA, the Endangered Species Act, and the Marine Mammal Protection Act that may reach conclusions regarding impacts that differ from this analysis.

There is also uncertainty about certain potential impacts on marine mammals resulting from the long-term presence of offshore wind structures in the environment. For example, operational wind turbine generators will generate low-frequency underwater noise that may exceed the established minimum threshold for potential behavioral and auditory masking impacts within a short distance (e.g., approximately 120 feet) from each foundation under some circumstances. Under some circumstances, operational noise could exceed ambient conditions within a few hundred feet of each foundation. The implications of long-term operational noise impacts and structure presence on marine mammal behavior, particularly the behavior of large whale species, are unclear. These potential impacts are topics of ongoing research.

There is broader uncertainty about how large whales will respond to the presence of extensive networks of novel offshore wind structures on the Atlantic OCS. Under the cumulative impact scenario, up to 2,547 new structures (i.e., WTGs) could be constructed across the geographic analysis area. Although the planned spacing of structures would not obstruct whale movement between structures, the potential synergistic effects of structure presence and low-level operational noise are uncertain. There is also some uncertainty around reef effect and hydrodynamic impacts on prey and forage availability and predator-prey interactions. These impacts would combine and interact with ongoing changes in marine species distribution and community composition driven by climate change. The potential consequences of these impacts on the Atlantic OCS are unknown. Monitoring studies would be able to track these changes and observe how they may influence whale behavior. At present, BOEM has no basis to conclude that these IPFs would result in significant adverse impacts on any marine mammal species.

BOEM determined the overall costs of obtaining the missing information for or addressing uncertainty of the above topics for marine mammals are exorbitant or the means to obtain it are not known. Therefore, BOEM extrapolated or drew assumptions from known information for similar species and/or situations, as presented in Section 3.4.4 (Marine Mammals) and in the BA submitted to NMFS (BOEM 2021b). As a result, the information and methods used by to predict potential impacts on marine mammals represent the best available information, and the analysis provided in the final EIS is sufficient to support sound scientific judgments and informed decision-making related to the proposed uses of the offshore portions of the analysis area. Notwithstanding the foregoing, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM does not believe that there is incomplete or unavailable information on marine mammal resources that is essential to a reasoned choice among alternatives.

Other Terrestrial and Coastal Habitats and Fauna

Although the preferred habitats of terrestrial and coastal fauna are generally known, exact abundances and distributions of various fauna are likely to remain unknown for the foreseeable future. However, the species inventories and other information from nearby areas provide an adequate basis for evaluating the fauna likely to inhabit the analysis area. Additionally, the onshore activities proposed involve only common, industry-standard activities for which impacts are generally understood. As such, there is no incomplete or unavailable information needed to conduct the impact assessment or make a reasoned choice among alternatives.

Sea Turtles

Sea turtles are difficult to observe in the open ocean, and there is some uncertainty about the distribution of some turtle species (e.g., the green sea turtle [*Chelonia mydas*]) in relation to the Lease Area. The NMFS BA (BOEM 2021b) provides a thorough overview of the available information about potential species occurrence and exposure to Project-related IPFs. The studies summarized therein provide a suitable basis for predicting potential species occurrence, relative abundance, and probable distribution of sea turtles in the analysis area.

Some uncertainty exists about the effects of certain IPFs on sea turtles and their habitats. For example, the effects of EMF on sea turtles are not completely understood. Although there are no data on impacts on sea turtles from EMFs generated by underwater cables, the preponderance of evidence summarized in the BOEM-sponsored report by Normandeau (2011) indicate that sea turtles are unlikely to detect most of the EMF impacts resulting from the Project. Potentially detectable impacts would be limited to within 1 to 2 feet of the short segments of cable laid on the bed surface. See Section 3.4.6 (Sea Turtles) of the EIS and the NMFS BA (BOEM 2021b). This information allowed BOEM's SMEs to estimate the potential risk to other species of sea turtles based on the assumption of similar anatomical, behavioral, and life history similarities, related to EMFs. Although the thresholds for EMF disturbance to the behavior of all potential species of sea turtles are not known, no adverse effects on sea turtles from the numerous submarine power cables around the world have been documented, and modeling of the anticipated EMFs generated by Project components suggest the majority of induced field strengths would likely be below detection levels. Similar to marine mammals, data are also not available to evaluate potential changes to normal movements of juvenile and adult sea turtles due to elevated suspended sediments. However, although some exposure may occur, total suspended solid impacts would be limited in magnitude and duration and within the range of exposures periodically experienced by these species. On this basis, any resulting impact on behavior would likely be too small to be biologically meaningful, and no adverse impacts would be expected (NOAA 2020).

There is also uncertainty relative to sea turtle responses to construction activities on the Atlantic OCS. Some potential for displacement from areas exposed to noise and disturbance exists. However, should any displacement of individuals occur, it is unclear if this would result in adverse impacts (e.g., because of lost foraging opportunities or increased exposure to potentially fatal vessel interactions). Additionally, it is currently unclear whether concurrent construction of multiple projects, increasing the extent and intensity of impacts over a shorter duration or spreading out project construction, and associated impacts over multiple years would result in the least potential harm to sea turtles. There is also uncertainty regarding the cumulative acoustic impacts associated with pile-driving activities. At this time, it is unclear if sea turtles that have ceased feeding during multiple construction activities would resume normal feeding, migrating, breeding, etc. behaviors once daily pile-driving activities cease or if secondary impacts would continue. Under the cumulative impact scenario, individual sea turtles may be exposed to acoustic impacts from multiple projects in 1 day or to acoustic impacts from one or more projects over the course of multiple days. The consequences of these exposure scenarios have been analyzed with the best available information, although some level of uncertainty remains due to the lack of observational data on species responses to pile driving. In addition, modeled predictions of operational sound for large turbines (10 megawatts) indicate that the sound levels could be greater than observed for existing wind turbines; actual sound levels are still predicted to be well below levels that could cause harm.

Some uncertainty exists in regard to the potential for sea turtle responses to Federal Aviation Administration hazard lights and navigation lighting associated with offshore wind development. Given the placement of the new structures far from nesting beaches, no impacts to nesting female or hatchling sea turtles would be expected. SFW has incorporated BOEM's guidance (Orr et al. 2013) for avoiding and minimizing artificial lighting impacts on aquatic life into the Project design. This environmental protection measure would limit WTG and electrical service platform lighting to minimum levels required by regulation for worker safety, navigation, and aviation. Sea turtle sensitivity to these minimal light levels is unknown. However, given that sea turtles do not appear to be adversely affected by oil and gas platform operations, which produce far more artificial light than offshore wind structures (BOEM 2021b), this IPF is not expected to have any measurable impacts (adverse or beneficial) on sea turtles in the offshore environment.

More broadly, considerable uncertainty remains about how sea turtles would interact with the long-term changes in biological productivity and community structure resulting from the development of an extensive network of artificial reefs across the geographic analysis area. Artificial reef and hydrodynamic impacts could influence predator-prey interactions and foraging opportunities in ways that influence sea turtle behavior and distribution. These IPFs are expected to interact with the ongoing influence of climate change on species distribution and behavior over broad spatial scales, but the nature and significance of these interactions are unclear. BOEM anticipates that ongoing monitoring of offshore energy structures will provide some useful insights into these synergistic effects.

BOEM considered the level of effort required to address the uncertainties described above for sea turtles and determined that the methods necessary to do so are lacking and/or the associated costs would be exorbitant. Where appropriate, BOEM inferred conclusions about the likelihood of potential biologically significant impacts from available information for similar species and/or situations. These methods are described in greater detail in Section 3.4.6 (Sea Turtles) and in the BA submitted to NMFS (BOEM 2021b). The approaches and methods used are based on the best available information, and the analysis provided in the final EIS is sufficient to support sound scientific judgements and informed decision making related to the proposed uses of the offshore portions of the analysis area. Notwithstanding the foregoing, the similarity between the layouts analyzed for the different alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM does not believe that there is incomplete or unavailable information on sea turtle resources that is essential to a reasoned choice among alternatives.

Wetlands and Other Waters of the United States

There is no incomplete or unavailable information related to the analysis of impacts on wetlands and other waters of the United States.

Commercial Fisheries and For-Hire Recreational Fishing

Fisheries are managed in the context of an incomplete understanding of fish stock dynamics and effects of environmental factors on fish populations. The fisheries information used in this assessment has limitations. For example, vessel trip report data is only an approximation because it is self-reported, and available historical data lacks consistency, making comparisons challenging. However, these data do represent the best available data and sufficient information exists to support the findings presented herein.

A second limitation is that aggregated geographic information system–based data necessary to update the revenue intensity figures included as Figure C-7 through Figure C-28 in Appendix C and referred to in Section 3.5.1 (Commercial Fisheries and For-Hire Recreational Fishing) were not available. These figures show inflation-adjusted annual average revenue by fishery management plan (FMP), by port and by gear. Aggregated data for FMPs were available only for 2008–2018, while aggregated data for the port and gear figures were available for 2008–2012. These revenue intensity figures have been used to provide graphic representation of the distribution of fishing effort in the geographic region in the vicinity of the South Fork Wind Farm and South Fork Export Cable for the years shown. While the analysis in Section 3.5.1 refers to these figures, annual Vessel Trip Report data for 2008–2019 from NMFS (2021) were the primary sources of data used in the tables throughout the assessment. Based on the foregoing, as well as the similarity between the layouts analyzed for the different alternatives, BOEM does not believe that there is incomplete or unavailable information on commercial fisheries and for-hire recreational fishing resources that is essential to a reasoned choice among alternatives

Cultural Resources

Information pertaining to the identification of historic properties within certain portions of the marine archaeology area of potential effects will not be available until after the record of decision is issued and the COP is approved. BOEM will prepare a Memorandum of Agreement with the Section 106 consulting parties allowing for deferred identification and evaluation of historic properties within this portion of the area of potential effects, facilitating that a good faith effort to identify historic properties and assess effects is fully performed prior to construction. This memorandum of agreement will be executed prior to issuance of a record of decision, and the deferred identification procedures and mitigation measures for cultural resources identified will apply to any of the alternatives selected. Therefore, BOEM does not believe that there is incomplete or unavailable information on cultural resources that is essential to a reasoned choice among alternatives.

Demographics, Employment, and Economics

Estimates of local employment and income resulting from development and construction of the Project may be underestimated because the broadly used model to project the employment impacts of offshore wind energy development—the Jobs and Economic Development Impact Offshore Wind Model developed by the National Renewable Energy Laboratory—has not been updated to include recent developments within the U.S. offshore wind component manufacturing and fabrication industry. In addition, the assumptions regarding future offshore wind projects are uncertain because the development parameters for some individual projects are still mostly either unknown or undisclosed. As noted in the introduction to this appendix, BOEM made assumptions regarding the timing and details of future offshore wind projects in many cases where no COP has yet been submitted. These assumptions were used to forecast the No Action alternative and the cumulative economic impacts for the Project.

Notwithstanding the above, since the alternatives analyzed consider projects of similar scope, BOEM does not believe that there is any incomplete and unavailable information on demographics, employment, and economics that is essential to a reasoned choice among alternatives.

Environmental Justice

Evaluations of impacts on environmental justice communities rely on the assessment of impacts on other resources. As a result, incomplete or unavailable information related to other resources, as described in this document, also affect the completeness of the analysis of impacts on environmental justice communities.

However, BOEM has determined that incomplete and unavailable resource information was either not relevant to a reasoned choice among alternatives or alternative data or methods used to predict potential impacts provided the best available information. Therefore, the analysis provided in the final EIS is sufficient to support sound scientific judgments and informed decision-making related to the proposed uses of the onshore and offshore portions of the analysis area.

Land Use and Coastal Infrastructure

There is no incomplete or unavailable information related to the analysis of impacts on land use and coastal infrastructure.

Navigation and Vessel Traffic

The navigation and vessel traffic impact analysis in the final EIS is based on automatic identification system (AIS) data for July 1, 2018, through June 30, 2019. Vessel monitoring system (VMS) data for fishing vessels provided by the National Marine Fisheries Service (NMFS) were the basis for polar histograms and other analytical outputs used in evaluating commercial and for-hire recreational fishing trips (Section 3.5.1). Some smaller recreational and fishing vessels carry an AIS; however, the AIS analysis likely excludes most vessels less than 65 feet (19.8 meters) long that traverse the WDA. In addition, as discussed under Commercial Fisheries and For-Hire Recreational Fishing, above, the VMS data provided by NMFS indicate the number of vessels in each fishery and their direction of travel while actively fishing, which speaks to alignment of the WTG grid. Nonetheless, the combination of AIS and VMS data described above represent the best available vessel traffic data and is sufficient to enable BOEM to make a reasoned choice among alternatives.

The U.S. Coast Guard’s (USCG’s) final report for the Areas Offshore of Massachusetts and Rhode Island Port Access Route Study (MARIPARS), evaluating the need for establishing vessel routing measures, was published in the *Federal Register* on May 27, 2020 (USCG 2020). The MARIPARS report recommended a standard and uniform grid pattern turbine layout throughout the Rhode Island and Massachusetts lease areas as the best way to facilitate predictable safe navigation throughout the contiguous leases. The five Rhode Island and Massachusetts offshore wind leaseholders, including SFW, have proposed a collaborative regional layout for wind turbines (1 × 1 nm apart in fixed east-to-west rows and north-to-south columns, with 0.7 nm theoretical transit lanes oriented northwest-southeast) across their respective BOEM leases (Geijerstam et al. 2019), which meets the layout rules set forth in the MARIPARS report recommendations. Although the USCG attached to the MARIPARS *Federal Register* docket the Responsible Offshore Development Alliance proposal (RODA 2020) recommending additional transit corridors through the lease areas, the MARIPARS report concluded that if the layout in the recommendations was implemented, the USCG would likely not pursue additional formal or informal routing measures. As a cooperating agency with BOEM, the USCG will continue to consult over the course of the NEPA process for the proposed Project as it relates to navigational safety and other aspects, including the impacts associated with alternatives assessed.

Based on the foregoing, BOEM does not believe that there is incomplete or unavailable information on navigation and vessel traffic that is essential to a reasoned choice among alternatives.

Other Uses (marine, military use, aviation, offshore energy)

As specified in the final EIS, this category includes other uses of the OCS not addressed in other resource sections. In the context of the NEPA analysis, this includes marine mineral resources, military and national security uses, aviation and air traffic, offshore energy uses (aside from the proposed Project), land-based radar systems, and scientific research surveys. There is no incomplete or unavailable information related to the analysis of marine mineral resources, military and national security uses, aviation and air traffic, offshore energy uses (aside from the aspects described in this appendix for the proposed Project, and the reasonably foreseeable offshore wind projects for which BOEM has not received COPs), and land-based radar systems.

As discussed in Section 3.5.7 for scientific research and surveys, analysis in the final EIS discloses both Project-specific and cumulative impacts to NMFS’s ability to continue conducting scientific research and surveys for the purpose of fisheries management and protected species management. Despite the foregoing, BOEM has concluded that the information provided by NOAA in Section 3.5.7 regarding scientific research and surveys are sufficient to support the impact findings presented in the final EIS. Therefore, BOEM does not believe that there is incomplete or unavailable information on scientific surveys that is essential to a reasoned choice among alternatives.

Recreation and Tourism

There is a paucity of quantitative data related to recreational not-for-hire fishing in the analysis area; therefore, quantitative analysis for this resource is not possible at this time. BOEM is considering how best to approach this issue for future similar projects. *Fisheries Economics of the United States,* 2016, (NMFS 2018) is a comprehensive summary document and the data presented discusses the overall economic level for not-for-hire recreational anglers in the offshore New England region (Maine, New Hampshire, Rhode Island, Connecticut, and Massachusetts). However, it does not relate to how projects like the South Fork Wind Farm are likely to affect not-for-hire recreational fishing and is not detailed enough in geographic extent to discuss specific recreational angling locations.

However, BOEM has determined that incomplete and unavailable resource information was either not relevant to a reasoned choice among alternatives or alternative data or methods used to predict potential impacts provided the best available information. Therefore, the analysis provided in the final EIS is sufficient to support sound scientific judgments and informed decision-making related to the proposed uses of the onshore and offshore portions of the analysis area.

Visual Resources

There is no incomplete or unavailable information related to the analysis of impacts on visual resources.

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The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the sound use of our land and water resources, protecting our fish, wildlife and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island communities.

The Bureau of Ocean Energy Management

The Bureau of Ocean Energy Management (BOEM) works to manage the exploration and development of the nation's offshore resources in a way that appropriately balances economic development, energy independence, and environmental protection through oil and gas leases, renewable energy development and environmental reviews and studies.