Commercial and Research Wind Lease and Grant Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf of the New York Bight

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Executive Summary

ES.1 Purpose and Need for Action

On March 29, 2021, the Bureau of Ocean Energy Management (BOEM) released the Announcement of Area Identification (Area ID) Memorandum describing the analysis and rationale used to develop the Wind Energy Areas (WEAs) in the Outer Continental Shelf (OCS) of New York Bight (NY Bight) (BOEM 2021a). The NY Bight is an offshore area extending generally northeast from Cape May in New Jersey to Montauk Point on the eastern tip of Long Island, NY. The purpose of the Proposed Action is to issue commercial and research leases within the WEAs and grant rights-of-way (ROWs) and rights-of-use and easement (RUEs) in the region to provide lessees the exclusive right to submit to BOEM plans to assess the physical characteristics of areas on the OCS of the NY Bight. The WEAs considered in this environmental assessment (EA) are depicted in **Figure ES-1**.

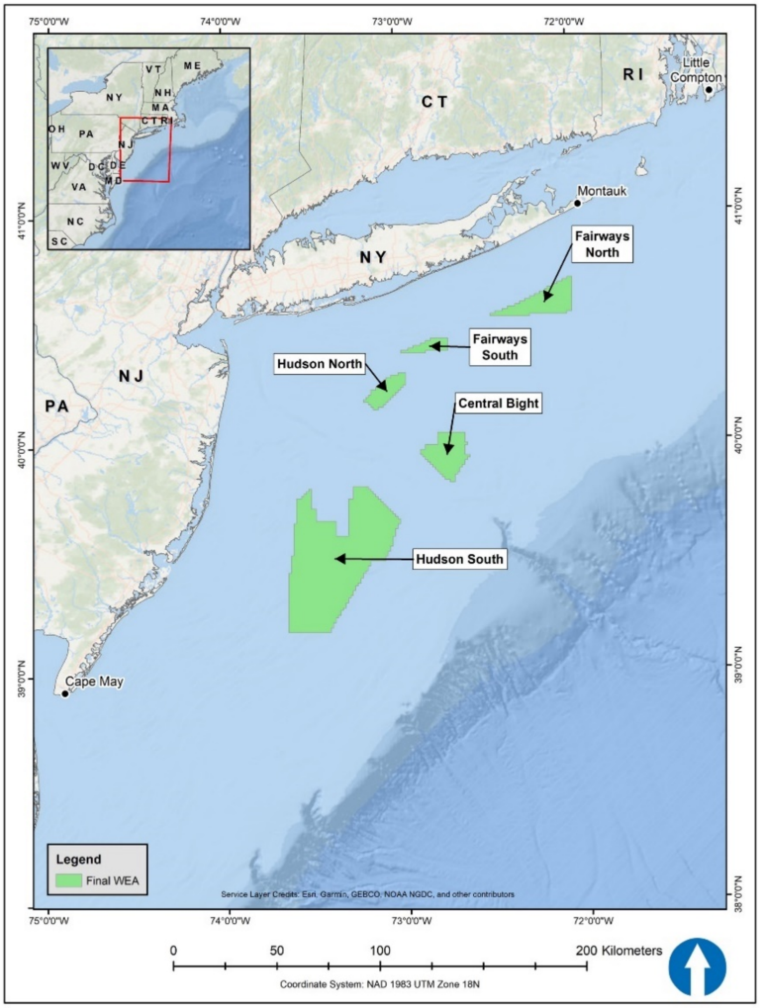

Figure ES-1. NY Bight Wind Energy Areas

BOEM's issuance of these leases and grants is needed to (1) confer the exclusive right to submit plans to BOEM for potential development, such that the lessees and grantees would commit to site characterization and site assessment activities necessary to determine the suitability of their leases and grants for commercial offshore wind production and/or transmission and develop plans for BOEM's review; and (2) ensure that site characterization and assessment activities are conducted in a safe and environmentally responsible manner.

ES.2 Proposed Action and Alternatives

The Proposed Action for this EA is the issuance of commercial and research wind energy leases within the WEAs that BOEM has designated on the OCS in the NY Bight, and the granting of ROWs and RUEs in support of wind energy development. Issuance of grants would only allow for the submittal of plans for

BOEM's consideration and approval, which does not constitute an irreversible and irretrievable commitment of resources. Therefore, BOEM's environmental analysis focused on the effects of site characterization and site assessment activities that take place after the issuance of commercial and research wind energy leases. This EA analyzes BOEM's issuance of up to 10 leases that may cover the entirety of the WEAs, the issuance of potential easements associated with each lease, and the issuance of grants for subsea cable corridors and associated offshore collector/converter platforms. The ROWs, RUEs, and potential easements would all be located within the NY Bight and would include corridors that extend from the WEAs to the onshore energy grid. The Proposed Action would result in site assessment activities on leases and site characterization activities on the leases, grants, and potential easements. Site assessment activities would most likely include the temporary placement of meteorological (met) buoys and oceanographic devices. Site characterization activities would most likely include geophysical, geotechnical, and biological surveys.

In this EA, BOEM analyzes two alternatives (**Table ES-1**).

Table ES-1. Alternatives analyzed in detail

Alternative	Description
Alternative A – No Action	Under Alternative A, no leases or grants would be issued in the NY Bight at this time. Some site characterization surveys (e.g., biological surveys) and off-lease site assessment activities do not require BOEM approval and could still be conducted under Alternative A, but these activities would not be likely to occur without a commercial wind energy lease or grant. Alternative A includes other ongoing activities and future planned actions (**Appendix D**) occurring in the same geographic area and timeframe (5 to 7 years after first lease issuance).
Alternative B (Preferred Alternative) – Offer some or all the WEAs for lease and adjacent areas for grants	Under Alternative B, lease issuance, site characterization, and site assessment activities could occur in the WEAs, and between the WEAs and shore along the potential transmission cable corridors.

WEA = Wind Energy Area.

ES.3 Foreseeable Activities and Impact-Producing Factors

The analysis covers the effects of routine and non-routine activities associated with lease and grant issuance, site characterization activities, and site assessment activities within the WEAs. This EA uses a reasonably foreseeable scenario of site characterization surveys and site assessment activities that could be conducted as a result of the Proposed Action. These scenarios are based on the requirements of the renewable energy regulations at 30 CFR Part 585, BOEM's guidance for lessees, previous lease applications and plans that have been submitted to BOEM, and previous EAs prepared for similar activities. Reasonably foreseeable non-routine and low-probability events and hazards that could occur during lease issuance related activities include (1) severe storms, such as hurricanes and extratropical cyclones; (2) allisions and collisions between the site assessment structure or associated vessels and other marine vessels or marine life; (3) spills from collisions or fuel spills resulting from generator refueling; and (4) recovery of lost survey equipment.

The analysis did not consider construction and operation of any commercial wind power facilities within the NY Bight WEAs, the latter of which would be evaluated as part of a separate National Environmental Policy Act (NEPA) process if a lessee submits a Construction and Operations Plan (COP).

Impact-producing factors (IPFs) associated with the various activities in the Proposed Action that could affect resources include the following:

- Noise
- Air Emissions
- Lighting
- Habitat Degradation
- Vessel Traffic
- Routine Vessel Discharges
- Bottom Disturbance
- Entanglement

ES.4 Environmental Consequences

This EA uses a four-level classification scheme (negligible, minor, moderate, and major) to characterize the environmental impacts predicted for each alternative. **Table ES-2** summarizes potential impacts that could occur under the Proposed Action (Alternative B). Under Alternative A (No Action), any potential environmental and socioeconomic impacts, including benefits, associated with Alternative B (Proposed Action) would not occur; however, impacts could occur from other ongoing or future planned actions (**Section 3**).

Table ES-2. Summary of impact determinations for Alternative B: Proposed Action

Resource	Impact Determination: Alternative B (Proposed Action)		
	Routine Activities		Non-Routine Events
	Site Assessment	Site Characterization	
Air Quality and Greenhouse Gas Emissions	Negligible	Negligible	Negligible
Benthic Resources	Negligible to Minor	Negligible to Minor	Negligible
Commercial and Recreational Fishing	Negligible to Minor	Negligible to Minor	Negligible
Cultural, Historical, and Archaeological Resources	Negligible	Negligible	Negligible
Finfish, Invertebrates, and Essential Fish Habitat	Negligible	Negligible to Minor	Negligible
Marine Mammals	Negligible to Minor	Negligible to Minor	Negligible
Military Use and Navigation/Vessel Traffic	Negligible	Negligible	Negligible
Recreation and Tourism	Negligible	Negligible	Negligible
Sea Turtles	Negligible	Negligible to Minor	Negligible

Note: Site assessment activities include met buoy deployment, operation, and decommissioning; site characterization activities include biological, geological, geotechnical, and archaeological surveys.

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List of Abbreviations and Acronyms

§	section
µpa	micropascal
Area ID	Announcement of Area Identification
ASMFC	Atlantic States Marine Fisheries Commission
BOEM	Bureau of Ocean Energy Management
Call	Call for Information and Nominations
CD	Consistency Determination
CEQ	Council on Environmental Quality
CHIRP	Compressed High-Intensity Radar Pulse
COP	Constructions and Operations Plan
CPT	cone penetration test
dB	decibel
DOD	Department of Defense
EA	environmental assessment
EFH	Essential Fish Habitat
EIS	environmental impact statement
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FONSI	Finding of No Significant Impact
G&G	geological and geophysical
GHG	greenhouse gas
HAPC	Habitat Area of Particular Concern
HF	high-frequency cetacean
hr	hour
HRG	high-resolution geophysical
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
IPF	impact-producing factor
ITA	incidental take authorization
km	kilometer
LF	low-frequency
MAFMC	Mid-Atlantic Fishery Management Council
met	meteorological
MF	mid-frequency
MISLE	Marine Information for Safety and Law Enforcement
MMPA	Marine Mammal Protection Act
MMS	Marine Minerals Service
NARW	North Atlantic right whale
NEFMC	New England Fishery Management Council
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act

NJ	New Jersey
nm	nautical mile
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NWP	Nationwide Permit
NY	New York
NYSERDA	New York State Energy Research and Development Authority
OCS	Outer Continental Shelf
OPAREA	operating area
OREP	Office of Renewable Energy Programs
PARS	Port Access Route Study
PDC	project design criteria
PEIS	Programmatic Environmental Impact Statement
PK	zero-to-peak sound pressure level
PPS	pulses per second
PSN	Proposed Sale Notice
PSO	protected species observer
PTS	permanent threshold shift
re	referenced to
RI	Rhode Island
RITE	Roosevelt Island Tidal Energy
ROW	right-of-way
RUE	right-of-use and easement
SAP	Site Assessment Plan
SAV	submerged aquatic vegetation
SBP	sub-bottom profiler
SEL	sound exposure level
SGCN	species of greatest conservation need
SHPO	State Historic Preservation Office
SL	source level
SOC	Standard Operating Condition
SPI	sediment profile imagery
SPL	sound pressure level
TSS	Traffic Separation Scheme
USACE	U.S. Army Corps of Engineers
USBL	ultra-short baseline
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WEA	Wind Energy Area

1 Purpose and Need for Action

The U.S. Department of the Interior's Bureau of Ocean Energy Management (BOEM) has prepared this environmental assessment (EA) to determine whether the issuance of a lease and grants within the Wind Energy Areas (WEAs) in the New York Bight (NY Bight) would lead to reasonably foreseeable significant impacts on the environment and, thus, whether an environmental impact statement should be prepared before a lease is issued.

On March 29, 2021, BOEM released the Announcement of Area Identification (Area ID) (BOEM 2021a). The Area ID Memorandum documents the analysis and rationale used to develop the WEAs in the NY Bight. The NY Bight is an offshore area extending generally northeast from Cape May in New Jersey to Montauk Point on the eastern tip of Long Island, NY.

The purpose of the Proposed Action is to issue up to 10 commercial and research leases within the WEAs and granting of rights-of-way (ROWs) and rights-of-use and easement (RUEs) in the region of the Outer Continental Shelf (OCS) of the NY Bight. BOEM's issuance of these leases and grants is needed to (1) confer the exclusive right to submit plans to BOEM for potential development, such that the lessees and grantees develop plans for BOEM's review and will commit to site characterization and site assessment activities necessary to determine the suitability of their leases and grants for commercial offshore wind production and/or transmission; and (2) impose terms and conditions intended to ensure that site characterization and assessment activities are conducted in a safe and environmentally responsible manner. The issuance of a lease by BOEM to the lessee conveys no right to proceed with development of a wind energy facility; the lessee acquires only the exclusive right to submit a plan to conduct this activity.

Based on the process described in the Area ID Memorandum (BOEM 2021a), the WEAs considered in this EA are described in **Table 1-1** and depicted in **Figure 1-1**.

Table 1-1. NY Bight Wind Energy Areas descriptive statistics

Parameter	Fairways North WEA	Fairways South WEA	Hudson North WEA	Central Bight WEA	Hudson South WEA	Total
Acres	88,246	23,841	43,056	84,688	567,552	807,383
Maximum depth (m)	56	46	45	61	59	n/a
Minimum depth (m)	42	39	41	52	32	n/a
Closest distance to New York (nm)	15	15	21	38	45	n/a
Closest distance to New Jersey (nm)	69	45	36	53	23	n/a

n/a = not applicable; WEA = Wind Energy Area.

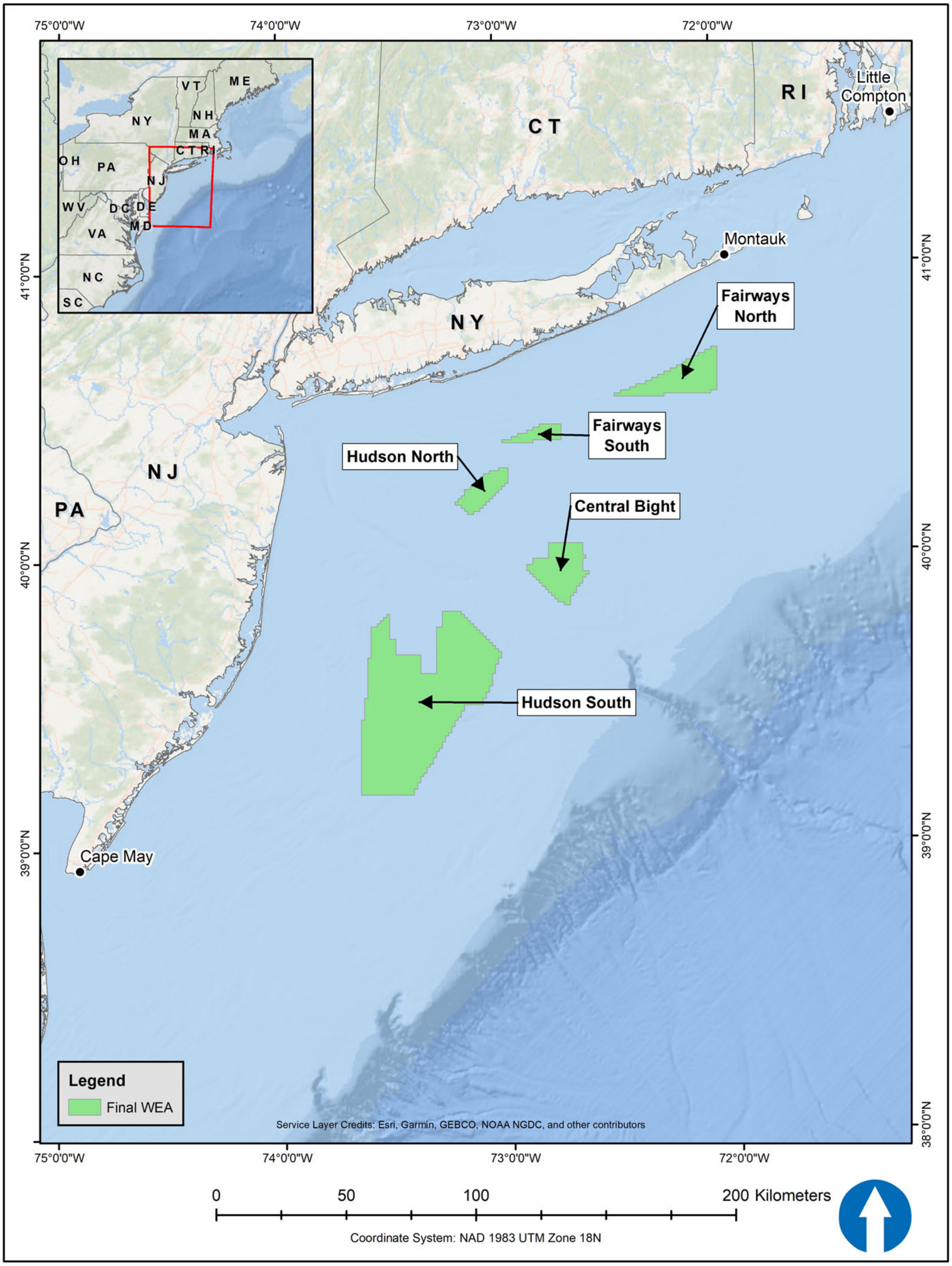

Figure 1-1. NY Bight Wind Energy Areas

2 Proposed Action

The Proposed Action is to offer for lease all or some the WEAs described above (**Table 1-1**; **Figure 1-1**) for commercial and research wind energy development and to grant ROWs and RUEs in support of wind energy development. Under the Proposed Action, BOEM would potentially issue up to 10 leases that may cover the entirety of the WEAs, issue easements associated with each lease, and issue grants for subsea cable corridors and associated offshore collector/converter platforms. The ROWs, RUEs, and potential easements would all be located within the NY Bight and may include corridors that extend from the WEAs to the onshore energy grid. This EA analyzes the reasonably foreseeable effects of activities that are anticipated to occur from the Proposed Action, including site assessment activities on leases and site characterization activities on the leases, grants, and potential easements. Site assessment activities would most likely include the temporary placement of meteorological (met) buoys and oceanographic devices. Activities included within the Proposed Action of this EA do not include the installation of met towers, since met buoys have become the preferred metocean data collection platform for developers. Site characterization activities would most likely include geophysical, geotechnical, and biological surveys.

This analysis does not consider construction and operation of any commercial wind power facilities, which would be evaluated if the lessee submits a Construction and Operations Plan (COP). BOEM takes this approach based on several factors.

First, BOEM does not consider the issuance of a lease to constitute an irreversible and irretrievable commitment of agency resources. The issuance of a lease only grants the lessee the exclusive right to submit to BOEM a Site Assessment Plan (SAP) and COP proposing development of the leasehold; the lease does not, by itself, authorize any activity within the lease area. After lease issuance, a lessee would conduct surveys and, if authorized to do so pursuant to an approved SAP, install meteorological measurement devices to characterize the site's environmental and socioeconomic resources and conditions and to assess the wind resources in the proposed lease area. A lessee would collect this information to determine whether the site is suitable for commercial development and, if so, submit a COP with its project-specific design parameters for BOEM's review. Should a lessee submit a COP, BOEM would consider its merits; perform the necessary consultations with the appropriate state, Federal, local, and tribal entities; solicit input from the public and the Task Force; and perform an independent, comprehensive, site- and project-specific National Environmental Policy Act (NEPA) analysis. This separate site- and project-specific NEPA analysis may take the form of an environmental impact statement (EIS) and would provide additional opportunities for public involvement pursuant to NEPA and the Council on Environmental Quality (CEQ) regulations at 40 CFR Parts 1500–1508. BOEM would use this information to evaluate the potential environmental and socioeconomic consequences associated with the lessee-proposed project when considering whether to approve, approve with modification, or disapprove a lessee's COP pursuant to 30 CFR 585.628. 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 would do this by disapproving a COP for failure to meet the statutory standards set forth in the Outer Continental Shelf Lands Act.

Second, BOEM does not consider the impacts resulting from the development of a commercial wind power facility within the WEA to be reasonably foreseeable at this time. Based on the experiences of the offshore wind industry in northern Europe, project design and the resulting environmental impacts are often geography- and design-specific, and it would therefore be premature to analyze environmental impacts related to potential approval of any future COP at this time (Michel et al. 2007; Musial and Ram 2010). A number of design parameters would be identified in a project proposal, including turbine size, foundation type, project layout, installation methods, and associated onshore facilities. However, the development of these parameters would be determined by information collected by the lessee during site characterization and assessment activities, and potential advances in technology during the extensive time period between lease issuance and COP approval. Each design parameter, or combination of parameters, would have varying environmental effects. Therefore, additional analyses under NEPA would be required before any future decision is made regarding construction of wind energy facilities on the OCS.

The timing of lease issuance, as well as weather and sea conditions, would be the primary factors influencing timing of site characterization and site assessment survey activities. Under the reasonably foreseeable site characterization scenario, BOEM could issue leases as early as late 2021 and continue through late 2022. It is assumed lessees would begin survey activities as soon as possible after receiving a lease and preparing an SAP and a Survey Plan, and when sea states and weather conditions allow for site characterization and site assessment survey activities. The most suitable sea states and weather conditions would occur from April to August (Atlantic Renewable Energy Corporation and AWS Scientific Inc. 2004). For leases issued in late 2021, the earliest surveys would likely begin no sooner than April 2022. Lessees have up to 5 years to perform site characterization activities before they must submit a COP (30 CFR §585.235(a)(2)). For leases issued in late 2022, those lessees' surveys could continue through August 2027 prior to submitting their COPs.

Of the alternatives considered in this EA, Alternative A is the No Action Alternative, which includes other ongoing activities and future planned actions. Alternative B, the Proposed Action, would result in site characterization and assessment activities in the identified WEAs of the NY Bight and along transmission cable corridors to shore. Both alternatives were analyzed by BOEM, in full, in this EA. The alternatives are described in **Section 3**.

2.1 Information Considered and Supporting National Environmental Policy Act Evaluations

Information considered in scoping this EA includes the following:

- Comments received in response to the April 11, 2018, Call for Information and Nominations (Call) associated with wind energy planning in the NY Bight
- Public response to the March 29, 2021, Notice to Stakeholders to prepare this EA
- Public response to the August 10, 2021, Notice to Stakeholders of the availability of the Draft EA (this comment period was extended by an additional two weeks)
- Ongoing consultation and coordination with the members of BOEM's NY Bight Intergovernmental Renewable Energy Task Force (Task Force)
- Ongoing or completed consultations with other Federal agencies, including the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), U.S. Department of Defense (DOD), and U.S. Coast Guard (USCG)

- New York State Energy Research and Development Authority (NYSERDA) completed studies and surveys[1]
- Research and review of current relevant NEPA documents that assess similar activities, as well as relevant scientific and socioeconomic literature (**Table 2-1**)

[1] Available at www.nyserda.ny.gov/About/Publications/Offshore-Wind-Plans-for-New-York-State

Table 2-1. Relevant regulatory documents and literature considered in this environmental assessment and incorporated by reference where appropriate.

Reference	Link
Other Relevant Lease Issuance Environmental Assessments (EAs)	
BOEM. 2021. South Fork Wind Farm and South Fork Export Cable Project Final Environmental Impact Statement. 1317 p. Report No.: OCS EIS/EA BOEM 2020-057.	www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/SFWF%20FEIS.pdf
BOEM. 2021. Vineyard Wind 1 Offshore Wind Energy Project Final Environmental Impact Statement. 4 vols. 2,422 p. Report No.: OCS EIS/EA BOEM 2012-0012.	www.boem.gov/vineyard-wind
BOEM. 2016. Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York, Revised Environmental Assessment. 449 p. Report No.: OCS EIS/EA BOEM 2016-070.	www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/NY/NY_Revised_EA_FONSI.pdf
BOEM. 2015a. Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore North Carolina, Revised Environmental Assessment. 353 p. Report No.: OCS EIS/EA BOEM 2015-038.	www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/NC/NC-EA-Camera-FONSI.pdf
BOEM. 2014. Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Massachusetts, Revised Environmental Assessment. 674 p. Report No.: OCS EIS/EA BOEM 2014-603.	www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/MA/Revised-MA-EA-2014.pdf
BOEM. 2013. Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Rhode Island and Massachusetts, Revised Environmental Assessment. 417 p. Report No.: OCS EIS/EA BOEM 2013-1131.	www.boem.gov/sites/default/files/uploadedFiles/BOEM/Renewable_Energy_Program/Smart_from_the_Start/Mid-Atlantic_Final_EA_012012.pdf
BOEM. 2012. Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New Jersey, Delaware, Maryland, and Virginia, Final Environmental Assessment. 366 p. Report No.: OCS EIS/EA BOEM 2012-003.	www.boem.gov/sites/default/files/uploadedFiles/BOEM/Renewable_Energy_Program/Smart_from_the_Start/Mid-Atlantic_Final_EA_012012.pdf

Reference	Link
Other Relevant Wind Energy Documents	
MMS. 2007. Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement. 4 vols. Report No.: OCS EIS/EA MMS 2007-046.	www.boem.gov/renewable-energy/guide-ocs-alternative-energy-final-programmatic-environmental-impact-statement-eis
Parsons G, Firestone J. 2018. Atlantic Offshore Wind Energy Development: Values and Implications for Recreation and Tourism. Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management. 52 p. Report No.: OCS Study BOEM 2018-013.	espis.boem.gov/final%20reports/5662.pdf
ICF Incorporated, LLC. 2012. Atlantic Region Wind Energy Development: Recreation and Tourism Economic Baseline Development. Herndon, VA: U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. 35 p. Report No.: OCS Study BOEM 2012-085.	espis.boem.gov/final%20reports/5228.pdf
BOEM. 2015b. Virginia Offshore Wind Technology Advancement Project on the Atlantic Outer Continental Shelf Offshore Virginia, Revised Environmental Assessment. 239 p. Report No.: OCS EIS/EA BOEM 2015-031.	www.energy.gov/sites/default/files/2016/03/f30/EA-1985-FEA-2015_1.pdf
Ecology and Environment Inc. 2014. Development of Mitigation Measures to Address Potential Use Conflicts between Commercial Wind Energy Lessees/Grantees and Commercial Fishermen on the Atlantic Outer Continental Shelf Final Report on Best Management Practices and Mitigation Measures. 98 p. Report No. OCS Study BOEM 2014-654.	www.boem.gov/sites/default/files/renewable-energy-program/Fishing-BMP-Final-Report-July-2014.pdf
Klein JI, Harris MD, Tankersley WM, Meyer R, Smith GC, Chadwick WJ. 2012. Evaluation of Visual Impact on Cultural Resources/Historic Properties: North Atlantic, Mid-Atlantic, South Atlantic, and Florida Straits. Volume I: Technical Report of Findings; Volume II: Appendices. 2 vols. 726 p. Report No.: OCS Study BOEM 2012-006.	Vol I: espis.boem.gov/final%20reports/5249.pdf Vol II: espis.boem.gov/final%20reports/5250.pdf
Other Relevant Survey Activity NEPA Evaluations	
BOEM. 2014. Atlantic OCS Proposed Geological and Geophysical Activities Mid-Atlantic and South Atlantic Planning Areas. Final Programmatic Environmental Impact Statement. 3 vols. 2,158 p. Report No.: OCS EIS/EA BOEM 2014-001.	www.boem.gov/oil-gas-energy/atlantic-geological-and-geophysical-gg-activities-programmatic-environmental-impact

Reference	Link
Other Relevant Affected Environment Documents	
NYDOS. 2013. New York Department of State Offshore Atlantic Ocean Study. Albany, NY. 144 p.	docs.dos.ny.gov/communitieswaterfronts/ocean_docs/NYSDOS_Offshore_Atlantic_Ocean_Study.pdf
Geo-Marine Inc. 2010. New Jersey Department of Environmental Protection Ocean/Wind Power Ecological Baseline Studies, Final Report. 4 vols. 923 p. Report No.: January 2008-December 2009.	www.nj.gov/dep/dsr/ocean-wind/
Normandeau Associates, APEM Inc. 2019. Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy. ReMOTe: Remote Marine and Onshore Technology. New York State Energy Research Development Authority.	remote.normandeau.com/portal_data.php?pj=6&public=1

BOEM = Bureau of Ocean Energy Management; MMS = Minerals Management Service; NYDOS = New York Department of State; OCS = Outer Continental Shelf; OREP = Office of Renewable Energy Programs.

2.2 Assumptions for Analysis and Impact-Producing Factors

BOEM's assumptions for the Proposed Action (Alternative B) scenario in this EA are summarized below in **Table 2-2**, and estimated quantification of survey effort is provided in **Appendix A**. This scenario is based on the requirements of the renewable energy regulations at 30 CFR Part 585, BOEM's guidance for lessees, previous lease applications and plans that have been submitted to BOEM, previous EAs prepared for similar activities (**Section 2.1**), and the biological assessment evaluating the effects of survey and data collection activities associated with renewable energy on the Atlantic OCS (Baker and Howson 2021). Unless otherwise noted, assumptions in this section are based on these sources.

Table 2-2. Assumptions for the Proposed Action (Alternative B) scenario

Overall Scenario Assumptions
BOEM would issue up to 10 leases in the WEAs, at 80,000 acres each (in WEAs large enough to achieve this).
A lessee would install two met buoys per lease.
There will be two export cable route corridors per lease.
A backbone transmission system with offshore converter collector platforms (platforms located within the cable corridors) could be granted an easement.
Surveying and Sampling Assumptions
Site characterization surveys would likely begin within one year following execution of lease (based on the likelihood that a lessee would complete reconnaissance site characterization surveys prior to installing a met buoy). Site characterization surveys would then continue on an intermittent basis for the following 5 years leading up to the preparation and submittal of the COP.
Lessees would likely survey the entire proposed lease area during the 5-year site assessment term to collect required geophysical and geotechnical information for siting of commercial facilities (wind turbines and transmission cable corridors). The surveys may be completed in phases, with the met buoy areas likely to be surveyed first.
Sub-bottom sampling (CPTs, vibracores, grab samples, SPI) of the WEA would require a sub-bottom sample at every potential wind turbine location (which would only occur in the portion of the WEA where structural placement is allowed) and one sample per kilometer of transmission cable corridor. Sampling will also be conducted at locations where offshore collector and/or converter platforms are proposed. The amount of effort and vessel trips required to collect the geotechnical samples varies greatly by the type of technology used to retrieve the sample. Benthic sampling could also include nearshore, estuarine, and SAV habitats along the transmission cable routes.
Lessees would be required to comply with Standard Operating Conditions (SOCs) developed to avoid and minimize adverse effects to resources (**Section 5**).
Installation, Decommissioning, and Operations and Maintenance Assumptions
Met buoy installation and decommissioning would likely take approximately one day each.
Met buoy installation and decommissioning would likely occur between April and August (due to weather).
Met buoy installation would likely occur in Year 2 after lease execution.
Met buoy decommissioning would likely occur in Year 6 or Year 7 after lease execution.
Assumptions for Generation of Noise
Under the Proposed Action, the following activities and equipment would generate noise: HRG survey equipment and vessel engines during site characterization surveys and met buoy installation, operations and maintenance, and decommissioning.

BOEM = Bureau of Ocean Energy Management; COP = Construction and Operations Plan; CPT = cone penetration test; HRG = high-resolution geophysical; met = meteorological; SAV = submerged aquatic vegetation; SPI = sediment profile imaging; WEA = Wind Energy Area.

This EA analyzes the effects of routine activities associated with lease and grant issuance, site characterization activities (i.e., biological, geological, geotechnical, and archaeological surveys of the WEAs as shown in **Table 2-3**), and site assessment activities (i.e., met buoy deployment, operation, and decommissioning) within the WEAs and within potential easements associated with transmission cable corridors. It does not consider construction and operation of any commercial wind power facilities on a lease or grant in the identified WEAs, which would be evaluated separately if a lessee submits a COP.

Impact-producing factors (IPFs) associated with the various activities in the Proposed Action that could affect resources include the following:

- Noise
- Air Emissions
- Lighting
- Habitat Degradation
- Vessel Traffic
- Routine Vessel Discharges
- Bottom Disturbance
- Entanglement

The IPFs associated with each routine and non-routine activity are provided in the following subsections.

Table 2-3. Typical equipment that would be used for surveys associated with the Proposed Action

Survey Type	Survey Equipment and/or Method	Resource Surveyed or Information Used to Inform
High-resolution geophysical surveys	Sub-bottom profiler, side-scan sonar, multibeam echosounder, magnetometer	Shallow hazards,[a] archaeological,[b] bathymetric charting, benthic habitat
Geotechnical/sub-bottom sampling[c]	Vibracores, deep borings, cone penetration tests	Geological[d]
Biological[e]	Grab sampling, benthic sled, underwater imagery/sediment profile imaging	Benthic habitat
Biological[e]	Aerial digital imaging, visual observation from boat or airplane	Avian
Biological[e]	Ultrasonic detectors installed on survey vessels used for other surveys	Bat
Biological[e]	Visual observation from boat or airplane	Marine fauna (marine mammals and sea turtles)
Biological[e]	Direct sampling of fish and invertebrates	Fish

[a]30 CFR §585.610(b)(2) and 30 CFR §585.626(a)(1)
[b]30 CFR §585.626(a) and 30 CFR §585.610–585.611
[c]30 CFR §585.610(b)(1) and 30 CFR §585.626(a)(4)
[d]30 CFR §585.610(b)(4) and 30 CFR §585.616(a)(2)
[e]30 CFR §585.610(b)(5) and 30 CFR §585.626(a)(3)

The U.S. Army Corps of Engineers (USACE) Nationwide Permit (NWP) Program was developed to streamline the evaluation and approval process for certain types of activities that have only minimal impacts on the aquatic environment. Most site characterization and site assessment activities under the Proposed Action would be covered by USACE NWP Numbers 5 and 6, which were developed under Section 404 of the Clean Water Act and Section 10 of the River and Harbors Act to provide a streamlined evaluation and approval process for certain activities that have minimal adverse impact, both individually and collectively, on the environment. NWP 5 covers the placement of scientific measurement devices, including tide gages, water recording devices, water quality testing and improvement devices, meteorological stations (which would include met buoys), and similar structures. NWP 6 covers a variety of survey activities, including core sampling, seismic exploratory operations, plugging of seismic shot holes and other exploratory-type bore holes, exploratory trenching, soil surveys, sampling, and historic resources surveys. An individual permit may be required from USACE if the proposed survey activities do not meet the terms and conditions of the NWP or if USACE determines that the survey activities would result in more than minimal adverse effects on the aquatic environment. Additionally, other Federal, state, and local permits, approvals, or authorizations may also be required.

2.2.1 High-Resolution Geophysical Surveys

High-resolution geophysical (HRG) surveys acquire geophysical shallow hazards information, including information to determine whether shallow hazards would impact seabed support of the turbines, to determine the presence or absence of archaeological resources, and to conduct bathymetric charting. Side-scan sonars, sub-bottom profilers, magnetometers, and multibeam echosounders may be used during HRG surveys and could add noise to the underwater environment. The types of equipment that may be used during these surveys are described in **Tables 2-4** and **2-5**. Acoustic information presented is representative of the types of equipment that may be used during characterization and site surveys, for which sound characteristics are known from field measurements at various distances from the source; these measurements were then back calculated to 1 m to estimate the source levels shown in **Table 2-5** (Crocker and Fratantonio 2016). This information is based on the highest reported power settings and source levels reported, but the actual equipment and settings used could have frequencies and source levels which differ from those indicated. The line spacing for HRG surveys would vary depending on the data collection requirements of the different HRG survey types, as shown in **Table 2-4**. The HRG survey equipment has numerous configurations (e.g., towed, pole mounted, hull mounted) but is typically deployed as a single source element, unlike other geophysical survey operations (e.g., oil and gas deep penetrating seismic exploration and mid-frequency active sonar military exercises), which use source arrays with multiple units or elements operating in unison. Therefore, it is important to note that noise resulting from offshore wind site characterization surveys is quieter and affects a much smaller area than noise from seismic surveys used for oil and gas exploration. More information on the technical specifications of the representative sources presented here can be found in Crocker and Fratantonio (2016).

Table 2-4. High-resolution geophysical survey equipment and methods

Equipment Type	Data Collection and/or Survey Types	Description of the Equipment	Line Spacing
Bathymetry/ depth sounder (multibeam echosounder)	Bathymetric charting	A depth sounder is a microprocessor-controlled, high-resolution, survey-grade system that measures precise water depths in both digital and graphic formats. The system would be used in such a manner as to record with a sweep appropriate to the range of water depths expected in the survey area. This EA assumes the use of multibeam bathymetry systems, which may be more appropriate than other tools for characterizing WEAs containing complex bathymetric features or sensitive benthic habitats, such as hardbottom areas.	The lessee would likely use a multibeam echosounder at a line spacing appropriate to the range of depths expected in the survey area.
Magnetometer	Collection of geophysical data for shallow hazards and archaeological resources assessments	Magnetometer surveys would be used to detect and aid in the identification of ferrous or other objects having a distinct magnetic signature. The magnetometer sensor is typically towed as near as possible to the seafloor and anticipated to be no more than approximately 6 m above the seafloor.	For the collection of geophysical data for shallow hazards assessments (including magnetometer, side-scan sonar, and sub-bottom profiler systems), BOEM recommends survey at a 150-m line spacing.
Side-scan sonar	Collection of geophysical data for shallow hazards and archaeological resources assessments	This survey technique is used to evaluate surface sediments, seafloor morphology, and potential surface obstructions (MMS 2007b). A typical side-scan sonar system consists of a top-side processor, tow cable, and towfish with transducers (or "pingers") located on the sides, which generate and record the returning sound that travels through the water column at a known speed. BOEM assumes that the lessee would use a digital dual-frequency side-scan sonar system with 300 to 500 kHz frequency ranges or greater to record continuous planimetric images of the seafloor.	
Shallow and medium (seismic) penetration sub-bottom profilers	Collection of geophysical data for shallow hazards and archaeological resources assessments and to characterize subsurface sediments	Sources used to collect these data consist of amplitude-frequency modulated systems (i.e., CHIRPs), electromagnetic transducers (e.g., boomers, bubble guns), and electrode sparkers. Typically, a high-resolution CHIRP System sub-bottom profiler is used to generate a profile view below the bottom of the seabed, which is interpreted to develop a geologic cross-section of subsurface sediment conditions under the track line surveyed. Another type of sub-bottom profiler that may be employed is a medium-penetration system, such as a boomer, bubble pulser, or impulse type system. Sub-bottom profilers are capable of penetrating sediment depth ranges of 3 m to greater than 100 m, depending on frequency and bottom composition.	For the collection of geophysical data for archaeological resources assessments (including magnetometers, side-scan sonar, and all sub-bottom profiler systems), BOEM recommends survey at a 30-m line spacing.

BOEM = Bureau of Ocean Energy Management; CHIRP = Compressed High-Intensity Radiated Pulse; EA = environmental assessment; MMS = Marine Minerals Service; WEA = Wind Energy Area.

Table 2-5. High-resolution geophysical survey equipment and their acoustic characteristics

HRG Equipment Categories	SL PK (dB re 1 µPa m)	SL SPL (dB re 1 µPa m)	SL SEL (dB re 1 µPa m)	Main Pulse Frequency (kHz)	Pulse Duration (seconds)	PPS	Beamwidth (degrees)
Medium-penetration SBP							
Boomers (proxy: AA251 Boomer Plate)	216	207	176	4.3	0.0008	1	Omni
Sparkers (proxy: AA Dura-spark)	225	214	188	2.9	0.0022	6	Omni
Bubble guns	204	198	173	1.1	0.0033	8	Omni
Shallow-penetration, non-parametric SBP (CHIRPs)							
SBP (proxy: EdgeTech 512i)	185	180	159	6.3	0.0087	8	80
SBP (proxy: Knudsen 3202)	214	209	193	3.3	0.0217	4	83
Parametric SBP							
Innomar, SES-2000 Medium-100	N/A	232	N/A	85	0.0035	40	5
Echosounders							
Reson Seabat 7111 multibeam echosounder	228	224	185	100	0.00015	20	160
Reson Seabat T20P multibeam echosounder	223	220	184	> 200	0.000254	50	150
Echotrac CV100 single-beam echosounder	197	194	163	> 200	0.000711	20	7
Side-scan sonar							
Klein 3900 side-scan sonar	226	220	179	> 200	0.000084	unreported	1.3
USBL positioning							
AA, Easytrak Nexus 2	193	192	N/A	18	0.0010	2	150
iXblue, IxSea GAPS Beacon System	N/A	188	N/A	8	0.0010	1	Omni

Source: Highest reported source levels (estimated at a distance of 1 m from the source) reported in Crocker and Fratantonio (2016) or manufacturer specifications for equipment categories that may be used for offshore wind site characterization surveys and modified as necessary based on manufacturer specifications or standard operating configurations.
µPa = micropascal; CHIRP = Compressed High -Intensity Radiated Pulse; dB = decibels; HRG = high-resolution geophysical; N/A = not applicable; PK = Zero-to-peak sound pressure level; PPS = pulses per second; re = referenced to; SBP = sub-bottom profiler; SEL = sound exposure level; SL = source level; SPL = Root-mean-square sound pressure level; USBL = ultra-short baseline.

BOEM assumes that, during site characterization, a lessee would survey potential transmission cable routes (for connecting future wind turbines to an onshore power substation) from the WEA to shore using HRG survey methods. BOEM assumes that the HRG survey grids for a proposed transmission cable route to shore would likely occur over a 1,000-m-wide corridor centered on the potential transmission cable location to allow for anticipated physical disturbances and movement of the proposed cable, if necessary. Since it is not yet possible to predict precisely where an onshore power substation may ultimately be installed or the route that any potential future transmission line would take across the seafloor from the WEA to shore, this EA used direct routes from the middle of each WEA to hypothetical potential interconnection points onshore in NY and NJ. The hypothetical points were selected based on proximity from shore to each WEA to conservatively approximate the level of surveys that may be conducted to characterize a transmission cable route. The hypothetical points used to approximate the level of surveys in no way represents a proposed cable route.

Increased vessel presence and traffic during HRG surveys could result in several IPFs including noise, air emissions, routine vessel discharges, and lighting from vessels.

2.2.2 Geotechnical Surveys

Geotechnical surveys are performed to assess the suitability of shallow sediments to support a structure foundation (i.e., gather information to determine whether the seabed can support foundation structures) or transmission cables under operational and environmental conditions that could potentially be encountered (including extreme weather events), as well as to document the sediment characteristics necessary for design and installation of all structures and cables. Samples for geotechnical evaluation are typically collected using shallow-bottom coring and surface sediment sampling devices taken from a survey vessel or drilling vessel. Likely methods to obtain samples to analyze physical and chemical properties of surface sediments are described in **Table 2-6**. These methods may result in bottom disturbance as a result of physical seafloor sampling.

Geotechnical/benthic sampling of the WEAs would require a sample at every potential wind turbine location (which would only occur in the portion of the WEA where structural placement is allowed) and one sample per kilometer of transmission cable corridor. The amount of effort and vessel trips required to collect the geotechnical samples varies greatly by the type of technology used to retrieve the sample (**Table 2-6**). The area of seabed disturbed by individual sampling events (e.g., collection of a core or grab sample) is estimated to range from 1 to 10 m^2 (BOEM 2014a; Fugro Marine GeoServices Inc. 2017). Some vessels require anchoring for brief periods using small anchors; however, approximately 50% of deployments for this sampling work could involve a boat having dynamic positioning capability (i.e., no seafloor anchoring impacts) (BOEM 2014a).

As with HRG surveys, increased vessel presence and traffic during geotechnical surveys may result in several IPFs including noise, air emissions, routine vessel discharges, and lighting from vessels. Additionally, bottom disturbance may occur as a result of geotechnical surveys due to physical sampling methods.

Table 2-6. Geotechnical/benthic sampling survey methods and equipment

Survey Method	Use	Description of the Equipment and Methods
Bottom-sampling devices	Penetrating depths from a few centimeters to several meters	A piston core or gravity core is often used to obtain samples of soft surficial sediments. Unlike a gravity core, which is essentially a weighted core barrel that is allowed to free-fall into the water, piston cores have a "piston" mechanism that triggers when the corer hits the seafloor. The main advantage of a piston core over a gravity core is that the piston allows the best possible sediment sample to be obtained by avoiding disturbance of the sample (MMS 2007b). Shallow-bottom coring employs a rotary drill that penetrates through several feet of consolidated rock. Drilling produces low-intensity, low-frequency sound through the drill string. The above sampling methods do not use high-energy sound sources (Continental Shelf Associates Inc. 2004; MMS 2007a).
Vibracores	Obtaining samples of unconsolidated sediment; may, in some cases, also be used to gather information to inform the archaeological interpretation of features identified through the HRG survey (BOEM 2020a)	Vibracore samplers typically consist of a core barrel and an oscillating driving mechanism that propels the core barrel into the sub-bottom. Once the core barrel is driven to its full length, the core barrel is retracted from the sediment and returned to the deck of the vessel. Typically, cores up to 6 m long with 8 cm diameters are obtained, although some devices have been modified to obtain samples up to 12 m long (MMS 2007a; USACE 1987).
Deep borings	Sampling and characterizing the geological properties of sediments at the maximum expected depths of the structure foundations (MMS 2007a)	A drill rig is used to obtain deep borings. The drill rig is mounted on a jack-up barge supported by four "spuds" that are lowered to the seafloor. Geologic borings can generally reach depths of 30–61 m within a few days (based on weather conditions). The acoustic levels from deep borings can be expected to be in the low-frequency bands and below the 160 dB threshold established by NMFS to protect marine mammals (Erbe and McPherson 2017).
CPT	Supplement or use in place of deep borings (BOEM 2020c)	A CPT rig would be mounted on a jack-up barge similar to that used for the deep borings. The top of a CPT drill probe is typically up to 8 cm in diameter, with connecting rods less than 15 cm in diameter.

BOEM = Bureau of Ocean Energy Management; CPT = cone penetration test; dB = decibels; HRG = high-resolution geophysical; MMS = Marine Minerals Service; NMFS = National Marine Fisheries Service; USACE = U.S. Army Corps of Engineers.

2.2.3 Biological Surveys

Biological surveys are necessary to characterize the biological resources that could be affected by the proposed activity or could affect activities in the proposed plan. Benthic habitat, avian, bat, and marine fauna surveys are all expected as part of the Proposed Action. Biological survey activities associated with the Proposed Action are described in **Table 2-7**. For biological surveys, BOEM assumes that all vessels associated with the Proposed Action would be required to abide by the Standard Operating Conditions (SOCs) (**Section 5**). NMFS may require additional measures from the lessee to comply with the Marine Mammal Protection Act (MMPA) and/or the Endangered Species Act (ESA).

Increased vessel presence and traffic during biological surveys may result in several IPFs, including noise, air emissions, routine vessel discharges, and lighting from vessels. Some biological surveys may be conducted from an aircraft (e.g., avian and bat surveys) and, if conducted, may result in aircraft noise, lighting, and emissions. Additionally, bottom disturbance and marine faunal mortality may occur as a result of benthic habitat and fisheries surveys due to physical sampling methods.

Table 2-7. Biological survey types and methods

Biological Survey Type	Survey Guidelines	Survey Method	Timing
Benthic habitat	BOEM (2019a): Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585, Subpart F. www.boem.gov/sites/default/files/renewable-energy-program/Regulatory-Information/BOEM-Renewable-Benthic-Habitat-Guidelines.pdf	Bottom sediment/fauna sampling and underwater imagery/sediment profile imaging (sampling methods described above under geotechnical surveys)	Concurrent with geotechnical/benthic sampling
Avian	BOEM (2020b): Guidelines for Providing Avian Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585. www.boem.gov/sites/default/files/documents/newsroom/Avian%20Survey%20Guidelines.pdf	Visual surveys from a boat	10 OCS blocks per day (Thaxter and Burton 2009) monthly for 2 to 3 years
		Plane-based aerial surveys	2 days per month for 2 to 3 years
Bats	None	Ultrasonic detectors installed on survey vessels being used for other biological surveys	Monthly for 3 months per year between March and November
Marine fauna (marine mammals, fish, and sea turtles)	BOEM (2019b): Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585. www.boem.gov/sites/default/files/renewable-energy-program/Regulatory-Information/BOEM-Fishery-Guidelines.pdf BOEM (2019c): Guidelines for Providing Information on Marine Mammals and Sea Turtles for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585. www.boem.gov/sites/default/files/renewable-energy-program/Regulatory-Information/BOEM-Marine-Mammals-and-Sea-Turtles-Guidelines.pdf	Plane-based and/or vessel surveys—may be concurrent with other biological surveys, but would not be concurrent with any geophysical or geotechnical survey work	2 years of survey to cover spatial, temporal, and inter-annual variance in the area of potential effect

BOEM = Bureau of Ocean Energy Management; OCS = Outer Continental Shelf.

2.2.4 Meteorological Buoy – Installation, Operation, and Decommissioning

Installation, operation and maintenance, and decommissioning of met buoys for characterizing wind conditions are part of the assumptions/scenario for the Proposed Action. Met buoys are anchored to the seafloor at fixed locations and regularly collect observations from many different atmospheric and oceanographic sensors. This EA assumes that a maximum of two buoys per lease would be installed, thus with 10 leases, a total of 20 buoys are considered. The choice of buoy type used usually depends on its intended installation location and measurement requirements. For example, a smaller buoy in shallow coastal waters may be moored using an all-chain mooring. On the OCS, a larger discus-type or boat-shaped hull buoy may require a combination of a chain, nylon, and buoyant polypropylene materials designed for many years of ocean service. The other relevant lease issuance EAs listed in **Table 2-1** provide evaluations of various met buoy schematics and met buoy and anchor systems, including hull type, height, and anchoring methods. The other EAs also describe activities related to installation, operation and maintenance, and decommissioning of the met buoys. Buoy types that are typically deployed are also described by the National Data Buoy Center (NDBC 2012).

Buoys are towed or carried aboard a vessel to the installation location and either lowered to the ocean surface from the deck of the vessel or placed over the final location and the mooring anchor is dropped. Based on previous proposals, anchors for boat-shaped or discus-shaped buoys would weigh about 2,721 to 4,536 kg, with a footprint of about 0.5 m^2 and an anchor chain sweep of about 34,398 m^2 (BOEM 2014a; Fugro Marine GeoServices Inc. 2017). Transport and installation vessel anchoring for 1 day is anticipated for these types of buoys. For spar-type buoys, installation would occur in two phases. Phase one would occur over 1 day, and the clump anchor would be transported and deployed to the seabed. In phase two, which would take place over 2 days, the spar-buoy would be similarly transported and then crane lifted into the water. Divers would secure it to the clump anchor (which weighs a minimum of 100 tons). Previous proposals have indicated that the maximum area of disturbance related to deployment of a spar-buoy occurs during anchor deployment/removal, resulting in a maximum area of disturbance of 118 m^2 of seafloor between its clump anchor and mooring chain (BOEM 2014a).

On-site inspections and preventative maintenance (i.e., marine fouling, wear, or lens cleaning) are expected to occur on a monthly or quarterly basis for met buoys. Periodic inspections for specialized components (i.e., buoy, hull, anchor chain, or anchor scour) would occur at different intervals but would likely coincide with the monthly or quarterly inspection to minimize the need for additional boat trips to the site.

Decommissioning is basically the reverse of the installation process. Equipment recovery would be performed with the support of a vessel(s) equivalent in size and capability to that used for installation. For small buoys, a crane-lifting hook would be secured to the buoy. A water/air pump system would de-ballast the buoy, causing it to tip into the horizontal position. The mooring chain and anchor would be recovered to the deck using a winching system. The buoy would then be transported to shore. Buoy decommissioning is expected to be completed within 1 to 2 days depending on buoy type.

Site clearance activities are also a part of decommissioning obligations and requirements pursuant to 30 CFR §585.906(e) and 30 CFR §585.910(b). A lessee must provide evidence that the area used for site assessment facilities (i.e., met buoys) has been returned to its original state within 60 days following removal of the facilities. The lessee must remove any trash or bottom debris introduced as a result of operations and document that the lease area is clear; such evidence may consist of one or more of the following: photographic bottom survey, site clearance, high-resolution side-scan survey, or sector-scanning sonar survey.

IPFs associated with met buoy installation operation and maintenance, and decommissioning (including site clearance) may include vessel traffic, noise and lighting, air emissions, and routine vessel discharges. Bottom disturbance and habitat degradation may also occur as a result of met buoy anchoring and installation. The presence of the buoy may act as a fish aggregating device attracting fish and other species (e.g., birds) to the buoy location. Entanglement in buoy or anchor components is a possible IPF associated with this phase of the Proposed Action.

2.2.5 Non-Routine Events

Reasonably foreseeable non-routine and low-probability events and hazards that could occur during site characterization and site assessment related activities include the following: (1) severe storms, such as hurricanes and extratropical cyclones; (2) allisions and collisions between the site assessment structures or associated vessels and other marine vessels or marine life; (3) spills from collisions or fuel spills resulting from generator refueling; and (4) recovery of lost survey equipment.

Impacts on the Proposed Action from storms, allisions and collisions, and spills have been previously described and analyzed in other relevant EAs (**Table 2-1**). Although these previous documents do not specifically address the NY Bight area, the assessment of potential impacts presented in those documents applies equally to the Proposed Action as the risks of these events are not materially different in the NY Bight. Accordingly, the potential impacts from non-routine events are described in those EAs and are briefly described below but not analyzed in detail in **Section 4**. However, recovery of lost survey equipment is a newly identified non-routine event and is carried forward for analysis in this EA.

Storms

Severe weather events have the potential to cause structural damage and injury to personnel. Major storms, winter nor'easters, and hurricanes pass through the area regularly, resulting in elevated water levels (storm surge) and high waves and winds. Storm surge and wave heights from passing storms are worse in shallow water and along the coast but can pose hazards in offshore areas. The Atlantic Ocean hurricane season extends from June 1 to November 30, with a peak in September when hurricanes would be most likely to impact the WEAs at some time during the Proposed Action. Storms could contribute to an increased likelihood of allisions and collisions that could result in a spill. However, the storm would cause the spill and its effects to dissipate faster, vessel traffic is likely to be significantly reduced in the event of an impending storm, and surveys related to the Proposed Action would be postponed until after the storm had passed. Although storms have the potential to impact met buoys, the structures are designed to withstand storm conditions. Though unlikely, structural failure of a met buoy could result in a temporary hazard to navigation.

Allisions and Collisions

An allision occurs when a moving object (i.e., a vessel) strikes a stationary object (e.g., met buoy); a collision occurs when two moving objects strike each other. A met buoy in the WEA could pose a risk to vessel navigation. An allision between a ship and a met buoy could result in the damage or loss of the buoy and/or the vessel, as well as loss of life and spillage of petroleum product. Although considered unlikely, vessels associated with site characterization and site assessment activities could collide with other vessels, resulting in damages, petroleum product spills, or capsizing. Risk of allisions and collisions is reduced through USCG Navigation Rules and Regulations, safety fairways, and Traffic Separation Schemes (TSSs) for vessels transiting into and out of the ports of NY and NJ. BOEM anticipates that aerial surveys (if necessary) would not be conducted during periods of storm activity because the reduced visibility conditions would not meet visibility requirements for conducting the surveys; flying at low elevations would pose a safety risk during storms and times of low visibility.

Collisions between vessels and allisions between vessels and met buoys are considered unlikely since vessel traffic is controlled by multiple routing measures, such as safety fairways, TSSs, and anchorages. These higher traffic areas were excluded from the WEAs. Risk of allisions with met buoys would be further reduced by USCG-required marking and lighting.

Spills

A spill of petroleum product could occur as a result of hull damage from allisions with a met buoy, collisions between vessels, accidents during the maintenance or transfer of offshore equipment and/or crew, or natural events (i.e., strong waves or storms). From 2000 to 2009, the average spill size for vessels other than tank ships and tank barges was 88 gallons (USCG 2011); should a spill from a vessel associated with the Proposed Action occur, BOEM anticipates that the volume would be similar.

Diesel fuel is lighter than water and may float on the water's surface or be dispersed into the water column by waves. Diesel would be expected to dissipate very rapidly, evaporate, and biodegrade within a few days (MMS 2007a). The National Oceanic and Atmospheric Administration's (NOAA's) Automated Data Inquiry for Oil Spills (ADIOS; an oil weathering model) was used to predict dissipation of a maximum spill of 2,500 barrels, a spill far greater than what is assumed as a non-routine event during the Proposed Action. Results of the modelling analysis showed that dissipation of spilled diesel fuel is rapid. The amount of time it took to reach diesel fuel concentrations of less than 0.05% varied between 0.5 and 2.5 days, depending on ambient wind (Tetra Tech Inc. 2015), suggesting that 88 gallons would reach similar concentrations much faster and limit the environmental impact of such a spill.

Vessels are expected to comply with USCG requirements relating to prevention and control of oil spills, and most equipment on the met buoys would be powered by batteries charged by small wind turbines and solar panels. BOEM expects that each of the vessels involved with site characterization and site assessment activities would minimize the potential for a release of oils and/or chemicals in accordance with 33 CFR part 151, 33 CFR Part 154, and 33 CFR Part 155, which contain guidelines for implementation and enforcement of vessel response plans, facility response plans, and shipboard oil pollution emergency plans. Based on the size of the spill, it would be expected to dissipate very rapidly and would then evaporate and biodegrade within a day or two (at most), limiting the potential impacts to a localized area for a short duration.

Recovery of Lost Survey Equipment

Equipment used during site characterization and site assessment activities (e.g., towed HRG survey equipment, cone penetration test [CPT] components, grab sampler, buoys, lines, cables) could be accidentally lost during survey operations. Additionally, it is possible (although unlikely) that a met buoy could disconnect from the clump anchor. In the event of lost equipment, recovery operations may be undertaken to retrieve the equipment. Recovery operations may be performed in a variety of ways depending on the equipment lost. A commonly used method for retrieval of lost equipment that is on the seafloor is through dragging grapnel lines (e.g., hooks, trawls). A single vessel deploys a grapnel line to the seafloor and drags it along the bottom until it catches the lost equipment, which is then brought to the surface for recovery. This process can result in significant bottom disturbances as it requires dragging the grapnel line along the bottom until it hooks the lost equipment, which may require multiple passes in a given area. In addition to dragging a grapnel line along the bottom, after the line catches the lost equipment, it will drag all the components along the seafloor until recovery.

Marine debris, such as lost survey equipment, that is not able to be retrieved because it is either small or buoyant enough to be carried away by currents or is completely or partially embedded in the seafloor (for example, a broken vibracore rod) could create a potential hazard for bottom-tending fishing gear or cause additional bottom disturbance. A broken vibracore rod that cannot be retrieved may need to be cut and capped 1 to 2 m below the seafloor. For the recovery of marine debris, BOEM will work with the lessee/operator to develop a recovery plan as described in the NMFS Programmatic ESA consultation for data collection activities (Anderson 2021). Selection of a mitigation strategy would depend on the nature of the lost equipment, and further consultation may be necessary.

IPFs associated with recovery of marine debris such as lost survey equipment may include vessel traffic, noise and lighting, air emissions, and routine vessel discharges from a single vessel. Recovery operations may also cause bottom disturbance and habitat degradation.

2.3 Resources Eliminated from Further Consideration

NEPA requires issues (resource areas) that are significant to the action be the focus of the analysis. Because many of the activities described in this EA have been previously analyzed in the Atlantic G&G Final Programmatic Environmental Impact Statement (PEIS), the Alternative Energy PEIS, and other relevant EAs (**Table 2-1**), the potential for impacts is well documented. The previous analyses provided in **Table 2-1** address the resources areas listed below in greater detail. Although these previous documents do not specifically address the NY Bight area, the same types of activities described in this EA are addressed in those documents. Additionally, activities included within the Proposed Action of this EA do not include the installation of met towers. Although the results presented in previous EAs had included met tower installation, this potential source of impact has been removed from the present analysis and may account for a different (reduced) impact rating relative to prior assessments. The evaluations and conclusions in those documents are consistent with BOEM's determination that the following resource areas, outlined below, will not be carried forward for analysis in this EA because impacts to those resources are anticipated to be negligible or less. However, the resources listed here would be within the scope of analysis for future actions (i.e., development of a wind lease area).

Bats

The potential impacts on bats associated with activities described in the scenario for the Proposed Action (HRG surveys, geotechnical/benthic sampling, and biological surveys within the NY Bight) would be negligible. Impacts to bats are analyzed in detail within the *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic OCS Offshore NY, Revised EA* (BOEM 2016). Bat activity in the

Atlantic has been found to decline dramatically 11 nm from shore (Sjollema et al. 2014), and it is generally considered unlikely that any bats would travel 15 nm or more from land over open water to forage exclusively in the WEAs (Peterson 2016; Sjollema et al. 2014). One species of bat federally listed as threatened, the northern long-eared bat (*Myotis septentrionalis*), occurs on Long Island; its range includes Queens, Nassau, and Suffolk Counties (USFWS 2020). Unlike tree bats, which migrate long distances to warmer climates in the winter, northern long-eared bats do not migrate long distances, especially over open water. Instead, colonies of northern long-eared bats hibernate in caves for the winter, and individuals roost in trees during the summer so that they can forage primarily in wooded habitat within a kilometer of their roost (80 *FR* 17974). Although passage of a migrating tree bat through any of the WEAs is considered a rare event (BOEM 2016), migrating tree bats have been detected on the OCS. Additionally, given the rarity of the northern long-eared bat in the region, its ecology and habitat requirements, it is extremely unlikely that any northern long-eared bats would venture so far from land and on to the OCS and into the WEAs (Pelletier et al. 2013; Peterson 2016).

Although bats are rare in the WEAs, bats could have avoidance or attraction responses to the survey vessels and met buoys due to noise, lighting, and the possible presence of insects. There may be temporary impacts to bats from onshore operational noise and human activity during construction and decommissioning or during survey operations of the export cable route or backbone transmission route in coastal areas; these operations, however, will not be out of character for the areas existing vessel traffic and operations. Due to the scarcity of bats offshore in the WEAs, the limited amount of added vessel traffic (relative to existing traffic described in **Section 4.2.5**), and the small number of met buoys to be installed at distance of 15 nm or more from shore, collisions between bats and boats/met buoys is unlikely. Thus, the overall impact of activities associated with the Proposed Action would be negligible.

Bathymetry, Geology, and Sediments

The potential impacts on bathymetry, geology, and sediments from activities described in the scenario for the Proposed Action (HRG surveys, geotechnical/benthic sampling, and biological surveys within the NY Bight) would be negligible. This analysis is consistent with the Atlantic G&G Final PEIS (BOEM 2014a). The installation of a met tower is not included as part of the Proposed Action analyzed within this EA. Installation of a met buoy would result in greater impacts to the seafloor than disturbance from bottom sampling. Disturbance from installation of a met buoy would result in a maximum impact area of 34,398 m^2, with anchor chain sweep, per buoy. A total of 170 acres of seafloor could be affected, assuming the maximum number (20) of met buoys are installed, that all buoys are either boat-shaped or discus-shaped, and that they disturb the maximum foreseeable area of seafloor. The dominant habitat type in the region is sand or soft bottom, and recovery of soft-bottom benthic environments takes a few months to a few years depending on the substrate composition (with sandy substrates recovering more quickly than silt/clay) (Brooks et al. 2006; Kritzer et al. 2016; Lindholm et al. 2004). Use of spar-type buoys would decrease the area of impact significantly. Thus, the installation of two met buoys per lease would create negligible impacts on the bathymetry, geology, and sediments of the seafloor. Impacts from bottom-sampling range of 1 to 10 m^2 per sample. BOEM estimates that approximately 5,800 samples would be collected (**Appendix A**). The maximum area of disturbance from bottom sampling would be about 14 acres assuming anchoring would be required for all samples, which is a highly unlikely scenario. Additionally, the estimated area of disturbance from bottom sampling would be spread out across the WEAs and along the potential transmission cable corridors. Therefore, collection of bottom samples would create negligible impacts on the bathymetry, geology, and sediments of the seafloor.

Birds

The potential impacts on birds associated with activities described in the scenario for the Proposed Action (HRG surveys, geotechnical/benthic sampling, and biological surveys within the NY Bight) would be negligible. The Atlantic Coast is a major flyway for birds, including terrestrial species, shorebirds, waterbirds, and marine birds. Five federally listed birds may be found within the WEAs: piping plover (*Charadrius melodus*); red knot (*Calidris canutus rufa*); roseate tern (*Sterna dougallii dougallii*); Bermuda petrel (*Pterodroma cahow*); and black-capped petrel (*Pterodroma hasitata*). Bird species that are likely to occur in the WEAs are generally found in other nearshore areas of the Atlantic Ocean from North Carolina to Massachusetts and are described in detail within the other relevant EAs listed in **Table 2-1**. The previous NEPA documents evaluated impacts to birds that could occur as a result of similar activities to the Proposed Action. These impacts include the effects associated with light, noise (vessel, equipment, and HRG sound sources), vessel traffic, installation of met buoys, and non-routine events. In the previous analyses (**Table 2-1**), installation of met towers was considered the most significant IPF to birds; that activity has been removed from the Proposed Action for this EA. Relative to existing vessel traffic in the NY Bight, the Proposed Action would introduce a small number of vessels over the timeframe of the Proposed Action, and only a maximum of 20 met buoys would be installed across the five noncontiguous WEAs, resulting in negligible impacts to birds. Additionally, lessees would be required to abide by the SOCs for birds (**Section 5**) to reduce the potential for the Proposed Action to adversely affect this resource.

Coastal Habitats

Previous NEPA evaluations include descriptions of the affected environment for coastal habitats along the entire Atlantic Coast, including NJ and NY (BOEM 2012; 2016; MMS 2007b). The coastal resources of the NY and NJ shorelines include sandy beaches, coarse-grained beaches, cliffs, shellfish beds in tidal flats, submerged aquatic vegetation (SAV) (seagrasses and attached macroalgae), coastal dune systems, barrier island forests, and salt and freshwater marshes. Impacts to SAV beds are addressed in **Sections 4.3.1** and **4.3.3**. The closest WEAs are located approximately 15 nm from NY and 23 nm from NJ. Given the minimum distance from shore, vessel traffic from site characterization surveys and site assessment activities would have no direct impacts on coastal habitats. Nearshore vessel traffic and use of coastal facilities have the potential to affect coastal habitats in already heavily used port areas. Vessel traffic associated with the Proposed Action would be split between ports in NY and NJ, and no expansion of these ports is expected in support of the Proposed Action. Specific ports used by a lessee in the future would be determined primarily by proximity to the WEAs and capacity to handle proposed activities. No direct impacts on coastal habitats are anticipated from routine activities associated with site characterization and site assessment, or from non-routine events under the Proposed Action. Indirect impacts from routine activities may include wake-induced erosion and increased turbidity caused by nearshore vessel traffic but would be negligible or less given the small amount of added vessel traffic to existing traffic in the area.

Coastal Infrastructure

Vessel and crew usage of onshore facilities associated with site characterization and site assessment activities have been analyzed in previous EAs (**Table 2-1**) and are not discussed further because these activities would be the same, with the exception that met towers would not be installed as part of the Proposed Action within this EA. Existing commercial ports, harbors, or industrial areas composing the coastal infrastructure could be used when implementing the Proposed Action, such as Staten Island, Brooklyn, and Erie Basin in NY or Perth Amboy, Shark River, and Newark in NJ.

Activities associated with the Proposed Action would not require additional coastal infrastructure to be constructed, would not require expansion of port areas (even if smaller ports are used), and would be smaller in scale than ongoing activities at existing ports. Consistent with previous EAs (**Table 2-1**), there would be no impacts on coastal infrastructure from site characterization and site assessment activities because the existing infrastructure and facilities would be adequate to accommodate Proposed Action activities. Therefore, there would be no impacts on coastal infrastructure in the vicinity of the WEAs.

Demographics and Employment

The potential impacts on demographics and employment that could occur as a result of site characterization and site assessment activities have been previously analyzed in other relevant EA documents and the Atlantic G&G Final PEIS (**Table 2-1**); it was concluded that impacts from these activities were expected to be negligible. Although the previous analyses do not cover the same geographic region, the types of activities addressed would have similar impacts on demographics and employment in the NY and NJ coastal areas. Temporary increases in employment from Proposed Action activities, such as surveying and met buoy fabrication and installation, could occur in various local economies associated with onshore- and offshore-related industry in the coastal counties of NY and NJ. Additionally, the small number of workers directly employed in site characterization and site assessment surveys would be insufficient to have a perceptible impact on local employment and population.

BOEM expects any beneficial impacts on employment, population, and the local economies in and around the ports to be short term and imperceptible, depending on the distribution of activities among ports and over time; therefore, impacts would be negligible. Although the approximate number of workers directly employed would be measurable, benefits to the local economy would be difficult to measure, and the overall impact to the local economy would be difficult to determine; therefore, impacts to demographics and employment would be nominal.

Environmental Justice

The anticipated leases would be located 15 nm or more from the nearest shoreline. Therefore, the site assessment and site characterization activities occurring within the WEAs would not have disproportionately high or adverse environmental or health effects on minority or low-income populations. Only the use of existing coastal facilities has the potential to impact minority or low-income populations. However, existing coastal facilities (ports and harbors) in NY and NJ would support proposed activities without any need for expansion. Because disproportionately high and adverse human health or environmental effects that would disproportionately affect low-income and minority persons would not occur as a result of the Proposed Action, there would be no impacts on environmental justice.

Physical Oceanography

Physical oceanography would not be affected by survey vessels, or by the installation of met buoys within the NY Bight. Ocean current characteristics, water column density stratification, and vertical current structure, among other factors, would be considered by the lessee during the planning, operation, and data post-processing activities as part of the SAP. Although the water column would be disrupted by the installation and decommissioning of met buoys, effects to physical properties of the water column and ocean currents would be nominal, and the majority of effects would occur directly to the seafloor as addressed above in **Bathymetry, Geology, and Sediments**. No impacts are anticipated to ocean currents, water column density, or other physical oceanographic characteristics from the Proposed Action.

Visual Resources

Previous NEPA evaluations include descriptions of the affected environment for visual resources along the entire Atlantic Coast, including NJ and NY (BOEM 2012; 2016; MMS 2007b). The potential impacts on visual resources associated with site characterization and site assessment activities would be negligible. Impacts to visual resources are analyzed in detail within the *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic OCS Offshore NY, Revised EA* (BOEM 2016). Previous determinations in other relevant EAs (**Table 2-1**) focus on impacts from the installation of met towers, which will not occur under the Proposed Action analyzed in this EA. The WEAs vary from 23 to 69 nm off the coast of NJ and from 15 to 45 nm off the coast of NY, and met buoys would not be distinguishable from a vessel at those distances because they sit only a few meters off the waterline (BOEM 2014b). Given the distance of the proposed lease areas from shore, the fact that no new coastal infrastructure would be necessary, and the relatively small amount of vessel traffic associated with the Proposed Action, visual impacts to onshore cultural resources and recreation and tourism would be limited and temporary in nature and would most likely not be distinguishable from existing vessel traffic. However, site characterization surveys could potentially displace other vessels in the area, leading to some increased utilization of the Ambrose Anchorage Ground resulting in temporary, short-term (negligible) visual impacts to the viewshed offshore southern Nassau County, NY.

Water Quality

The routine activities associated with the Proposed Action that would impact coastal and marine water quality include vessel discharges (including bilge and ballast water, and sanitary waste), geotechnical and benthic sampling, and installation and removal of met buoys. Non-routine events include the recovery of lost survey equipment.

Impacts to coastal and marine waters from vessel discharges would likely be of short duration and remain undetectable or minimal with adherence to regulations governing discharges (BOEM 2016). The Proposed Action is not anticipated to increase runoff or onshore discharge into harbors, waterways, coastal areas, or the ocean environment. As indicated in **Section 2.2**, most site characterization and site assessment activities would be covered by USACE Nationwide Permit Numbers 5 and 6, which were developed under Section 404 of the Clean Water Act and Section 10 of the River and Harbors Act to provide a streamlined evaluation and approval process for certain activities that have minimal adverse environmental impact, both individually and collectively. Sediment disturbance resulting from anchoring and coring would be short term, would temporarily impact local turbidity and water clarity, and is not anticipated to result in any significant impact to any area within the WEAs or along any potential transmission cable route.

Impacts to water quality could occur during met buoy installation and decommissioning, with water quality rapidly returning without mitigation to its original state during operation of the buoys and after decommissioning. Sediment disturbance and resultant turbidity associated with recovering lost equipment would be similar to small-scale benthic trawling conducted as part of commercial fishing operations in the area and would not be out of character for the region. Therefore, impacts from vessel discharges, sediment disturbance from geotechnical/benthic sampling and met buoy installation and decommissioning, and recovery of lost equipment in coastal and marine water quality would be negligible or less, with any changes being small in magnitude, highly localized, and transient.

3 Alternatives and Geographic Analysis Area

This chapter describes the No Action Alternative and one action alternative for lease and grant issuance, site characterization, and site assessment activities within the WEAs and along the transmission cable corridors of the NY Bight. The alternatives are described in **Table 3-1** and the following sections.

Table 3-1. Alternatives analyzed in detail

Alternative	Description
Alternative A – No Action	Under Alternative A, no leases or grants would be issued in the NY Bight at this time. Some site characterization surveys (e.g., biological surveys) and off-lease site assessment activities do not require BOEM approval and could still be conducted under Alternative A, but these activities would not be likely to occur without a commercial wind energy lease or grant. Alternative A includes other ongoing activities and future planned actions (**Appendix D**) occurring in the same geographic area and timeframe (5 to 7 years after first lease issuance).
Alternative B (Preferred Alternative) – Offer some or all the WEAs for lease and adjacent areas for grants	Under Alternative B, lease issuance, site characterization, and site assessment activities could occur in the WEAs, and between the WEAs and shore along the potential transmission cable corridors.

WEA = Wind Energy Area.

Alternative B was developed as a result of extensive coordination with the NY Bight Intergovernmental Renewable Energy Task Force (BOEM 2021a); relevant consultations with Federal, state, and local agencies; and extensive input from the public and potentially affected stakeholders as described in the Area ID Memorandum (BOEM 2021a).

3.1 Alternative A – No Action

Under the No Action Alternative, no wind energy leases would be issued, and site assessment activities would not occur within the identified WEAs of the NY Bight. Although some site characterization surveys (e.g., geological, geophysical, biological, and archaeological surveys that are conducted on unleased or ungranted areas of the OCS) do not require BOEM approval and could still be conducted under Alternative A, these activities are less likely to occur without a commercial wind energy lease. The No Action Alternative sections include a description of the baseline conditions of the affected environment for each resource. These descriptions also include a discussion of how the affected environment or baseline for each resource may change, evolve, or shift (i.e., the trajectory of the resource) absent the Proposed Action (Alternative B). The trajectory of each resource is influenced by other present (ongoing) and planned actions (formerly referred to as cumulative) (**Section 4.2** and **Appendix D**). These other present and planned actions that contribute to the No Action baseline will be addressed, along with impacts to the resources from those actions with a focus on effects that are reasonably foreseeable and overlap in time and space with those of the Proposed Action (5 to 7 years after first lease issuance). Alternative A will serve as the shifting baseline (reflecting changes over time as a result of ongoing and planned actions) against which the action alternative (Proposed Action) is evaluated.

3.2 Alternative B – Proposed Action/Preferred Alternative

Alternative B (the Preferred Alternative or Proposed Action) is the issuance of up to 10 commercial and research wind energy leases and site characterization and site assessment activities within the WEAs as identified in **Figure 1-1** and the granting of ROWs and RUEs in support of wind energy development.

Effects from installation, construction, and operation of a full-scale wind energy facility are outside the scope of the analysis for the Proposed Action and, therefore, are not addressed in the EA, (except to the extent they are relevant to the effects identified in the present [ongoing] and planned actions [formerly referred to as cumulative] considered as part of Alternative A). Effects associated with site assessment and site characterization activities are the focus of this EA and include multiple actions that are intended to aid a future NEPA analysis for a wind energy facility in the event a developer proposes one. The purpose of this NEPA analysis is to identify potential effects on resources, including wildlife species, from the Proposed Action.

Effects from Alternative B were analyzed using the shifting baseline (reflecting changes to the affected environment as it shifts over the course of the Proposed Action) for each resource that is presented under the No Action Alternative. Alternative B assumes that each lessee would undertake the largest expected number of site characterization surveys (i.e., shallow hazards, geological, geotechnical, archaeological, and biological surveys) in the WEAs. Under Alternative B, assuming that the lessee chooses to install met buoys, BOEM anticipates that no more than two met buoys would be installed within a proposed lease. BOEM anticipates that each lease could have up to two transmission cable routes (for connecting future wind turbines to an onshore power substation) or would utilize a backbone transmission system.

Under Alternative B, BOEM would require each lessee to avoid or minimize potential impacts on the environment by complying with various requirements. These requirements are referred to as SOCs (**Section 5**) and would be implemented through lease stipulations. The impacts of Alternative B on environmental and socioeconomic resources are described in detail in **Section 4.3**.

Additionally, potential impacts of activities associated with Alternative B are analyzed alone and in combination with present (ongoing) and planned actions (formerly cumulative) (**Section 4.2** and **Appendix D**).

3.3 Geographic Analysis Area

BOEM used a localized geographic scope to evaluate impacts from planned actions for resources that are fixed in nature (i.e., their location is stationary such as benthic and archaeological resources) or for resources where impacts from the Proposed Action would only occur in waters in and directly around the NY Bight WEAs (e.g., water quality). This analysis includes potential activities that are anticipated to occur on the Atlantic OCS offshore NY and NJ, as well as activities that may take place in state waters (the NY Bight area) (**Figure 1-1**). However, the geographic boundaries for the analysis for marine mammals, sea turtles, fish/fishing, and birds include the entire NY Bight and some waters offshore Rhode Island (RI) and Massachusetts to the north and Delaware to the south given their highly mobile and, in some cases, migratory nature (**Appendix D, Figure D-1**). Additionally, the area for cultural, historical, and archaeological resources encompasses the depth and breadth of the seabed between shore and the WEAs as far south as a line drawn between the southwestern corner of the Hudson South

WEA to Cape May, NJ, and as far north as a line drawn between the northeastern corner of the Fairways North WEA to the eastern edge of Narragansett Bay. BOEM has not defined onshore areas from which the site characterization activities would be visible as part of the analysis area because BOEM has concluded that the equipment and vessels performing these activities would be indistinguishable from existing lighted vessel traffic from an observer onshore. In addition, there is no indication that the issuance of a lease or grant of a RUE or ROW and subsequent site characterization would involve expansion of existing port infrastructure. Therefore, onshore staging activities are not considered as part of the cultural, historical, and archaeological resources analysis area.

Figure 3-1 provides a diagram depicting the present (ongoing) and planned actions that serve as the shifting baseline within the geographic analysis area, and **Figure 3-2** provides a diagram depicting the Proposed Action in addition to the shifting baseline within the geographic analysis area.

3.4 Alternatives Considered but Dismissed

Through the Area ID process, the WEAs underwent significant winnowing as a result of extensive coordination with the Task Force; relevant consultations with Federal, state, and local agencies; and extensive input from the public, potentially affected stakeholders, and potential developers, due to concerns related to visual and historic properties, marine protected species, exiting cable, recreational and commercial fishing, and vessel navigation (**Section 6.1.1**). On March 29, 2021, BOEM released the Area ID Memorandum (BOEM 2021a), which documents the analysis and rationale used to develop recommendations for WEAs in the NY Bight. Because of the winnowing that has already occurred and because the Proposed Action will not result in the approval of a wind energy facility and is expected to result only in site assessment and site characterization activities, BOEM has not identified any action alternatives that could result in meaningful differences in impacts to the various resources analyzed in this Final EA.

BOEM considered including as a second action alternative a temporal removal of portions of the WEAs, and NMFS proposed a similar mitigation alternative in their scoping comment letter. After further evaluation, it became apparent that lease stipulations and SOCs would regulate the mitigative seasonal restrictions, and these alternatives were dismissed from further consideration. Other scoping comments did not suggest alternatives that met the purpose and need and/or would have resulted in different impacts.

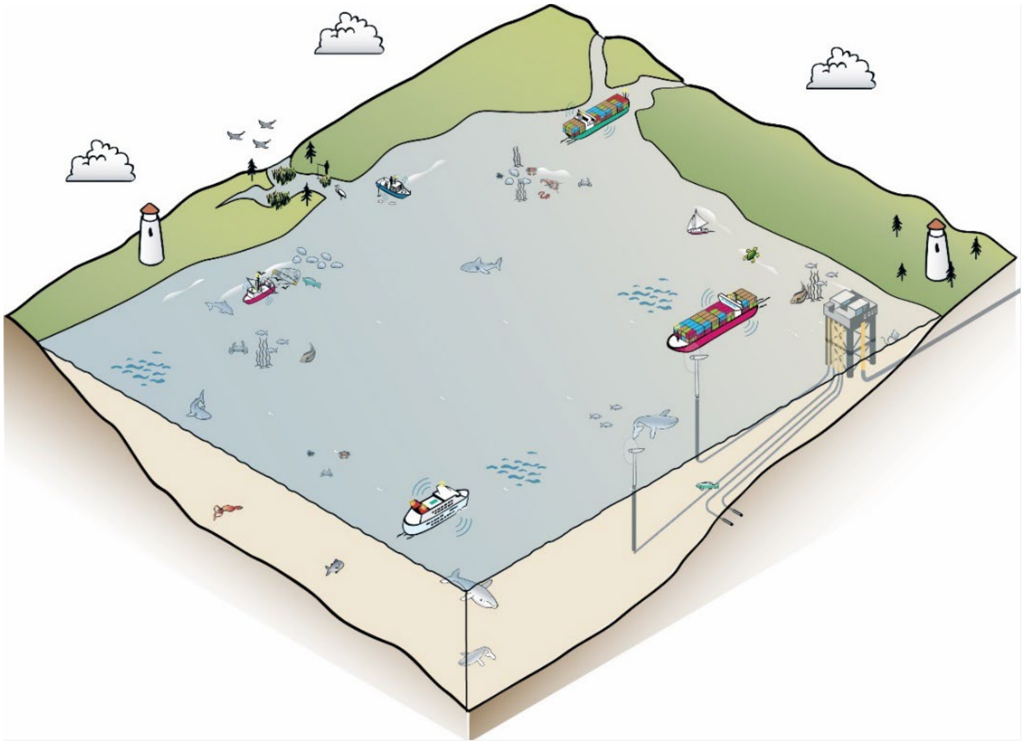

Figure 3-1. Diagram representing the No Action Alternative and affected environment (including planned actions)

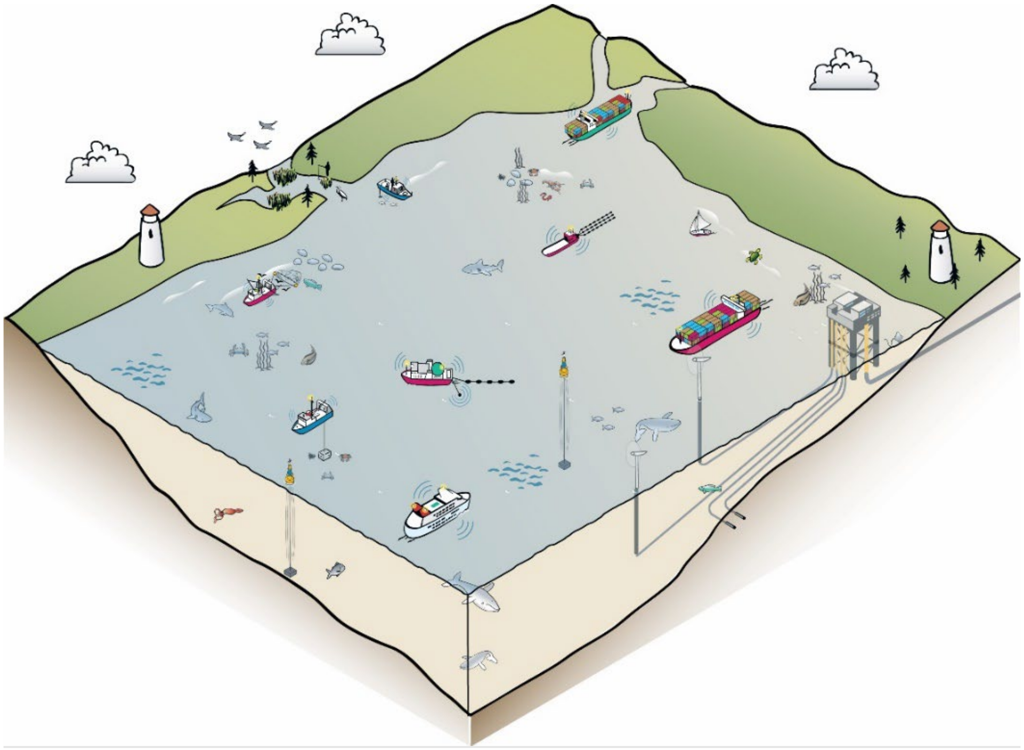

Figure 3-2. Diagram representing the Proposed Action/Preferred Alternative when added to the baseline

4 Environmental Consequences

4.1 Assessment Methodology

This EA uses a four-level classification scheme (negligible, minor, moderate, and major) to characterize the environmental impacts predicted if the Proposed Action or the No Action Alternative is implemented. Definitions of impacts are presented in two separate groups: (1) biological and physical and (2) socioeconomic resources. Impact level definitions used in this EA are described in **Table 4-1**.

The impact level definitions below were originally developed for BOEM's PEIS for Alternative Energy Development (MMS 2007b), were used in other previous lease issuance EAs (**Table 2-1**), and are used in this EA to provide consistency in BOEM's discussion of impacts.

Table 4-1. Definitions of impact determinations used in this environmental assessment

Impact Determination	Definition for Biological and Physical Resources	Definition for Socioeconomic Resources
Negligible	Little to no effect or no measurable impacts.	Little to no effect or no measurable impacts.
Minor	Most impacts on the affected resource could be avoided with proper mitigation. Impacts would not disrupt the normal or routine functions of the affected resource. If impacts occur, the affected resource would recover completely without any mitigation once the impacting agent is eliminated.	Adverse impacts on the affected activity or community could be avoided with proper mitigation. 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 without any mitigation.
Moderate	Impacts on the affected resource are unavoidable. Proper mitigation would reduce impacts substantially during the life of the Proposed Action. The viability of the affected resource is not threatened, although some impacts may be irreversible, or the affected resource would recover completely if proper mitigation is applied during the life of the Proposed Action or proper remedial action is taken once the impacting agent is eliminated.	Impacts on the affected activity or community are unavoidable. Proper mitigation would reduce impacts substantially during the life of the Proposed Action. The affected activity or community would have to adjust somewhat to account for disruptions due to impacts of the Proposed Action, 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	Impacts on the affected resource are unavoidable. Proper mitigation would reduce impacts somewhat during the life of the Proposed Action. The viability of the affected resource may be threatened, and the affected resource would not fully recover, or the resource may retain measurable effects indefinitely even if proper mitigation is applied during the life of the Proposed Action or remedial action is taken once the impacting agent is eliminated.	Impacts on the affected activity or community are unavoidable. Proper mitigation would reduce impacts somewhat during the life of the Proposed Action. The affected activity or community would experience unavoidable disruptions to a degree beyond what is normally acceptable, and, once the impacting agent is eliminated, the affected activity or community may retain measurable effects indefinitely, even if remedial action is taken.

In order to comply with the page limits Section 1501.5 of the CEQ implementing regulations, BOEM has focused the main body of this EA on the impacts for resources of most concern and moved to **Appendix B** the analysis of other resources, including all resources consisting of only negligible Proposed Action impacts, including air quality (emissions estimates are presented in **Appendix C**); cultural, historical, and archaeological resources; and recreation and tourism.

4.2 Alternative A – No Action Alternative and Affected Environment

Under the No Action Alternative, BOEM would not issue commercial wind energy leases, and grants and site assessment activities would not occur in the WEAs included in the Proposed Action. This would eliminate vessel traffic associated with site assessment (installation, maintenance, and decommissioning of met buoys). Certain site characterization surveys do not require BOEM approval (e.g., geological, geophysical, biological, and archaeological surveys that are conducted on unleased or ungranted areas of the OCS) and could still be conducted under the No Action Alternative; however, a potential lessee is not likely to undertake these activities without the possibility of securing a commercial wind energy lease. The No Action Alternative sections include a description of the baseline conditions of each resource, as well as a description of how the affected environment or baseline for each resource may change, evolve, or shift (i.e., the trajectory of the resource) absent the Proposed Action (Alternative B). This EA identifies other present (ongoing) and planned actions (formerly cumulative) that contribute to the No Action baseline, along with impacts to the resources from those actions; the EA focuses on effects that are reasonably foreseeable and have a reasonably close causal relationship to the Proposed Action in the same location and timeframe (5 to 7 years after first lease issuance).

Appendix D includes a list of the ongoing and planned projects and IPFs that BOEM has identified as potentially contributing to reasonably foreseeable impacts when combined with impacts from the Proposed Action over the geography and time scale described in **Section 3.3**. Reasonably foreseeable planned actions include eight types of actions: (1) other wind energy development activities such as site characterization surveys; site assessment activities; and construction, operation, and decommissioning of wind energy facilities that could occur on existing leases; (2) hydrokinetic projects; (3) undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); (4) marine minerals use and ocean dredged material disposal; (5) military use; (6) marine transportation; (7) fisheries use and management; and (8) global climate change. As indicated in **Section 2**, issuance of a lease only grants the lessee the exclusive right to submit to BOEM an SAP and COP proposing development of the leasehold; the lease does not, by itself, authorize any activity within the lease area. Therefore, the analysis within this EA does not consider development of the NY Bight WEAs. However, the No Action Alternative does consider current approved, proposed, and contemplated projects across existing leases.

BOEM has completed a study of IPFs on the North Atlantic OCS to consider in an offshore wind development cumulative impacts scenario (Avanti Corporation and Industrial Economics Inc. 2019).[2] 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 "planned actions" 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 Avanti Corporation and Industrial Economics Inc. (2019) study identifies the relationships between IPFs associated with specific ongoing and reasonably foreseeable "planned actions" and activities in the North Atlantic OCS to consider in a NEPA "planned actions" impacts scenario. These IPFs and their relationships were utilized in the EA analysis and identification of "planned actions" impacts, and the determination as to which IPF applied to which resource was decided by BOEM. If an IPF was not associated with the Proposed Action, it was not included in this analysis.

As discussed in the Avanti Corporation and Industrial Economics Inc. (2019) study, "planned actions" other than offshore wind projects may also affect the same resources as the Proposed Action or other offshore wind projects, possibly via the same IPFs or IPFs through which offshore wind projects do not contribute. This section describes different resources and how these reasonably foreseeable planned actions could affect each of those resources in the absence of the Proposed Action.

4.2.1 Benthic Resources

Descriptions of the benthic resources offshore New York are provided in a previous EA (BOEM 2016) and resources offshore New Jersey are described in the lease issuance EA for New Jersey, Delaware, Maryland, and Virginia (BOEM 2012) and the Ocean/Wind Power Ecological Baseline Studies Final Report (Geo-Marine Inc. 2010); these documents are incorporated by reference.

NYSERDA published results of a multibeam echosounder and benthic survey on the NY Bight in 2017 (NYSERDA 2017a). The following conclusions were drawn based on the results from the 2017 survey, with other findings incorporated by reference:

- Multibeam echosounder data indicated that the most prevalent bedforms observed across the survey area were sand waves, sand bars, and ripples formed in response to hydrodynamic forcing at multiple scales.
- Surface sediments were generally firm, fine, and medium sands, although very fine silty sand and gravel to slightly gravelly sediments were also observed.

[2] On July 16, 2020, the CEQ, which is responsible for Federal agency implementation of NEPA, updated the regulations for implementing the procedural provisions of NEPA (85 *FR* 43304–43376). The new implementing regulations went into effect on September 14, 2020. The update eliminated explicit references to "cumulative impacts" from the regulations. Instead, "the environmental impact statement shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration, including the reasonably foreseeable environmental trends and planned actions in the area(s)." As such, the term "cumulative" has been replaced by planned actions throughout this EA.

- Data collected from Sediment Profile Image and Plan View photographic images indicated that the areas surveyed were composed of soft-bottom substrata that were predominantly firm sands and occupied by diverse benthic biotic communities.
- The primary biotic community in the lease area was *Echinocardium* bed, as sand dollars were observed at most survey stations.
- No sensitive habitats (such as cold-water corals) were observed.

In addition to sand dollars, infauna and mobile epifauna associated with soft sediments (such as crabs, gastropods, bivalves, burrowing anemones, and sea stars) were observed throughout the study area. In softer fine and very fine sand, infaunal tube-building and burrowing polychaetes, as well as orange sponges and abundant beds of thin *Ampelisca* amphipod tubes, were observed.

The inner continental shelf is characterized by a seabed morphology consisting of relatively flat, migrating sand waves and ripples with occasional larger sand ridges. Surficial sediment types are generally sand of varying coarseness with mixtures of silt or gravel (Williams et al. 2007). Sand ridges provide a distinct habitat for adults, settled juveniles, and larvae for a number of fish species, indicating that they have a distinct influence on fish abundance and assemblages (see **Section 4.2.3** for additional information). **Section 4.2.3** also includes a discussion of impacts to Essential Fish Habitat (EFH).

Various benthic fauna are found in the continental shelf habitat ranging in size from microscopic to larger macrofauna. Common macrofauna of the inner continental shelf include species from several taxa, including echinoderms (e.g., sea stars, sea urchins, sand dollars), cnidarians (e.g., sea anemones, soft corals), mollusks (e.g., bivalves, cephalopods, gastropods), bryozoans, sponges, amphipods, and crustaceans (BOEM 2012; Geo-Marine Inc. 2010).

Artificial reefs are man-made underwater structures that are developed intentionally or from remnants of objects built for other purposes, such as shipwrecks. The NY State Department of Environmental Conservation manages 12 artificial reefs in the marine district relatively close to shore and outside of the WEAs (NYDEP 2021). The State of New Jersey has an artificial reef network containing 17 artificial reef sites—located between 2 and 25 nm offshore from Sandy Hook to Cape May—that it manages in cooperation with the USACE (NJDEP 2019).

Macroalgae, seagrasses, and freshwater and tidal macrophytes (i.e., SAV) provide food and habitat for many different species, and seagrasses are protected under a number of state and Federal statutes. The dominant seagrass in the region is eelgrass, which is typically found in water depths from 1 to 8 m, well outside of the depth range of the WEAs and therefore are not expected to be present in the WEAs but could be present in shallow waters along potential transmission cable corridors (BOEM 2016). SAV has also been identified as a Habitat Areas of Particular Concern (HAPCs) for both juvenile and adult summer flounder (also known as fluke) (**Sections 4.2.3** and **4.3.3**).

Benthic resources are subject to pressure from ongoing activities and conditions, especially climate change, commercial fishing using bottom-tending gear (e.g., dredges, bottom trawls, traps/pots), and sediment dredging; these activities are anticipated to continue for the foreseeable future and could possibly impact the habitat, abundance, diversity, community composition, and percent cover of benthic fauna and flora. Additional activities that disturb benthic resources include dredging for navigation and military uses (Hale et al. 2017). Dredging for navigation results in localized short-term impacts to benthic resources, and these areas are quick to recover from disturbance (Avanti Corporation and Industrial Economics Inc. 2019).

Climate change is expected to continue to contribute to the gradual warming of ocean waters, which can influence distributions of benthic species and alter ecological relationships (Avanti Corporation and Industrial Economics Inc. 2019). Warmer water may influence invertebrate migration and may make them more vulnerable to disease (Brothers et al. 2016; Hoegh-Guldberg and Bruno 2010). Disturbance of benthic invertebrate communities by commercial fishing activities can impact community structure and diversity and limit recovery (Avanti Corporation and Industrial Economics Inc. 2019), though this impact is less significant in sand that is strongly influenced by tidal currents and waves (Nilsson and Rosenberg 2003; Sciberras et al. 2016). Studies of the Atlantic Coast from 1990 to 2010 show endemic benthic invertebrates shifting their distribution northward in response to rising water temperatures, resulting in changes to benthic community structure (Hale et al. 2017). Temperatures are predicted to continue to rise in the region, so this trend is likely to continue, leading to changes in the distributions of some species. However, no future activities were identified within the geographic analysis area other than ongoing activities (Avanti Corporation and Industrial Economics Inc. 2019).

Appendix D presents additional information about the ongoing and planned actions that could impact benthic resources.

Conclusion

Under the No Action Alternative, BOEM would not issue any commercial or research wind energy leases in the NY Bight WEAs, and there would be no effects on benthic resources attributable to the Proposed Action. However, benthic resources in the NY Bight would continue to be exposed to climate change and ongoing and planned activities over the timeframe considered in this EA (**Appendix D**).

Over the timeframe considered in this EA, local impacts to benthic resources from climate change are likely to be small, incremental, and difficult to discern from effects of other actions such as commercial fishing (Avanti Corporation and Industrial Economics Inc. 2019). During reasonably foreseeable offshore wind energy development on existing leases or easements (**Appendix D**), benthic resources would be impacted by anchoring/mooring activities, installation of associated undersea cables, installation of new wind turbines and offshore substation foundations, benthic habitat sampling, and geotechnical drilling and boring; these activities are expected to contribute considerable impacts across several IPFs. These offshore wind structures could attract some fish species, resulting in increased predation on benthic resources and increased recreational and commercial fishing efforts nearby (ICF Incorporated 2021). The dominant habitat type in the region is sand or soft bottom, and species that rely on this habitat would not likely experience population-level impacts, but these structures could create new hard surfaces that may provide habitat for hardbottom species like blue mussel and sea anemones (BOEM 2021c; 2021d; ICF Incorporated 2021).

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with ongoing and reasonably foreseeable planned actions in the geographic analysis area may result in **moderate** adverse impacts to benthic resources because, though the viability of the resource is not threatened, some impacts may be irreversible.

4.2.2 Commercial and Recreational Fishing

BOEM (2016) examined the fishing grounds and corresponding revenue within the NY Bight area; information from that report is incorporated here by reference. Multiple fishing grounds are located within the NY Bight, including Cholera Bank, Middle Ground Bank, and Angler Bank. This diversity of fisheries results in a variety of vessels, gear types, and fishing techniques being used in the WEAs (BOEM 2021a; NYSERDA 2017b).

Fisheries in the geographic analysis area are managed at both the Federal, state, and regional level. At the Federal level, there are two councils designated by the Magnuson Fishery Conservation and Management Act of 1976 (later renamed the Magnuson-Stevens Fishery Conservation and Management Act): New England Fishery Management Council (NEFMC) for Connecticut, Massachusetts, Maine, New Hampshire, and Rhode Island; and the Mid-Atlantic Fishery Management Council (MAFMC) for Delaware, Maryland, North Carolina, New Jersey, New York, Pennsylvania, and Virginia. At the regional level, Atlantic States Marine Fisheries Commission comprises 15 Atlantic states. Species managed at the Federal level include sea scallop, Atlantic salmon, and Atlantic herring by the NEFMC and Atlantic bluefish by the MAFMC; both councils jointly manage monkfish and spiny dogfish. Species managed at the regional level include American lobster, black drum, red drum, tautog, and weakfish. Black sea bass, spiny dogfish, scup, and summer flounder are managed at both the Federal and regional level. NOAA Fisheries has management authority for certain tunas, sharks, swordfish, and billfish. These prominent fisheries in the NY Bight are not a comprehensive list of all managed fisheries in the Atlantic Region.

NOAA Fisheries maintains landings data for commercial and recreational fisheries based on year, state, and species. Fisheries that utilize the NY Bight to the greatest extent include the Atlantic sea scallop, squid, summer flounder, and surfclam/ocean quahog fisheries. See **Figures 4-1**, **4-2**, **4-3**, and **4-4** for spatial distributions of sea scallop revenue; squid, mackerel, and butterfish revenue; summer flounder, scup, and black sea bass revenue; and surfclam/ocean quahog revenue within the analysis area for 2018. The sea scallop fishery accounts for approximately 37% of the total fishing revenue in the analysis area (NOAA Fisheries 2019). Additional fisheries include menhaden, American lobster, Atlantic surfclam, and ocean quahog. See **Table 4-2** for a summary of the 2019 commercial revenue and landings for the top 10 species by revenue for NY, NJ, and RI.

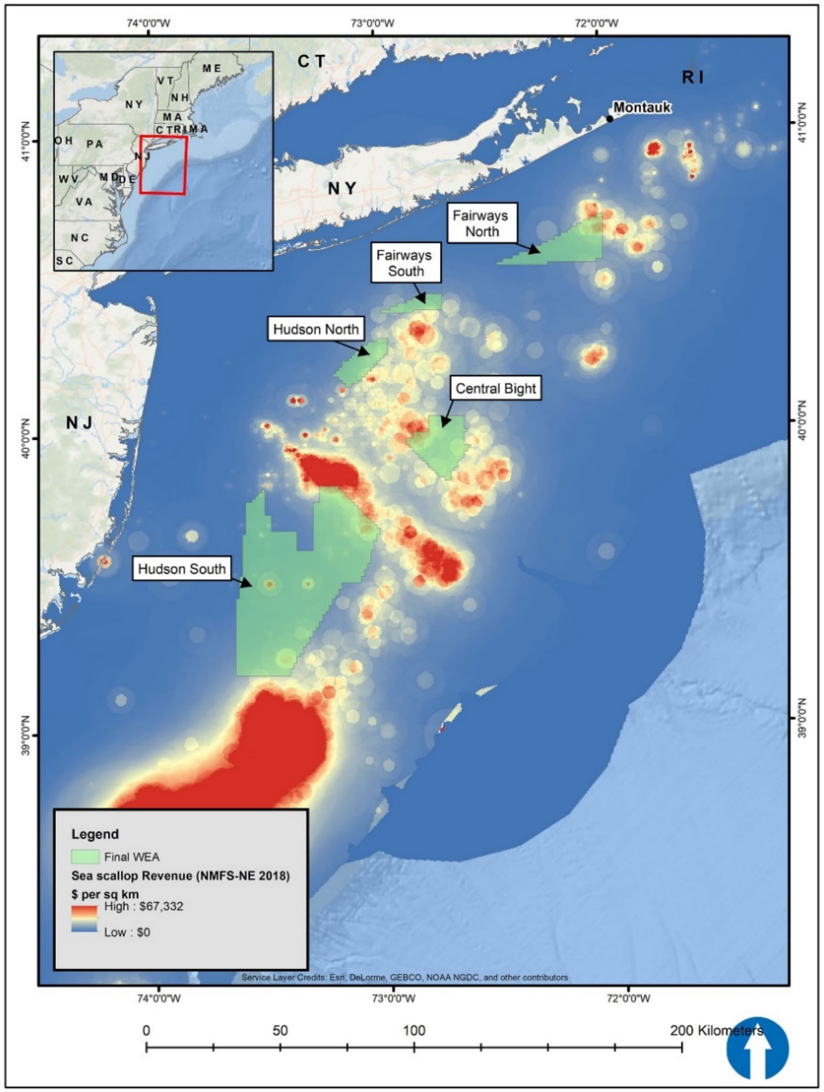

Figure 4-1. Sea scallop revenue from 2018 data in the NY Bight Wind Energy Areas

Source: NOAA Fisheries (2019)

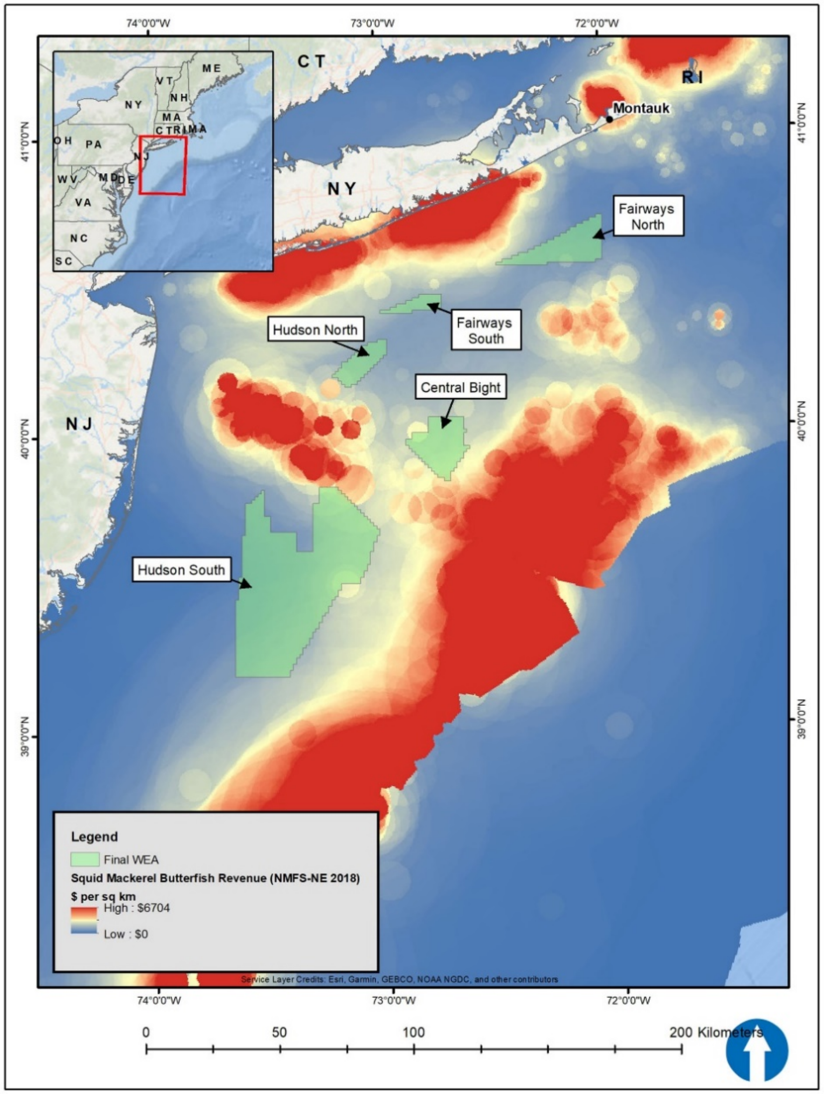

Figure 4-2. Squid, mackerel, and butterfish revenue from 2018 data in the NY Bight Wind Energy Areas

Source: NOAA Fisheries (2019)

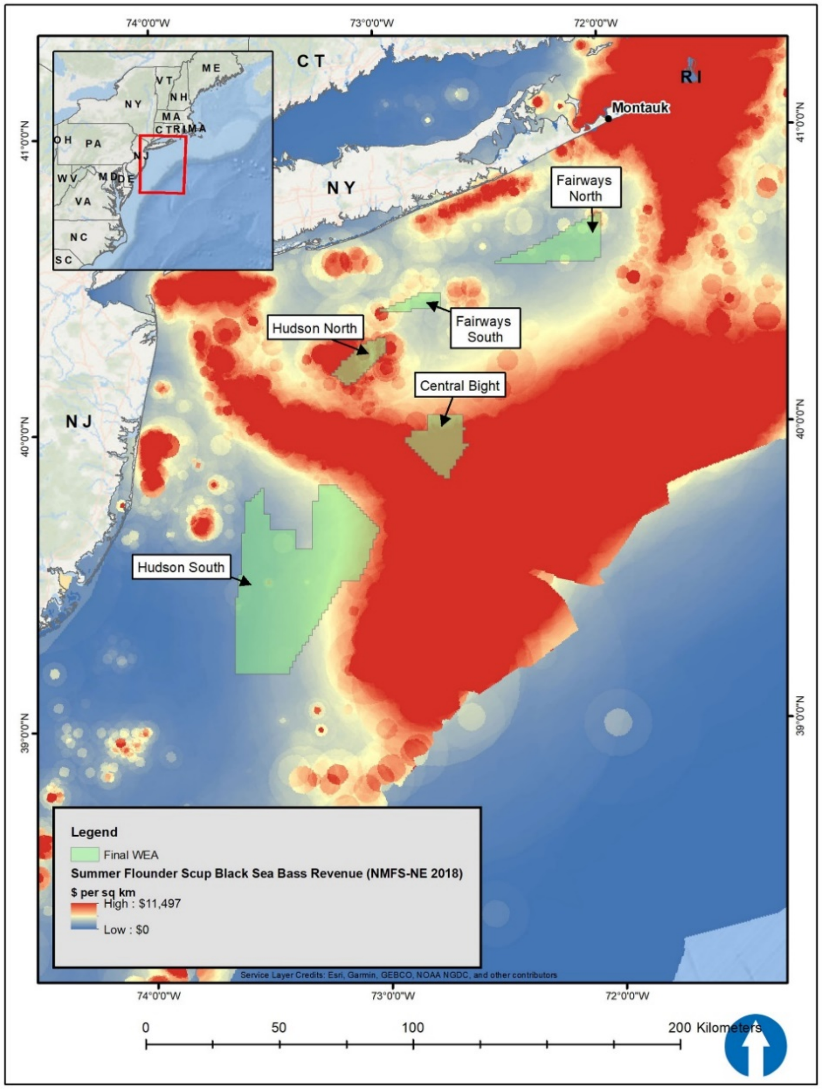

Figure 4-3. Summer flounder, scup, and black sea bass revenue from 2018 data in the NY Bight Wind Energy Areas

Source: NOAA Fisheries (2019)

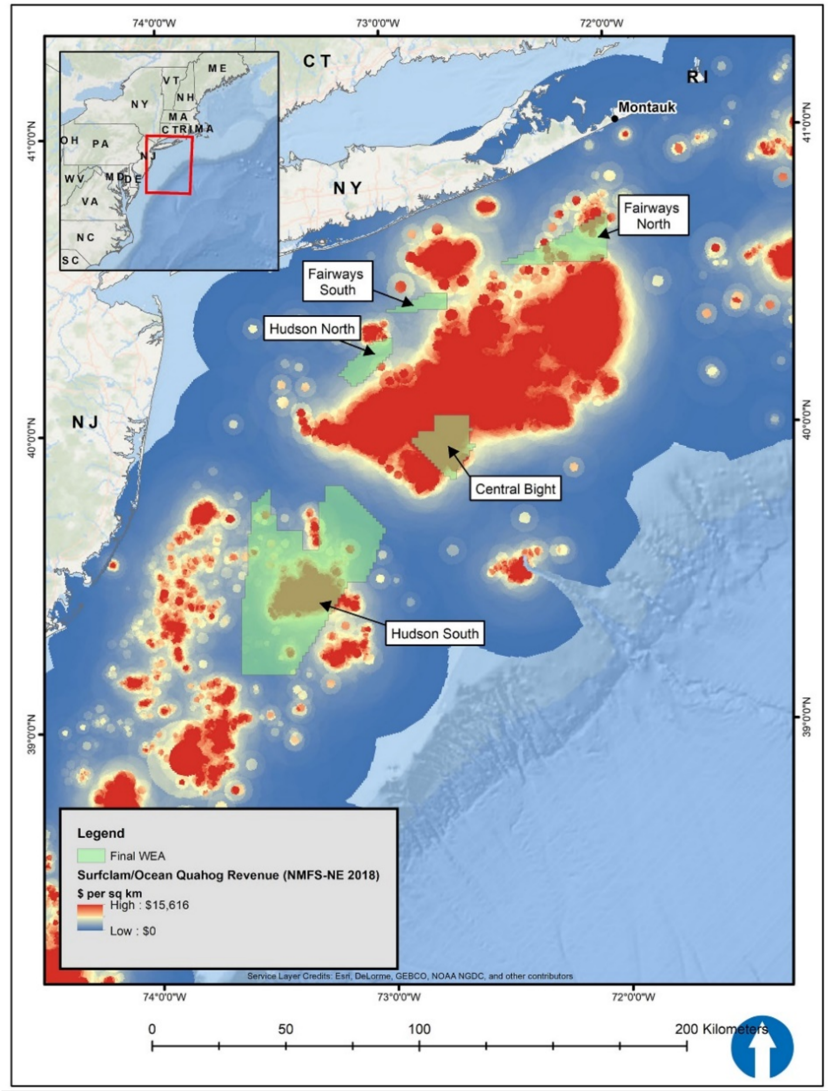

Figure 4-4. Surfclam/ocean quahog revenue from 2018 data in the NY Bight Wind Energy Areas

Source: NOAA Fisheries (2019)

Table 4-2. Commercial revenue and landings summary for 2018 for the top 10 species by revenue for New York, New Jersey, and Rhode Island

Species Name	Pounds	Dollars
Sea scallop	13,280,756	121,900,348
Longfin squid	22,213,210	34,132,115
Shortfin squid	40,289,416	20,115,696
Summer flounder	4,126,157	14,198,848
Menhaden	79,015,909	13,625,105
American lobster	2,189,937	13,368,482
Atlantic surfclam	18,622,741	12,613,263
Ocean quahog	1,999,445	11,455,040
Blue crab	5,768,085	8,719,851
Eastern oyster	486,838	7,148,953
Other	89,243,822	73,114,371

Source: NOAA Fisheries (2019)

There are multiple recreational areas within the NY Bight, particularly around Cholera Bank and along the south coast of Long Island. The State of New Jersey designated Cholera Bank as a sport and commercial fishing ground, and as a prime fishing habitat (Long and Figley 1984). As noted in BOEM (2016), five aliquots on Cholera Bank were previously removed from leasing consideration. The fisheries with the highest landings in 2019 were striped bass, scup, and summer flounder (NOAA Fisheries 2019). See **Table 4-3** for a summary of the 2019 recreational landings for NY, NJ, and RI.

Table 4-3. Recreational landings summary for 2018 for New York, New Jersey, and Rhode Island

Species Name	Pounds
Striped bass	16,046,409
Scup	9,946,276
Summer flounder	6,507,968
Bluefish	6,113,698
Black sea bass	5,469,250
Tautog	4,847,883
Bluefin tuna	3,415,843
Thresher shark	2,884,628
Atlantic herring	1,493,666
Dolphinfish	1,177,292
Other	6,903,883

Source: NOAA Fisheries (2019)

For more information, see **Section 4.2.3**; see **Appendix E** for the EFH Assessment. Additional details are also located in the draft EIS issued for the Liberty Port Ambrose Deepwater Port Application (Tetra Tech Inc. 2013) and in the Memorandum for Area ID in the NY Bight (BOEM 2021a).

Generally, the activity and value of fisheries are expected to remain fairly stable during the time frame considered in this EA (NOAA Fisheries 2021b; 2021c). Commercial fisheries and recreational fishing in the NY Bight are subject to pressure from ongoing activities, including regulated fishing effort, vessel traffic, other bottom-disturbing activities, and climate change. Fisheries management affects commercial fisheries and recreational fishing in the region through management of sustainable fish stocks and measures to reduce impacts on important habitat and protected species. These management plans include measures such as fishing seasons, quotas, and closed areas, which constrain how the fisheries are able to operate and adapt to change. These management actions can reduce or increase the size of available landings to commercial and recreational fisheries.

Climate change is also predicted to affect U.S. northeast fishery species (Hare et al. 2016; NOAA Fisheries 2021b; 2021c) and may impact commercial and recreational fisheries differently; habitat may increase for some stocks and decrease for others, depending on the targeted species and ability of fishing regulations to adapt. Changing environmental and ocean conditions (currents, water temperature, etc.), increased storm magnitude or frequency, and shoreline changes can impact fish distribution, populations, and availability to commercial and recreational fisheries.

Conclusion

Under the No Action Alternative, BOEM would not issue any commercial or research wind energy leases in the NY Bight WEA, and there would be no effects on commercial and recreational fishing attributable to the Proposed Action; however, BOEM expects ongoing activities and planned actions to have continuing regional impacts on commercial and recreational fishing over the timeframe considered in this EA (**Appendix D**). Impacts from most ongoing activities (e.g., climate change, military use, marine transportation) are anticipated to remain largely similar to current levels over the timeframe considered; however, impacts from other wind energy development activities are anticipated to increase over the same timeframe. Ongoing actions resulting in space-use conflicts (including port utilization) with commercial and recreational fishing in the geographic analysis area primarily include marine transportation (commercial shipping) and military use. During reasonably foreseeable offshore wind energy development on existing leases or easements (**Appendix D**), the presence of structures could lead to impacts on commercial and recreational fishing through allisions, entanglement or gear loss/damage, fish aggregation (which can be beneficial), habitat conversion, navigation hazards (including transmission cable infrastructure), and space-use conflicts (BOEM 2021c; 2021d). NOAA Fisheries estimates that activities associated with reasonably foreseeable offshore wind energy development in the geographic analysis area could affect up to 24% of total average revenue for major Mid-Atlantic commercial species in lease areas through disruption and displacement, if all sites considered in the assessment are developed (NOAA Fisheries 2021b; 2021c). The geographic analysis area for reasonably foreseeable offshore wind energy development in the NOAA Fisheries reports (NOAA Fisheries 2021b; 2021c) included over 20 projects and covered a larger area than considered in this EA. These effects may arise from met buoys, foundations, scour/cable protection, and transmission cable infrastructure, and some disruption effects may be unavoidable.

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with ongoing and reasonably foreseeable planned actions in the geographic analysis area may result in **moderate** adverse impacts, because some commercial and recreational fishing would experience disruptions even if remedial action were taken, and others would have to adjust to account for disruptions and space-use conflicts due to impacts. Displacement impacts may also change interactions between habitats, species, and fishing fleets (NOAA Fisheries 2021b; 2021c).

4.2.3 Finfish, Invertebrates, and Essential Fish Habitat

The affected environment encompasses coastal (marine and estuarine) and demersal and pelagic habitats in the open ocean that provide habitat for over 250 fish species (Geo-Marine Inc. 2010). A general description of the affected environment for this section of the Atlantic OCS is provided in the PEIS for Alternative Energy Development (MMS 2007b). Mid-Atlantic Bight hardbottom and soft-bottom demersal fishes, pelagic fishes (i.e., coastal pelagic, epipelagic, and mesopelagic fishes), and ichthyoplankton are discussed in the Atlantic G&G Final PEIS (BOEM 2014a). Finfish occurring in the NY Bight are also described in the previous NY EA (BOEM 2016). Many of the fish species found in the NY Bight are of importance due to their value as commercial and/or recreational fisheries (**Section 4.2.2**). Fish species from the Mid-Atlantic Bight listed under the ESA by NOAA Fisheries as endangered are Atlantic salmon, shortnose sturgeon, and the NY Bight distinct population segment of Atlantic sturgeon. A portion of the Hudson River has been designated as critical habitat for the NY Bight distinct population segment of Atlantic sturgeon (82 *FR* 39160). Two additional Mid-Atlantic Bight species, giant manta and oceanic whitetip shark, are listed as threatened under the ESA. More information on these ESA-listed species may be found in the biological assessment (Anderson 2021; Baker and Howson 2021).

Several managed invertebrate species occur in the NY Bight and are known to occur or could occur in the WEA, including longfin inshore squid, Atlantic sea scallop, Atlantic surfclam, ocean quahog, horseshoe crabs, blue crab, and American lobster. Several invertebrates—such as shrimps, crabs, amphipods, gastropods, and polychaete worms—are not managed but contribute to food webs from offshore or nearshore ecosystems (Malek et al. 2016).

EFH for fish and shellfish resources of NY Bight WEAs were characterized using broad ecological/habitat categories: soft bottom, hardbottom, and pelagic. Within each category, **Appendix E** lists the life stage composition and distribution.

The offshore analysis area primarily includes EFH for soft-bottom species (Atlantic sea scallop, ocean quahog, inshore squid, offshore squids, bluefish, hakes, skates, cod, and flatfishes) and several highly migratory species, such as tunas and sharks. HAPCs (**Figure 4-5**) offshore of NJ and NY include Baltimore, Wilmington, Toms, Middle Toms, Hendrickson, and Hudson Canyons. Other HAPCs include sand tiger shark pupping area in Delaware Bay; sandbar shark nursery areas in Great Bay, NJ; inshore juvenile cod (< 20 m depths); and summer flounder SAV nursery areas. HAPCs for summer flounder include native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH. In locations where native species have been eliminated from an area, then exotic species are included (NMFS 2021).

Estuarine (inshore) portions of the analysis area are characterized mostly by soft-bottom sediments that support salt marshes, oyster reefs, and mussel beds, as well as stands of eelgrass and other SAV (Raposa and Schwartz 2009). Fishes segregate into these habitats by species and life stages. Managed species found in inshore waters include squids, scup, weakfish, bluefish, summer flounder, and winter flounder (Collie et al. 2008). Many of these species are present as juveniles or subadults. Inshore habitats of the region are productive and support common prey species, such as shrimps, bay anchovy, Atlantic herring, Atlantic menhaden, butterfish, killifishes, and Atlantic silversides (Raposa and Schwartz 2009).

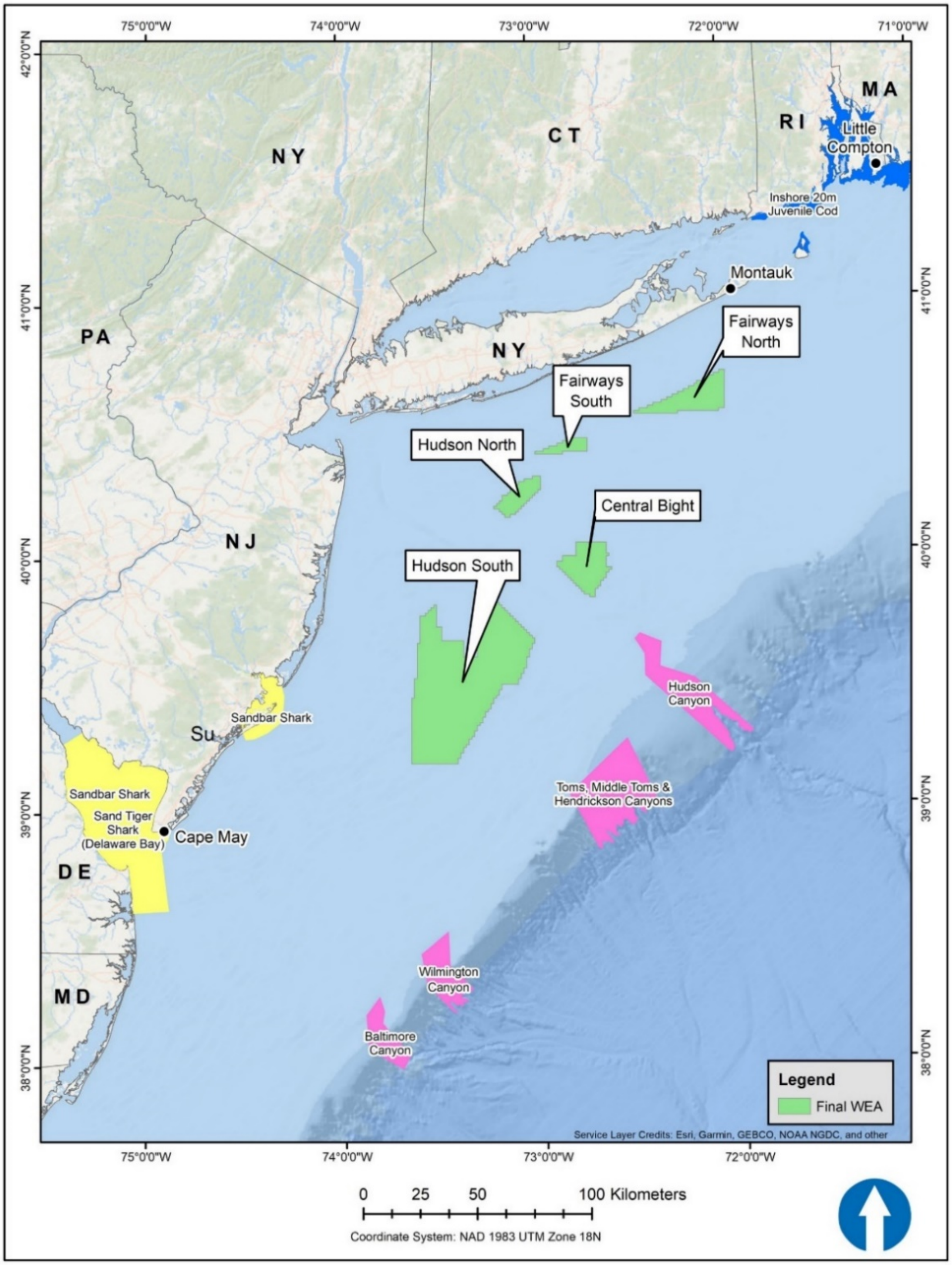

Figure 4-5. Habitat Areas of Particular Concern in the vicinity of the NY Bight Wind Energy Areas
Source: NMFS (2021). Note that summer flounder HAPC is not shown as the data is not currently available.

Finfish, invertebrates, and EFH in the NY Bight are subject to pressure from ongoing activities, especially harvest, bycatch, dredging and bottom trawling, and climate change (NOAA Fisheries 2021c). As discussed in **Section 4.2.2**, climate change is also predicted to affect northeast U.S. fishery species (Hare et al. 2016); some stocks may have increased habitat, and some may see habitat reduced. Dredging for navigation, marine minerals extraction, and/or military uses, as well as commercial fishing using bottom trawls and dredge fishing methods, disturb seafloor habitat on a recurring basis and could possibly impact EFH and the abundance, diversity, community composition of bottom dwelling finfish and invertebrates; however, over the timeframe considered, impacts from these activities are expected to remain stable. Commercial and recreational fishing using other methods results in mortality of finfish and invertebrates through harvest and bycatch. In the most recent ecosystem evaluation for the Mid-Atlantic Bight, Atlantic mackerel and bluefish were the only species identified as overfished (NOAA Fisheries 2021c). Other managed species were found not to be overfished, although other species may be overfished in other parts of the Atlantic. Dredging disturbs swaths of seafloor habitat. Impacts from the aforementioned activities are similar in nature but greater in extent (spatially and temporally) than those caused by other bottom-directed IPFs that create a relatively narrow trench and backfill in the same operation, such as pipeline trenching or submarine cable emplacement.

Conclusion

Under the No Action Alternative, BOEM would not issue any commercial or research wind energy leases in the NY Bight WEA, and there would be no effects on finfish, invertebrates, and EFH attributable to the Proposed Action; however, BOEM expects ongoing activities and planned actions to have continuing regional impacts on finfish, invertebrates, and EFH over the timeframe considered in this EA (**Appendix D**).

Over the timeframe considered in this EA, local impacts to finfish, invertebrates, and EFH from climate change are likely to be small, incremental, and difficult to discern from effects of other ongoing actions. The largest ongoing contributor to impacts on finfish, invertebrates, and EFH stems from commercial and recreational fishing. During reasonably foreseeable offshore wind energy development on existing leases or easements (**Appendix D**), finfish, invertebrates, and EFH would be impacted by anchoring/mooring activities, installation of associated undersea cables, installation of new wind turbines and offshore substation foundations, and vessel traffic, with additional impacts from lighting and noise associated with all ongoing and planned actions.

Pile driving would result in the greatest potential noise-related impacts (as described in the previous EAs listed in **Table 2-1**) and in the Vineyard Wind and South Fork Final EISs (BOEM 2021c; 2021d). Noise generated during pile driving in adjacent leases can be transmitted through water and/or through the seabed; the level of noise can cause injury and mortality, result in moderate short-term stress and behavioral changes to finfish and invertebrates, and cause EFH to be unsuitable while pile driving is occurring. The impact of pile-driving noise on finfish and invertebrates would depend on the time of year it occurs and could be greater if the noise occurs in spawning habitat during a spawning period, particularly for species that aggregate to spawn (e.g., Atlantic cod), use sound to communicate (e.g., Atlantic cod), or spawn only once during their lifetime (e.g., longfin squid). The installation of wind energy structures (wind turbines and offshore substation foundations) could result in hydrodynamic disturbance, fish aggregation, increased entanglement of lost fishing gear, habitat conversion, and migration disturbances locally; impacts would vary seasonally and regionally (ICF Incorporated 2021).

Wind energy structures in the geographic analysis area also may have potential effects on the Mid-Atlantic Bight cold pool (BOEM 2021b; 2021c). Offshore wind lease areas in the Planned Action Scenario (**Appendix D**) are mostly sited within shallower depths than the cold pool is located (Lentz 2017). While offshore wind foundation structures would affect local mixing of cool bottom waters with warm surface waters, the extent to which these local effects may cumulatively affect the cold pool as a whole is not well understood. Given the size of the cold pool (approximately 30,000 km^2 (NOAA Fisheries 2020)), BOEM does not anticipate that planned offshore wind farms would negatively affect the cold pool, although they could affect local conditions. However, 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 could occur from planned offshore wind farms and potentially could result in changes in habitat suitability and fish community structure. Further, any potential effects would be analyzed, and new analyses would be incorporated in subsequent NEPA documents at the COP stage of the wind energy development process.

As discussed in **Section 4.2.1**, offshore wind structures could attract some fish species resulting in increased predation on benthic resources; recreational and commercial fishing efforts could increase nearby as well. The dominant habitat type in the region is sand or soft bottom, and these structures would create new hard surfaces that may provide habitat for benthic resources. Some impacts to finfish and benthic species could occur from these planned actions. Proposed wind energy projects (i.e., full turbine buildout) in the geographic analysis area (not including/apart from the Proposed Action [i.e., lease issuance]) and potential site assessment and site characterization activities have been evaluated or are being elevated for potential effects (BOEM 2021c; 2021d; NMFS 2020a). Considering all the IPFs together, BOEM anticipates that the overall impacts associated with ongoing and reasonably foreseeable planned actions in the geographic analysis area may result in **moderate** adverse impacts to finfish, invertebrates, and EFH because the overall effect would be unavoidable, but the resource would be expected to recover completely.

4.2.4 Marine Mammals

The 31 species of marine mammals that occur on the NY Bight comprise 6 mysticete (baleen whales) taxa, 21 odontocete species (toothed whales including dolphins, a porpoise, beaked whales, dwarf and pygmy sperm whales, and sperm whales), and 4 pinniped (seals) taxa. BOEM (2016) provides detailed information on these marine mammals, including sightings information, and is incorporated here by reference. All 31 species are protected by the MMPA. In addition, five marine mammal species are additionally protected under the ESA; these species are listed as endangered and include the blue whale, fin whale, North Atlantic right whale (NARW), sei whale, and sperm whale. The blue whale, sei whale, and sperm whale are primarily found in deeper waters seaward of the WEAs, while NARWs and fin whales are considered to be seasonally “common” in the WEAs. Perhaps the most biologically important marine mammal found in the region is the NARW, as estimates indicate there are between 345 to 369 individuals currently living in waters from offshore Newfoundland to the southeast U.S. (Pettis et al. 2021). The authors derive their estimates from historically and emerging high-use habitats and migratory corridors across the region. Another right whale abundance model indicated that the population estimate is 368 individuals (Pace 2021). All coastal waters from Massachusetts to Florida have been identified as a biologically important area for this species and essential for their seasonal migration. Additionally, the area east of Montauk Point has been designated as a biologically important feeding area for the endangered fin whale (LaBrecque et al. 2015). There is no critical habitat for any endangered and threatened species in the NY Bight.

There are several relevant reports specific to offshore energy planning and the occurrence of marine mammals in the NY Bight on the following topics: marine mammal distribution off Long Island, NY; NARW occurrence off NJ detected in visual and acoustic surveys; cetacean distribution in the NY offshore planning area; baseline monitoring for large whales in the NY offshore planning area; and distribution and habitat use for the six cetacean species of the greatest conservation need (Kenney and Vigness-Raposa 2010; King et al. 2021; Lagueux et al. 2010; New York Department of State [NYDOS] 2013; NYDEP 2015; Schlesinger and Bonacci 2014; Whitt et al. 2013). Furthermore, more information regarding abundance estimates, life history, hearing abilities, and foraging behavior can be found in Mangi Environmental Group (2011), BOEM (2014a), and Waring et al. (2016).

The *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment 2020* (Hayes et al. 2021) indicates that, for most marine mammal species found regularly in the NY Bight, there are insufficient data to determine population trends. However, the NARW population declined in abundance from 2011 to 2018. During the 2019 to 2020 calving season, 10 calves were observed (up from 7 during the 2018 to 2019 season), but births were significantly below what was expected, and the species continues to be in decline (Pettis et al. 2021). The humpback whale has undergone a status change from the 2019 stock assessment (Hayes et al. 2020) and is now a strategic stock (Hayes et al. 2021).[3]

Marine mammals in the geographic analysis area are subject to a variety of ongoing human-caused impacts, including collisions with vessels (ship strikes), entanglement with fishing gear, fisheries bycatch, anthropogenic noise, disturbance of marine and coastal environments, effects on benthic habitat, and climate change (Hayes et al. 2020). Many marine mammal migrations cover long distances, and these factors can have impacts on individuals over broad geographical scales. Climate change has the potential to impact the distribution and abundance of marine mammal prey due to changing water temperatures, ocean currents, and increased acidity; see BOEM (2019d) and NMFS (2020a) for discussion of climate change effects on marine mammals.

Entanglement in fishing gear is a substantial ongoing threat to marine mammals. Fisheries interactions are estimated to result in 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 off the Mid-Atlantic Coast, with hotspots driven by marine mammal density and fishing intensity (Benaka et al. 2019; Lewison et al. 2014). Entanglement in fishing gear and vessel strikes have been identified as the leading causes of mortality in NARWs and may be a limiting factor in the species recovery (NOAA Fisheries 2021a). Entanglement may also be responsible for high mortality rates in other large whale species (Hayes et al. 2021; Read et al. 2006). Additionally, bottom trawling and benthic disruption have the potential to result in impacts on prey availability and distribution.

[3] NMFS defines a strategic marine mammal stock as a declining stock that is experiencing a high level of human-caused mortality and is likely to be listed under the ESA or designated as depleted under the MMPA.

Conclusion

Under the No Action Alternative, BOEM would not issue any commercial or research wind energy leases in the NY Bight WEA, and there would be no effects on marine mammals attributable to the Proposed Action; however, BOEM expects ongoing activities and planned actions to have continuing regional impacts on marine mammals over the timeframe considered in this EA (**Appendix D**).

Over the timeframe considered in this EA, local impacts to marine mammals from climate change are likely to be small, incremental, and difficult to discern from effects of other ongoing actions. The largest ongoing contributors to impacts on marine mammals stem from commercial marine vessels and commercial and recreational fishing activities primarily through vessel strikes and entanglement risk. During reasonably foreseeable offshore wind energy development on existing leases or easements (**Appendix D**), marine mammals would be impacted by anchoring/mooring activities, installation of associated undersea cables, installation of new wind turbines and offshore substation foundations, and vessel traffic, with additional impacts from lighting and noise associated with all the ongoing and planned actions.

Construction from reasonably foreseeable wind energy development in the geographic analysis area, most notably from pile driving, would create airborne and underwater noise with **moderate** potential to affect marine mammals. An individual may be exposed to anywhere from a single pile-driving event (lasting no more than a few hours on a single day) to intermittent noise over a period of weeks (or longer) if an individual travels over the larger geographic analysis area where pile driving may be occurring for multiple projects. Effects range from low-level behavioral effects to temporary hearing impairment (Wood et al. 2012). Hearing damage could impair a whale’s ability to communicate, which could affect the ability to find a mate. Such an impact could be significant for NARWs. Hearing damage may also impair foraging and predator avoidance (Weilgart 2007). Behavioral effects resulting from less intense sounds include disturbance, changes in diving or calling behavior, and avoidance of the ensonified area, as summarized by ICF Incorporated (2021). These behavioral effects could interrupt critical functions, such as foraging, or cause increased energy expenditure. Less intense sounds can also lead to masking effects, which can reduce species communication distances or impair the ability to detect prey and/or predators; see discussions in BOEM (2021b; 2021d).

The available literature reviews suggests that individual marine mammals avoid disturbing levels of noise by swimming away from the noise source, with the duration of avoidance varying greatly, indicating that marine mammal responses to pile driving in the offshore environment are unpredictable and likely context-dependent (BOEM 2021c; 2021d; ICF Incorporated 2021). Permanent sublethal hearing injuries, although possible, are unlikely to occur based on current and anticipated future impact avoidance and minimization requirements. BOEM requires all future COPs to include project-specific mitigation and monitoring measures developed through NEPA, ESA consultations, and incidental take authorizations (ITAs) designed to avoid exposure of individuals to injurious levels of noise and minimize and monitor effects of exposure that would result in behavioral responses. These measures would reduce the overall impacts on any individual by reducing project-specific impacts.

Other sources of noise from wind projects include helicopters and aircraft used for transportation and facility monitoring, HRG surveys, turbine operation, cable installation, and vessel traffic associated with these activities. Depending on their distribution in relation to construction activities and the timing of that construction, the duration and frequency of any exposure of marine mammals to construction noise would be variable, but impacts of acoustic effects are expected to be greatest for baleen whales. The potential for biologically significant responses is expected to increase with increased exposure to multiple events, and when considering the number and extent of wind energy projects planned in the geographic analysis area (**Appendix D**), it is possible that underwater noise impacts sufficient to cause adverse effects on marine mammals could occur under the No Action Alternative.

Offshore wind structures could alter marine mammal movement patterns. The structures could attract some fish species, resulting in increased marine mammal prey availability, and recreational and commercial fishing efforts could increase nearby and present entanglement and collision risks to marine mammal species (ICF Incorporated 2021). These structures may also displace marine mammals from preferred habitats or alter movement patterns (particularly during construction), potentially changing exposure to commercial and recreational fishing activity (ICF Incorporated 2021). Overall, the combined effects of the presence of wind farm structures on marine mammals are variable—ranging from incrementally adverse to incrementally beneficial—and difficult to predict with certainty.

Various research programs have been proposed to study interactions between marine mammals and wind energy activities. The collection of data related to protected species could be used to assist in future analyses of offshore activities, development of additional avoidance and minimization measures, and gaining a better understanding of habitat utilization in the NY Bight. Under the No Action Alternative, data collection may or may not occur.

Proposed wind energy projects (i.e., full turbine buildout) in the geographic analysis area (not including the Proposed Action [i.e., site assessment and characterization following issuance of a lease]) have been evaluated for potential effects to marine mammals from entanglement, vessel collisions, and noise. NMFS conducted a broad assessment of the effects of installing met buoys, conducting geophysical and geotechnical surveys with specified HRG equipment, and conducting associated vessel activities for offshore wind energy development projects off the U.S. Atlantic Coast (Anderson 2021). They found that if projects meeting the design criteria implement certain avoidance and mitigation measures, the activities are not likely to adversely affect any ESA-listed species under NMFS's jurisdiction. NMFS also published a biological opinion describing the effects of the construction, operation, and eventual decommissioning of the proposed Vineyard Wind project northeast of the NY Bight (NMFS 2020a). That assessment concluded that some project activities are likely to affect (or "take") ESA-listed species, mainly by behavioral disturbance; however, given the conservation status of NMFS species, together with the past, present, and anticipated future impacts to the species and habitat, the amount of anticipated take will not jeopardize the continued existence of any ESA-listed species under NMFS' jurisdiction. Other analyses have reached similar conclusions (**Table 2-1**).

Considering all the IPFs of the No Action Alternative together, BOEM anticipates that the overall impacts associated with reasonably foreseeable planned actions in the geographic analysis area may result in **moderate** adverse impacts to marine mammals because the overall effect would be unavoidable, as some individuals will likely experience disturbances, but the majority of affected individuals would be expected to recover completely, and no population-level impacts will occur among marine mammals of the NY Bight.

4.2.5 Military Use and Navigation/Vessel Traffic

As described in BOEM (2016) and Tetra Tech Inc. (2013), multiple military installations operated by the U.S. Navy, U.S. Army, U.S. Air Force, and USCG are located along the NY and NJ coastlines. Vessels and aircraft conducting military operations are typically working in military operating areas (OPAREAs) away from commercial traffic lanes. These operations could include submarine and anti-submarine training, U.S. Air Force exercises, and various vessel training exercises. The USCG also has two Weapons Training Areas located offshore of NY for training in law enforcement operations. According to the Marine Cadastre National Viewer, there is a Danger Zone located east of Sandy Hook, NJ, and one at the Cape May inlet in Cape May, NJ. There is also a Restricted Area associated with the U.S. Navy Operational Support Center in Earle, NJ.

The NY Bight is an important economic area on the Atlantic Coast supporting commercial shipping at the Port of NY and NJ. There are three TSSs established by the International Maritime Organization (IMO) and under the jurisdiction of the USACE. Moving from north to south, the three TSSs are the Nantucket to Ambrose/Ambrose to Nantucket Traffic Lanes, Hudson Canyon to Ambrose/Ambrose to Hudson Canyon Traffic Lanes, and the Barnegat to Ambrose/Ambrose to Barnegat Traffic Lanes. Each TSS is surrounded by precautionary areas at its inshore and offshore limits (**Figure 4-6**). According to a 2016 economic study by the Port Authority of NY and NJ, the Port handled 8,500 deep sea vessel transits during 2016 (Port Authority of NY & NJ 2017). According to 2019 Trade Statistics reported by the Port Authority of NY and NJ, the Port handled a total of 86,215 thousand metric tons of cargo (bulk and general) during 2019 (Port Authority of NY & NJ 2021). According to marine traffic data from 2021, the Port of NY and NJ saw from 50 to 222 port calls per day between September 20 to October 20 (MarineTraffic 2021). Vessel traffic data for the northern portion of the NY Bight from 2017 to 2019 is provided in the northern NY Bight Port Access Route Study (PARS) and indicates that an average of over 6,000 unique vessels of all types transit the area yearly, resulting in over 66,000 transits in the area studied (USCG 2021).

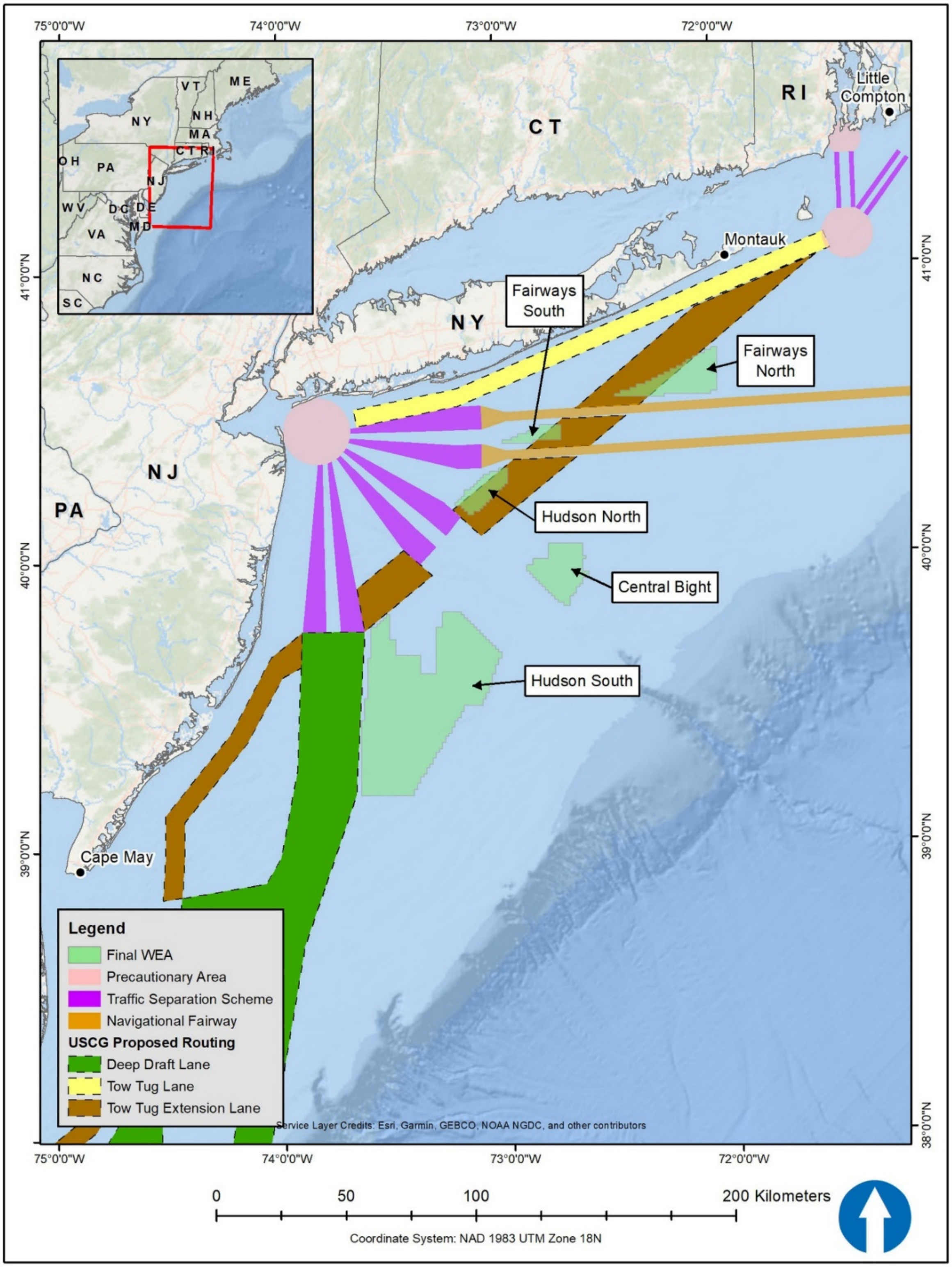

Figure 4-6. Navigation schemes near the NY Bight Wind Energy Areas

In addition to commercial shipping, the Port of NY and NJ contains three cruise terminals located in Manhattan and Brooklyn, NY, and Bayonne, NJ. There are also multiple ferry terminals that operate in NY Harbor, with some service locations in Connecticut, Massachusetts, and central New Jersey.

In June 2020, the USCG published an Advanced Notice of Proposed Rulemaking for the Atlantic Coast. The Notice included new shipping safety fairways in the vicinity of the WEAs and described in the Atlantic Coast PARS. The Notice also included a tug and towing lane within the NY Bight as shown in **Figure 4-6**. Additionally, the USCG published two notices to conduct PARSs for the coast of NJ and the northern NY Bight. In April 2021, the USCG published a supplemental notice of study concerning the Northern NY Bight PARS. The USCG requested additional sources of information to assess the various uses in the study area (i.e., fishing activity, boating traffic, military activities, and environmental information) and any other general comments. The USCG uses this data to evaluate the potential of revising the lanes as depicted in the Advanced Notice of Proposed Rulemaking. In July 2021, the USCG made available for public comment, the draft of the Northern NY Bight PARS (USCG 2021).

The Memorandum for Area ID in the NY Bight discusses the meetings BOEM has conducted and actions BOEM has taken in an attempt to remove portions of the WEAs and effectively deconflict them with existing and future activities in the NY Bight (BOEM 2021a).

Over the timeframe considered in this EA, national security and military interests will continue to use the onshore and offshore areas in the geographic analysis area at a similar rate to current use. It is likely that vessel traffic associated with military vessels, commercial business craft (tugboats, fishing vessels, and ferries), commercial recreational craft (cruise ships and fishing/sight-seeing/diving charters), research vessels, and personal craft (fishing boats, houseboats, yachts and sailboats, and other pleasure craft) will continue using ports and trafficking within the geographic analysis area. Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). Despite this determination, the general trend along the coastal region from Virginia to Maine is that port activity will increase minimally over the timeframe considered.

Conclusion

Under the No Action Alternative, BOEM would not issue any commercial or research wind energy leases in the NY Bight WEA, and there would be no effects on military use and navigation/vessel traffic attributable to the Proposed Action; however, BOEM expects ongoing activities and planned actions to have continuing regional impacts on military use and navigation/vessel traffic over the timeframe considered in this EA (**Appendix D**). Over the timeframe considered in this EA, impacts to military use and navigation/vessel traffic from climate change are likely to be small, incremental, and difficult to discern from effects of other ongoing actions.

Ongoing actions resulting in vessel traffic in the geographic analysis area primarily include marine transportation (commercial shipping) and commercial and recreational fishing; however, both activities have co-existed with military use activities in the NY Bight for a substantial amount of time. In addition, vessels and aircraft conducting military operations are typically working in military OPAREAs away from commercial traffic lanes. All project types listed in the Planned Action Scenario (**Appendix D**) would result in increased vessel traffic in the region; some projects would introduce structures (such as met buoys, wind turbines, and offshore substations) that may present risks of allision and collision, as well as obstacles to navigation. Presence of structures associated with reasonably foreseeable offshore wind energy development would impact military and national security vessels and other vessel traffic in the geographic analysis area primarily through risk of allision and collision with stationary structures and other vessels. Deep-draft military vessels are not anticipated to transit outside of navigation channels unless necessary for search and rescue or nontypical operations. Allision risks for smaller vessels moving within or near planned offshore wind structures would be higher. However, these risks would be minimized by projects adhering to USCG and BOEM structural lighting requirements, which would provide lighting at sea level. Risk of allision with commercial or recreational fishing vessels could indirectly increase as a result of the fish aggregating effect around the offshore wind facility structures. Furthermore, increased vessel traffic due to construction of planned 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.

As offshore wind development structures are built, aircraft navigation patterns and complexity would incrementally increase. These changes could compress lower altitude aviation activity into more limited airspace above the offshore WEAs, potentially leading to airspace conflicts or congestion and increasing collision risks for low-flying aircraft.

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with ongoing and reasonably foreseeable planned actions in the geographic analysis area over the timeframe considered would result in **minor** adverse impacts to military use and navigation/vessel traffic.

4.2.6 Sea Turtles

Four species of sea turtles occur in the NY Bight. Of the four species, hatchling, juvenile, and adult loggerhead, leatherback, green, and Kemp's ridley sea turtles are expected to occur in the vicinity of the WEAs, and all four species are listed as either endangered or threatened under the ESA. The hawksbill sea turtle is considered rare in the NY Bight and is therefore not expected to occur in the WEAs. NYSERDA (2021) contains detailed information on the species of sea turtles expected to occur in the lease area, including sightings information. For information regarding life history, behavioral ecology, and hearing abilities, see Kenney and Vigness-Raposa (2010), Mangi Environmental Group (2011), and Baker and Howson (2021).

Sea turtles are wide-ranging and long-lived, making population trends and estimates difficult. Leatherback nesting trends have been found to vary by region, with overall trends being generally negative (Wallace and Eckert 2018). For loggerhead sea turtles, progress toward recovery has been made since publication of the 2008 Loggerhead Sea Turtle Recovery Plan, but recovery units have not met most of the critical benchmark recovery criteria (NMFS and USFWS 2019). Recent models indicate a persistent reduction in survival and/or recruitment to the nesting population of Kemp's ridley, suggesting that the population is not recovering to historical levels (NMFS and USFWS 2015). The most recent status review for the North Atlantic distinct population segment of green sea turtle estimates that nesting trends are generally increasing (Seminoff et al. 2015). However, a study by Ceriani et al. (2019) has indicated that using nest counts as a direct proxy for adult female population status can be misleading and is not evidence of a strong population recovery.

Regional, pre-existing threats to sea turtles include entanglement in fisheries gear, fisheries bycatch, and vessel strike. Globally, entanglement in and ingestion of man-made debris is a substantial threat to sea turtles, and it is believed that entanglements are underestimated, as not all are reported (Duncan et al.

2017). In the geographic analysis area, leatherback sea turtles are the primary species at risk of becoming entangled, but loggerhead and green sea turtles also occur (BOEM 2021c). Research by Duncan et al. (2017) estimated that over 1,200 entangled sea turtles are encountered per year globally, with just over a 90% mortality rate. Commercial fisheries occurring in the NY Bight include bottom trawl, midwater trawl, dredge, gillnet, longline, and pots and traps (BOEM 2016). Commercial vessel traffic in the region is variable, depending on location and vessel type. The commercial vessel types that transit through the NY Bight include cargo, passenger, recreational, tug-tow, military, and tanker (BOEM 2021a). Climate change has the potential to impact the distribution and abundance of sea turtle prey, due to changing water temperatures, ocean currents, and increased acidity; changing water temperature may also affect sea turtle nesting range (see BOEM (2019d) and NMFS (2020a) for discussion of climate change effects on sea turtles).

Conclusion

Under the No Action Alternative, BOEM would not issue any commercial or research wind energy leases in the NY Bight WEA, and there would be no effects sea turtles attributable to the Proposed Action; however, BOEM expects ongoing activities and planned actions to have continuing regional impacts on sea turtles over the timeframe considered in this EA (**Appendix D**).

Over the timeframe considered in this EA, local impacts to sea turtles from climate change are likely to be small, incremental, and difficult to discern from effects of other ongoing actions. The largest ongoing contributors to impacts on sea turtles stem from commercial marine vessels and commercial and recreational fishing activities, primarily through vessel strikes and entanglement risk. During reasonably foreseeable offshore wind energy development on existing leases or easements (**Appendix D**), sea turtles may be impacted by anchoring/mooring activities, installation of associated undersea cables, installation of new wind turbines and offshore substation foundations, and vessel traffic, with additional impacts from lighting and noise associated with all the ongoing and planned actions.

Construction from reasonably foreseeable wind energy development in the geographic analysis area, most notably from pile driving, would create airborne and underwater noise. Sea turtles close to impact pile driving could potentially experience a temporary or permanent loss of hearing sensitivity, and reduced hearing sensitivity could limit the ability to detect predators and prey or find potential mates, reducing the survival and fitness of affected individuals (Finneran et al. 2017; Popper et al. 2014). For example, behavioral effects from impact pile driving of an 8-m monopole could be experienced by sea turtles within approximately 1 mile from the pile (Denes et al. 2018). If sea turtles are present within the ensonified area, potential behavioral impacts may include altered submergence patterns, short-term disturbances, startle responses (diving or swimming away), short-term displacement of feeding/migrating, and temporary stress responses, as discussed in BOEM (2021b; 2021d) and NSF and USGS (2011). The accumulated stress and energetic costs of avoiding repeated exposure to pile-driving noise over a season or a life stage could potentially have long-term impacts on survival and fitness; see (U.S. Navy 2018) for summary information. In contrast, sea turtles could become habituated to repeated noise exposure over time and not suffer long-term consequences as demonstrated even when the repeated exposures were separated by several days (Moein et al. 1994). While these potential impacts are acknowledged, their potential significance is currently unclear because sea turtle sensitivity and behavioral responses to underwater noise are a subject of ongoing study.

BOEM requires all wind energy COPs on the OCS to include project-specific mitigation and monitoring measures designed to reduce exposure of sea turtles to injurious levels of noise. This requirement will reduce the baseline level of impacts to sea turtles in the geographic analysis area that are likely to occur irrespective of the Proposed Action. Based on current and anticipated future impact avoidance and minimization requirements, it is anticipated that only a small number of individuals would be present in close proximity to construction activities, and impacts to sea turtles from construction-related noise would likely be limited to **minimal** or **moderate** short-term effects on a small number of individuals and would not be significant at the population level.

Proposed wind energy projects in the geographic analysis area (not including the Proposed Action) have been evaluated for potential effects to sea turtles from entanglement, vessel collisions, and noise. NMFS conducted a broad assessment of the effects of survey and data collection related activities for offshore wind energy development projects off the U.S. Atlantic Coast (Anderson 2021). They found that if projects meeting the design criteria implement certain avoidance and mitigation measures, the activities are not likely to adversely affect any ESA-listed species under NMFS's jurisdiction. Furthermore, NMFS published a biological opinion describing the effects of the construction, operation, and eventual decommissioning of the proposed Vineyard Wind project northeast of the NY Bight (NMFS 2020a). That assessment concluded that pile driving is likely to adversely affect ESA-listed sea turtles, mainly from behavioral disturbance, but given the avoidance and mitigation measures, the anticipated effects likely will not jeopardize the continued existence of sea turtles. Other analyses have reached similar conclusions (**Table 2-1**).

Other sources of noise from reasonably foreseeable wind projects include helicopters and aircraft used for transportation and facility monitoring, HRG surveys, turbine operation, and vessel traffic associated with these activities. Depending on their distribution in relation to the other noise sources and the timing of activities generating noise, the duration and frequency of any exposure of sea turtles to the other noise would be variable but anticipated to only result in behavioral disturbance impacts (NMFS 2013; 2020a). However, accumulated stress and energetic costs of avoiding repeated exposure to noise sources over a season or a life stage could have long-term effects on survival and fitness.

As discussed in **Section 4.2.1**, attraction effects from foundations are likely beneficial to sea turtles, due to the improved feeding opportunities; however, these beneficial effects would be offset by negative effects associated with increased interactions with fishing gear or increased risk of collision with vessels (ICF Incorporated 2021). Overall, the combined effects of the presence of wind farm structures on sea turtles are variable—ranging from incrementally adverse to incrementally beneficial—and difficult to predict with certainty.

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with ongoing and reasonably foreseeable planned actions in the geographic analysis area may result in **moderate** adverse impacts to sea turtles because the overall effect would be unavoidable, as some individuals will likely experience disturbances, but the majority of affected individuals would be expected to recover completely, and population numbers are not anticipated to be affected.

4.3 Alternative B – Proposed Action/Preferred Alternative

The Proposed Action/Preferred Alternative is analyzed alone and in combination with the changing baseline conditions as described in the No Action Alternative /Affected Environment Section (**Section 4.2**).

4.3.1 Benthic Resources

The main impacts on benthic organisms from routine activities include crushing or smothering of organisms by anchors and moorings, geotechnical and benthic equipment, and clump anchors for the met buoys. Impacts from these samplings are expected to be limited to the immediate area of the activity and within a radius around the anchor from both the anchor footprint and the mooring line (**Section 2.2**). In addition, the data collected during HRG surveys could identify certain benthic habitat features (e.g., complex habitat), allowing the lessee to develop and implement appropriate avoidance measures for placement of anchors and moorings and clump anchors for met buoys. Larger, mobile benthic organisms (e.g., lobsters, crabs) may be able to avoid lethal impacts but would still experience displacement within the footprint of project-related infrastructure. Additionally, sediment suspension and redistribution during met buoy deployment could interfere with the filter-feeding mechanisms of bivalve mollusks (e.g., scallops), but this impact would be short term, localized, and only occur for a maximum of 20 met buoys in the entirety of the WEAs. Because sonar, sub-bottom profiling, magnetometry, and benthic imaging (e.g., video) involve remote sensing of the seafloor, these site characterization activities would not physically alter the benthos.

Sub-bottom profilers, such as boomers, emit intense sound pulses. There is limited data regarding the effect of sound on benthic invertebrates. A review of available studies indicated that such sound pulses have minimal effects on marine invertebrates (Carroll et al. 2017). In general, particle motion is most relevant to frequencies below 1,000 Hz and within close ranges to the source (within tens of meters), although some information suggests that fish and invertebrates may perceive the sound at greater distances (Popper and Hawkins 2018; Weilgart 2018). At longer ranges from the source, it is expected that particle motion associated with impulsive noise sources (e.g., medium sub-bottom profilers) will have similar effects to pressure waves in fish and invertebrate species (Weilgart 2018). Additionally, because there are no accepted thresholds for particle motion for which the potential for impact may be assessed, particle motion impacts were not evaluated separately from sound pressure impacts. Geotechnical and benthic sampling may disturb, injure, or cause mortality to benthic resources in the immediate area sampled. BOEM estimates that approximately 5,800 geotechnical/benthic samples would be taken by the lessee for site characterization under Alternative B (see **Appendix A** for geotechnical sampling calculations). The physical bottom-sampling footprint for each collection is dependent upon the sampling device used but in general is anticipated to be on the order of 1 to 10 m^2 per sample (BOEM 2014a; Fugro Marine GeoServices Inc. 2017). Actual areas sampled are small, but some instruments are positioned in large frames that land on the seafloor, expanding the sampling footprint and potentially crushing benthic resources. The impacts of the small footprint of the samples over the WEAs and along potential transmission cable routes of the NY Bight are not expected to result in the loss of any species diversity or ecosystem function. Additionally, recovery of the soft-bottom benthic environment could take a few months to a few years depending on the substrate composition (with sandy substrates recovering more quickly than silt/clay). Organisms from adjacent, unaffected sediments could migrate to the location where a grab or core had been taken, facilitating recovery. Benthic impacts from site characterization activities are expected to be **minor**.

Beds of SAV and purpose-built artificial reefs are not present in the WEAs but could be present along the transmission cable routes closer to shore and could be impacted by bottom sampling. Additional nearshore habitats that could be impacted by bottom sampling include shellfish beds and estuarine habitats. However, specific transmission cable routes to shore are unknown at this stage, making it difficult to determine the extent to which these types of habitats could be impacted. Nevertheless, the number of inshore samples collected along the transmission cable route is expected to be small along each route corridor, and inshore sampling would require specific state permits and may be subject to mitigation measures at that stage. Additionally, there are no known locations of stony or soft corals in the WEAs, and the seafloor is ranked as “low suitability” habitat for these organisms (BOEM 2012; 2016). Stony corals are present in the NJ artificial reef sites (Geo-Marine Inc. 2010). Hardbottom habitats (e.g., rocky reef communities) may exist in small, isolated patches, and data collected during initial remote geophysical surveys could identify possible locations for these communities. Met buoys would only be installed in the WEAs, and BOEM would require the lessee to develop and implement avoidance measures near these resources before authorizing activities that would disturb the seafloor.

Biological surveys—primarily fishery surveys, including trawl, gillnet, ventless trap, and shellfish surveys, but also placement of fixed gear and passive acoustic monitoring mooring equipment—and the use of sediment profile and plan view imaging equipment would likely result in some benthic disturbance and direct mortality to benthic species (Baker and Howson 2021). These activities could also reduce the amount of prey available to sea turtles, marine mammals, and marine fish, including Atlantic sturgeon. However, given the limited extent and duration of bottom-disturbing survey activities relative to the amount of habitat available in the geographic analysis area, these activities are unlikely to have a measurable effect on the feeding behavior and biological fitness of any individual fish. Generally, the impacted areas would be small, and surveys would be conducted as described in **Appendix A**. These surveys would also occur infrequently and are of limited duration. Expected mortality and benthic disturbance is anticipated to be undetectable within the overall benthic regime and impacts to benthic resources are expected to be **negligible**. A spar-type met buoy is estimated to disturb a maximum of 118 m^2 of seafloor between its clump anchor and mooring chain. Anchor mooring chains for boat-shaped or discus-shaped met buoys are assumed to have a sweep affecting an area of about 34,398 m^2 (BOEM 2014a; Fugro Marine GeoServices Inc. 2017). Disturbance from installation of a met buoy could result in a maximum impact area of 34,398 m^2, inclusive of anchor chain sweep, per buoy. A total of 170 acres of seafloor could be affected, assuming that the maximum number of met buoys (20) are installed, that all buoys are either boat-shaped or discus-shaped, and that they disturb the maximum area of seafloor. Affected areas are expected to recover within a few months to a few years (with sandy substrates recovering more quickly than silt/clay) after decommissioning of the buoy (Brooks et al. 2006; Kritzer et al. 2016; Lindholm et al. 2004). Note that the anchor cable would not make complete contact with all areas of the bottom within its sweep (BOEM 2016), and use of spar-type buoys would decrease the area of impact significantly. Thus, benthic impacts from buoy installation and operation are expected to be **minor**. A met buoy clump anchor would increase the hard surface available to support certain benthic organisms (e.g., mussels, barnacles, algae, other encrusting organisms), but this community would be very different from that of the original soft-bottom community (Michel et al. 2007). With a maximum of only 20 met buoys installed, this additional hard surface would be minimal.

Decommissioning of buoys is not expected to result in adverse impacts on benthic resources, as it requires a limited number of vessels and can be completed in 1 to 2 days depending on the buoy type (Baker and Howson 2021). Often a crane is used to remove the buoy, and divers perform site clearance activities to return the seafloor to its original state. Thus, benthic impacts from buoy decommissioning are expected to be **negligible**.

Some invertebrates are prey for listed species (e.g., whales, sea turtles, sturgeon), and impacts to benthic resources may alter the diet composition of these protected species. However, because the amount of benthic habitat affected by routine activities would be extremely small relative to the available foraging habitat in the region, any effects to protected species resulting from benthic disturbance are expected to be **negligible** (Anderson 2021; NMFS 2013).

Non-Routine Events

Non-routine events that could potentially have benthic impacts include recovery of lost survey equipment. A commonly used method for retrieval of lost equipment is through dragging grapnel lines. A single vessel deploys a grapnel line to the seafloor and drags it along the bottom until it catches the lost equipment, which is then brought to the surface for recovery. This process could result in significant bottom disturbances, as it requires dragging the grapnel line along the bottom until it hooks the lost equipment, which may require multiple passes in a given area. In addition to dragging grapnel line along the bottom, after the line catches the lost equipment, it will drag all the components along the seafloor until recovery, resulting in additional benthic impacts.

Where lost survey equipment is not able to be retrieved because it is either small or buoyant enough to be carried away by currents or is completely or partially embedded in the seafloor (for example, a broken vibracore rod), additional bottom disturbance may occur. For example, a broken vibracore rod that cannot be retrieved may need to be cut and capped 1 to 2 m below the seafloor, resulting in additional bottom disturbance in the immediate vicinity of the lost equipment.

The extent of impacts related to the recovery of equipment would depend on the type of equipment lost. The size of the lost equipment and/or the replacement cost would dictate the number of attempts made at recovery. The number of attempts made at recovery would affect both the size of resultant impact area and time spent searching. Additionally, the location of the lost equipment could affect the level of impact on other resources. Because the WEAs are predominantly composed of sand substrate, it is generally anticipated that the benthos would recover quickly (Brooks et al. 2006; Kritzer et al. 2016; Lindholm et al. 2004). Impacts from non-routine events are expected to be **negligible**.

Conclusion

Overall, impacts from the Proposed Action to benthic resources are expected to be **minor**. Impacts of routine activities including site characterization surveys and installation and operation of met buoys on benthic communities are expected to be **minor**, except for buoy removal and biological surveys, which are expected to have **negligible** impacts. Primary effects of routine activities associated with the Proposed Action would be crushing and smothering by clump anchors and mooring chains. These impacts would be limited to the immediate footprint of the buoy and spread out across each WEA. The maximum area affected would be small for buoy-related activities. The recovery of affected benthic communities to pre-disturbance levels is expected to take between a few months to a few years, depending on the degree of impact and specific composition of the benthic substrate and associated community. BOEM would require a lessee to incorporate avoidance measures before physical sampling and met buoy installation near any hardbottom communities identified during geophysical surveying (**Section 5**).

Impacts to benthic communities from non-routine events are limited to those associated with the recovery of lost equipment. The extent of impacts would depend on the type of lost equipment. Given that the WEAs are predominantly composed of sand substrate, it is generally anticipated that benthic impacts from non-routine events are expected to be **negligible** because sand substrate recovers quickly without remedial or mitigating action.

In the context of the changing baseline and planned actions, the incremental impacts from the Proposed Action resulting from individual IPFs would range from **negligible** to **minor** for benthic resources. BOEM anticipates that the combined overall impacts associated with the Proposed Action and with ongoing and reasonably foreseeable planned actions would be **moderate** for benthic resources in the geographic analysis area, because impacts are unavoidable, but the viability of benthic resources is not threatened. The main impact drivers, which are analyzed under the No Action Alternative, stem from recurring bottom disturbance from bottom-tending fishing gear and mortality resulting from the planned wind projects.

4.3.2 Commercial and Recreational Fishing

The proposed site characterization and site assessment activities involve installation, maintenance, and decommissioning of met buoys within each WEA and surveys for site characterization within each WEA and along each transmission cable route. These activities would result in increased vessel traffic in the area and the temporary exclusion/displacement of vessels to prevent conflicts and collisions with survey vessels and gear. The Proposed Action includes installation of a maximum of 20 met buoys, which take approximately 1 to 3 days to complete depending upon met buoy type (**Section 2.2.4**). Exclusion/displacement as a result of survey activities involving geotechnical exploration and other operations are expected to be on the scale of hours and confined to the immediate area around the survey ship. Vessels not related to site characterization or site activities that may be transiting the area could use USCG notices (i.e., Local Notice to Mariners) to avoid the areas where buoys are being installed. Impacts to commercial and recreational fishing activities from surveys for site characterization could vary depending on the fishing gear type used (e.g., fishermen using fixed gear may need to retrieve their gear before a survey vessel could potentially transit over their gear in their fishing location).

Site characterization and site assessment activities are expected to take place in the spring and summer months, which would overlap with commercial and recreational fishing seasons. Commercial and recreational fishing would not be broadly excluded from the areas inside the WEAs or along the transmission cable routes; temporary exclusion would only be necessary within the immediate footprint of site characterization and site assessment activities. However, noise generated from low-frequency sound (produced by some survey equipment) may result in decreased catch rates of fish while the survey is occurring. Decreased catch rates may be most notable in hook and line fisheries because behavior changes may reduce the availability of the fish to be captured in the fishery (Lokkeborg et al.

2012; Pearson et al. 1992). The direct impact of these noise sources on fish is analyzed in **Section 4.3.3**. and expected to range from **negligible** to **minor**.

As also noted in **Section 4.3.3**, met buoy clump anchors could provide previously unavailable habitat for species that prefer structured and hardbottom habitats, creating a temporary increase in these types of fish near the buoy while the structure is in place (ICF Incorporated 2021). Additionally, the buoys themselves may provide habitat for pelagic species, such as dorado (also known as dolphinfish) (ICF Incorporated 2021). Installation of met buoys could, therefore, have a temporary and limited beneficial effect on commercial and recreational fisheries, depending on the species of interest and the fishing gear used.

Impacts from seafloor disturbances are anticipated to range from **negligible** to **minor** for commercial and recreational fisheries. As described in **Sections 4.3.1** and **4.3.3**, mollusks (such as scallops) would likely be adversely affected (buried or crushed) in the immediate area of the buoy clump anchors and moorings and suffer from increases in suspended sediment load during the installation and decommissioning process; however, the area impacted by met buoy installations is small relative to area available for commercial and recreational fishing. Impacts from biological surveys, primarily fishery surveys, would likely result in some direct mortality to commercially important finfish and invertebrates and could include impacts to ESA-listed species; these impacts are discussed in **Section 4.3.3**.

Prior to identification of the final WEA, major areas of fishing interest were removed to minimize potential conflict between activities (BOEM 2021a). Similarly, most coastal recreational fishing for NY and NJ takes place away from the WEAs (Geo-Marine Inc. 2010; New York Department of State 2013). Existing vessel traffic to the Port of NY and NJ is significant (**Section 4.2.5**) and is not inclusive of other vessel traffic in the geographic analysis area. Relative to existing vessel traffic, the Proposed Action would result in a nominal increase in vessel traffic, as outlined in **Appendix A**, that will be spread out over a 5- to 7-year period; therefore, impacts of increased vessel traffic to commercial and recreational fishing are anticipated to be **negligible**. Although commercial fishing vessels may transit the WEA en route to historical fishing grounds, survey activities or met buoy installation activities likely would not interfere with access to active fishing grounds beyond the WEAs, except for the potential need to change transit routes slightly to avoid survey and installation vessels and installed met buoys. After met buoys are decommissioned and removed, the proposed sites are anticipated to pose no obstacle to commercial or recreational fishing.

There are numerous port and marina locations shoreward of the WEAs that may be used by commercial fishing vessels, recreational vessels, and project vessels. The projected number of vessel trips for site characterization and site assessment activities (**Appendix A**) at any of these ports or marinas would be small relative to existing use (**Section 4.2.5**) and are not expected to adversely impact current use of these facilities.

Non-Routine Events

Similar to the discussion presented in **Section 4.3.1**, non-routine events that could potentially have impacts on commercial and recreational fishing include recovery of lost survey equipment through the temporary displacement of fishing activities. The extent of impacts would depend on the type of lost equipment; the size of the lost equipment and/or the replacement cost would dictate the number of attempts made at recovery. The number of recovery attempts could affect the size of resultant impact area and time spent searching. The location of the lost equipment would also affect the impact on other resources.

Furthermore, lost survey equipment that is not recovered could interfere with commercial and recreational fishing activities by acting as a potential hazard for bottom-tending fishing gear. For example, a broken vibracore rod that cannot be retrieved may need to be cut and capped 1 to 2 m below the seafloor to remove the potential hazard, which would result in bottom disturbance to the immediate vicinity of the lost equipment. Most fishing gear penetrates < 1 m, but 2-m burial may be required and would be determined on case-by-case basis with BOEM and the Bureau of Safety and Environmental Enforcement. In any case, the potential for recovery operations to interact with commercial or recreational fishing activities is unlikely, given that recovery operations would likely involve one vessel for a short period of time; therefore, impacts are expected to be **negligible**.

Conclusion

Overall, impacts to commercial and recreational fisheries under the Proposed Action are expected to be **minor**. Impacts are expected to range from **negligible** to **minor** depending on the fishery and Proposed Action activity, as effects would be notable, but the resource would be expected to recover completely without remedial or mitigating action. **Minor** impacts are expected based on multiple factors, including the low level of vessel traffic activity associated with site characterization and site assessment activities relative to existing traffic; the fact that up to 20 met buoys would be installed over a relatively large geographic area; and the relatively small spatial area and limited duration of sound produced from routine activities and events. Communication and coordination between a lessee and affected fishermen could greatly reduce the potential for conflict during vessel movement and met buoy installation activities.

In the context of the changing baseline and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs is anticipated to range from **negligible** to **minor** for commercial and recreational fishing. BOEM anticipates that the combined overall impacts associated with the Proposed Action and with ongoing and reasonably foreseeable planned actions would be **moderate** for commercial and recreational fishing in the geographic analysis area, because some fishing operations would experience substantial disruptions for the entire timeframe under consideration even with remedial action. The main impact drivers stem from construction of offshore structures related to planned wind projects.

4.3.3 Finfish, Invertebrates, and Essential Fish Habitat

Review of previous lease issuance EAs and the Atlantic G&G Final PEIS (**Table 2-1**) identified potential impacts to fish resources and EFH that could occur in WEAs during site characterization and site assessment. Although all these previous documents do not specifically address the NY Bight area, many species occur across all areas, and the conclusions on impact levels are applicable to this EA. The following conclusions for site characterization that were made in previous EAs and the Atlantic G&G Final PEIS (where relevant) are expected to be the same in the NY Bight and will not be carried forward in this analysis, noting that information has been added where relevant to address recent scientific literature:

- Impacts from acoustic sound sources from HRG surveys and geotechnical exploration are expected to range from **negligible** to **minor**. Medium and shallow sub-bottom profilers are the only sound source expected to produce sounds within finfish and invertebrate hearing ranges (**Table 2-5**). Fish are not expected to be exposed to sound pressure levels (SPLs) that could cause hearing damage. While fishes can also detect particle motion at frequencies produced during HRG surveys, there is currently limited understanding of the potential effects of particle motion on fish and invertebrates (Popper and Hawkins 2018). In general, particle motion is most relevant to frequencies below 1,000 Hz and within close ranges to the source (within tens of meters), although some information suggests that fish and invertebrates may perceive the sound at greater distances. At longer ranges from the source, it is expected that particle motion associated with impulsive noise sources (e.g., medium sub-bottom profilers) will have similar effects to pressure waves in fish and invertebrate species (Weilgart 2018). Additionally, because there are no accepted thresholds for particle motion for which the potential for impact may be assessed, particle motion impacts were not evaluated separately from sound pressure impacts. Impacts would result in temporary and spatially limited changes in behavior and displacement, particularly to those species capable of hearing in the high-frequency range such as herrings. Additionally, no significant adverse effects on EFH for any pelagic species are anticipated.
- Impacts from vessel and equipment noise are expected to be **negligible**. Noise from vessels and equipment (other than the site assessment and site characterizations related equipment discussed in this section) would be temporary and spatially limited because vessels would be moving. Any potential impacts could result in behavioral changes (BOEM 2021c; 2021d). Vessel and equipment noise associated with the Proposed Action would be inconsequential relative to existing vessel noise in the geographic analysis area.

The EFH Assessment (**Appendix E**) includes a description and discussion of the potential activities considered under the Proposed Action and evaluates impacts to soft-bottom benthic, hardbottom benthic, and pelagic (water column) habitats and species.

Installation of clump anchors associated with met buoys may cause an increase in local suspended sediments. These impacts would be limited to the immediate area surrounding the anchors and of short duration. With a maximum of only 20 met buoys to be installed across all WEAs, these impacts are anticipated to be **negligible**. Installation clump anchors and associated mooring chain also may result in the direct mortality of benthic invertebrates and the loss of benthic habitat. Sessile (immobile) marine invertebrates, including molluscan shellfish, would be lost (buried or crushed) in the footprint of the clump anchor and area of the anchor chain sweep as discussed in **Section 4.3.2**. Although sea scallops are mobile shellfish, it is a conservative assumption that they would not be able to avoid sudden deployment of a clump anchor, and, for these analyses, they are considered to be sessile. The amount of habitat temporarily displaced or lost in the area is small compared to the amount of habitat available in the surrounding area, and the recovery of affected habitat to pre-disturbance levels is expected to take between a few months to a few years, depending on the degree of impact and specific composition of the benthic substrate and associated community. Fish and mobile invertebrates are expected to move to the surrounding areas during installation of a met buoy. Clump anchors could adversely affect EFH; however, these structures have a small footprint and are not expected to significantly affect the quality or quantity of EFH in the WEAs. Additionally, the WEAs are predominantly composed of sand substrate, and it is generally anticipated that the benthos would recover quickly (Brooks et al. 2006; Kritzer et al.

2016; Lindholm et al. 2004). Therefore, impacts from habitat loss due to met buoy installation on finfish, invertebrates, and EFH are expected to be **negligible**.

Met buoy clump anchors installed on soft substrates would introduce hard substrate to these areas that could be colonized by benthic invertebrates. Fish species that prefer hardbottom or complex habitats would likely be attracted to anchors, potentially increasing local fish abundance (ICF Incorporated 2021). Additionally, the buoys themselves may provide habitat for pelagic species, such as dorado (also known as dolphinfish) (ICF Incorporated 2021). Changes in species composition and community assemblage is expected only at the anchor and buoy, and, as a result, effects on finfish and invertebrate populations and EFH are expected to be **negligible** because a total of only 20 met buoys would be installed across all WEAs. As discussed in **Section 4.3.2**, removal of met buoys are expected to be **negligible** to finfish and invertebrate populations, and EFH.

Biological surveys, primarily fishery surveys, would likely result in some direct mortality to finfish and invertebrates and could include impacts to ESA-listed species such as the Atlantic sturgeon, Atlantic salmon, and shortnose sturgeon. However, the dispersed nature of biological survey-related vessel traffic and limited number of surveys reduces the potential for repeated disturbances (Baker and Howson 2021). Generally, methodologies employed in fisheries surveys include returning most of the animals back to the sea a quickly as possible. Nevertheless, sub-sampling and other trauma is expected to result in some mortality. This mortality is anticipated to be undetectable within the overall fishery management regime described in **Section 4.2.3**. Although the overall impacts to finfish and invertebrates from biological surveys are anticipated to be **negligible**, BOEM recognizes that some fishery surveys could impact ESA-listed species. Gillnet sampling in particular, poses a risk of injury or mortality to adult sturgeon (BOEM 2021c). Measures described in SOCs (**Section 5**) were developed to minimize the impacts of these surveys.

Impacts to finfish from vessel traffic associated with the Proposed Action are generally not expected occur; however, vessels may transit to and from rivers and estuaries where Atlantic sturgeon are known to be vulnerable to vessel strike (e.g., Hudson River, Delaware River and Bay). Considering the limited number of vessels involved in the Proposed Action, the slow vessel speeds, and that these vessels would be spread out across a variety of port locations, impacts to the Atlantic sturgeon are expected to be **negligible** (Baker and Howson 2021).

Geotechnical and benthic sampling may impact HAPCs (**Figure 4-5**) in the immediate area sampled. BOEM estimates that approximately 5,800 geotechnical/benthic samples would be taken by the lessee for site characterization under Alternative B (see **Appendix A** for geotechnical sampling calculations). However, geotechnical and benthic sampling that could occur within inshore areas (including within HAPCs) associated with the potential transmission cable routes would be a small number of samples and would be subject to specific state permit conditions relative to the undetermined transmission cable route. As discussed in **Section 4.3.2**, the physical bottom-sampling footprint for each collection is dependent upon the sampling device used but, in general, is anticipated to be on the order of 1 to 10 m^2 per sample (BOEM 2014a; Fugro Marine GeoServices Inc. 2017). The impacts of the small footprint of the samples within the inshore area along potential transmission cable routes (including within HAPCs) are not expected to result in the loss of any ecosystem function. Impacts to HAPCs from geotechnical and benthic sampling are expected to be **negligible**.

Non-Routine Events

Similar to **Section 4.3.2**, non-routine events that could potentially have impacts on finfish and invertebrate populations and EFH include recovery of lost survey equipment. The extent of impacts would depend on the type of lost equipment and if the equipment can be recovered. The size of the lost equipment and/or the replacement cost would dictate the number of attempts made at recovery, affecting the size of the resultant impact area and time spent searching. Additionally, the location of the lost equipment could affect the impact on other resources. When equipment is not able to be retrieved, bottom disturbance may occur from cutting/capping activities or from the equipment itself as it is carried away by currents. As described in **Section 4.3.1**, the impacts to finfish and invertebrate populations, and EFH resulting from the recovery of lost equipment are expected to be **negligible**.

Conclusion

Overall, impacts from site characterization and site assessment activities to finfish and shellfish populations and EFH in the WEAs, when combined, are expected to be **minor**. However, impacts would range from **negligible** to **minor** depending on the activity. Primary impacts to this resource are disturbance related, and no population-level effects are anticipated.

In the context of the changing baseline and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor** for finfish, invertebrates, and EFH. BOEM anticipates that the combined overall impacts associated with the Proposed Action and with ongoing and reasonably foreseeable planned actions would be **moderate** for finfish, invertebrates, and EFH 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 impact drivers were analyzed under the No Action Alternative and stem from bottom-tending fishing gear, construction-related noise, and placement of offshore structures related to planned wind projects.

4.3.4 Marine Mammals

Factors that could potentially have an impact on marine mammals from the Proposed Action include acoustic effects from HRG surveys and vessel and equipment noise; benthic habitat effects; vessel collision effects; and various effects from the installation, operation, and decommissioning of met buoys. BOEM has developed SOCs for lessees and operators, which are designed to prevent or reduce possible impacts to marine mammals during site characterization and site assessment activities (**Section 5**).

Impacts from site characterization have been analyzed in the Atlantic G&G PEIS and EA documents provided in **Table 2-1**. Despite regional differences in some of the assessments, the conclusions on impact levels are applicable to this EA, as there is substantial overlap in the species considered. The following conclusions for site characterization that were made in the previous analyses are expected to be the same for the Proposed Action:

- Impacts from HRG survey sound sources are expected to be **minor**. The Proposed Action involves neither low- or mid-range sonar (which in some cases has been associated with marine mammal stranding events [for example, see Frantzis (2003); Gordon et al. (2003)]) nor deep penetrating seismic surveys (which have been linked to behavioral responses among marine mammals more than 5 miles away [see Gordon et al. (2003) for a review]). Furthermore, mid- and low-frequency sonar and deep penetrating seismic surveys are not normally used for shallow hazard site assessment surveys such as those included in the Proposed Action and will not be authorized in a lessee's SAP where BOEM-recommended techniques will suffice (see BOEM (2020c)). The acoustic signals from HRG survey equipment in the Proposed Action are within the hearing range for marine mammals and may cause Level B Harassment (i.e., behavioral disturbance as defined by the MMPA) but not hearing impairment. The June 29, 2021, programmatic ESA consultation with NMFS (Anderson 2021) determined that, with implementation of the BOEM project design criteria (PDCs), HRG surveys are not likely to adversely impact listed species of marine mammals. Consequently, the biological assessment for HRG surveys (Baker and Howson 2021) and associated concurrence letter from NMFS (Anderson 2021) are herein incorporated by reference. New information has become available about the propagation of HRG sources since those documents were published, and text provided in the remainder of this section reflects the updated information. The Level B threshold for marine mammals used in this analysis for HRG sources is an SPL of 160 decibels (dB) referenced to (re) 1 micropascal (µPa). This threshold is consistent with the previous analyses; however, recent information indicates the directionality of many of these sources can greatly influence the horizontal propagation of sound produced by these activities, which can reduce the distance from the source at which the potential for behavioral disturbance may occur (86 *FR* 22160; 86 *FR* 26465; 85 *FR* 21198). Although the distances may be smaller for some sources, the acoustic signals are still audible for marine mammals, and received levels may still exceed the Level B threshold; therefore, the conclusion remains the same. Detailed discussions on underwater sound and its importance to marine mammals and their hearing capabilities can be found in the Atlantic G&G Final PEIS and the previous Massachusetts Revised EA (**Table 2-1**), noting that the Atlantic G&G PEIS is only relevant here where it is addressing non-seismic effects of sound such as HRG surveys. Lease stipulations that have been developed for other projects will be used for the Proposed Action as appropriate (**Section 5**), and new stipulations will be developed if needed for compliance with best management practices identified in Anderson (2021) and to ensure that marine mammals are not likely to be exposed to HRG survey noise above thresholds for Level B Harassment.

- Impacts from vessel and equipment noise, including geotechnical sampling (e.g., coring), are expected to be **negligible** to **minor**. The potential for adverse impacts under the June 29, 2021, programmatic ESA consultation with NMFS (Anderson 2021) determined that geotechnical surveys would have discountable impacts and are not likely to adversely impact listed species of marine mammals.
- Impacts from vessel traffic associated with site characterization are expected to be **negligible**. The increase in vessel traffic relative to the Proposed Action is discountable relative to the existing vessel traffic within the geographic analysis area (**Section 4.2.5**). Vessel separation distances and vessel strike avoidance procedures for marine mammals from the June 29, 2021, programmatic consultation (Anderson 2021) will be used as appropriate (**Section 5**). Also, new stipulations could be developed if needed for the Proposed Action. With the implementation of PDCs for vessel operations, the likelihood of a vessel strike is expected to be extremely low

(Baker and Howson 2021); however, if a vessel strike does occur, impacts could be significant (i.e., if an NARW was struck resulting in mortality).

The predominant source of noise during site characterization activities that could affect marine mammals would be HRG survey activities. However, the potential for impacts is not equal among HRG equipment. Multibeam echosounder and side-scan sonar typically used during site characterization surveys operate at frequencies over 180 kHz, which is outside the general hearing range of marine mammals likely to occur in the NY Bight and not likely to affect these species. BOEM acknowledges that some commercially available multibeam echosounders and side-scan sonars can operate at frequencies below 180 kHz; however, no surveys completed thus far on existing offshore wind leases have used this equipment. Also, the resolution provided from lower frequencies would not likely meet BOEM guidelines for geophysical data collection pursuant to requirements at 30 CFR §585.610–585.611 and 30 CFR §585.626(a) (BOEM 2020c), and use of non-standard equipment is unlikely. Parametric sub-bottom profilers (SBPs) operate below 180 kHz, but no impacts are expected to occur during operation of these sources due to the narrow beamwidth (< 5°, which significantly reduces the impact range of the source) and rapid attenuation of the higher frequencies (≥ 85 kHz) in sea water. Ultra-short baseline (USBL) positioning systems are also unlikely to affect marine mammals. Though they operate under 180 kHz, they have a wide variety of configurations, source levels, and beamwidths and have been shown to produce extremely small acoustic propagation distances in their typical operating configuration (AECOM Technical Services Inc. and HDR Inc. 2020; CSA Ocean Sciences Inc. 2020; Vineyard Wind LLC and Jasco Applied Sciences (USA) Inc. 2020). Additionally, NMFS's analyses of geophysical work for ITAs in the U.S. Atlantic have indicated that no Level A or B exposures are likely to result from the use of parametric SBPs or USBLs (86 *FR* 18943, 86 *FR* 26465, 86 *FR* 11930). Therefore, only medium-penetration SBPs (e.g., sparkers, boomers) and shallow-penetration, non-parametric SBPs (e.g., Compressed High-Intensity Radiated Pulses [CHIRPs]) were considered in this assessment.

Impacts from underwater noise in marine mammals may include Level A Harassment (i.e., permanent threshold shift [PTS], generally considered a type of injury) or Level B Harassment (i.e., behavioral disturbance) as defined by the MMPA. Studies indicate that the onset of hearing impacts is correlated with the zero-to-peak sound pressure level (PK) and sound exposure level (SEL), which account for the intensity of the sound and duration of exposure required to elicit hearing impacts in marine mammals. The potential for impact also depends on the type of sound (impulsive; non-impulsive, continuous; and non-impulsive, intermittent). Therefore, the assessment of PTS in marine mammals in this EA is based on the NMFS (2020b) acoustic guidance, which provides acoustic threshold criteria for the onset of PTS in five marine mammal hearing groups for both impulsive (e.g., sparkers/boomers) and non-impulsive (e.g., CHIRPs) sound types (**Table 4-4**). No otariid pinnipeds are expected to occur in the NY Bight, so this hearing group was not included in the assessment. These criteria represent the most recent guidance from NMFS.

Table 4-4. Threshold criteria for the onset of permanent threshold shift in marine mammals

Hearing Group		Impulsive Sound	Non-impulsive Sound
Low-frequency (LF) cetaceans	PK	219 dB re 1 μPa	N/A
	SEL_{24h}	183 dB re 1 $μPa^2$ s	199 dB re 1 $μPa^2$ s
Mid-frequency (MF) cetaceans	PK	230 dB re 1 μPa	N/A
	SEL_{24h}	185 dB re 1 $μPa^2$ s	198 dB re 1 $μPa^2$ s
High-frequency (HF) cetaceans	PK	202 dB re 1 μPa	N/A
	SEL_{24h}	155 dB re 1 $μPa^2$ s	173 dB re 1 $μPa^2$ s
Phocid pinnipeds (PW)	PK	218 dB re 1 μPa	N/A
	SEL_{24h}	185 dB re 1 $μPa^2$ s	201 dB re 1 $μPa^2$ s

Source: NMFS (2020b)
μPa = micropascal; dB = decibel; N/A = not applicable; PK = zero-to-peak sound pressure level, the maximum absolute value of the amplitude of a pressure time series; re = referenced to; SEL_{24h} = sound exposure level over 24 hours, a measure of the total sound energy of an event or multiple events over 24 hours.

Currently, the recommended Level B thresholds recommended by NMFS in 2012 are provided as unweighted SPL to assess behavioral impacts (NOAA Fisheries 2021d). Although these criteria do not differentiate between marine mammal hearing groups like the PTS thresholds, they do differentiate between the types of sound sources and are applied as follows:

- SPL 120 dB re 1 μPa for the potential onset of behavioral disturbance from a *non-impulsive*, *continuous* source of sound (e.g., vessel noise, geotechnical coring)
- SPL 160 dB re 1 μPa for the potential onset of behavioral disturbance from an *impulsive* or *non-impulsive, intermittent* source (e.g., HRG surveys)

Behavioral reactions are expected to occur over a wide spectrum of variable responses, some which may be negligible, while others can have more biologically severe consequences. An increasing number of studies indicate that the effect of underwater sound on marine mammal behavior is quite variable between species, individuals, life history stage, and behavioral state (Ellison et al. 2012; Wood et al. 2012). Additionally, some species (e.g., beaked whales and porpoises or migrating baleen whales) or animals in certain behavioral states may be more sensitive to disturbance, while other species may be more tolerant to environmental noise (Wood et al. 2012). Some marine mammal species may show tolerance of some noise in certain frequency bands, while different frequency contents may elicit stronger responses (Nowacek et al. 2004).

To assess the potential for impacts from underwater noise, BOEM calculated the ranges to threshold criteria provided above for each marine mammal hearing group. The calculations apply the information from **Table 2-5**, which reports the highest source levels from either Crocker and Fratantonio (2016) or the manufacturer for each equipment category. The NMFS User Spreadsheet Tool (NMFS 2018) was used to calculate distances to the PTS PK thresholds for impulsive omnidirectional sources. For sources with beamwidths less than 180°, a MATLAB script developed by NMFS Office of Protected Resources based on the work from Sivle et al. (2015) was used to calculated ranges to the PTS SEL_{24h} thresholds. Ranges to behavioral thresholds were calculated using interim guidance from NMFS (2020b) for sources with beamwidths less than 180° and by applying spherical spreading loss to the source level for equipment with beamwidths greater than 180°. Spherical spreading was determined to be the most applicable transmission loss equation for this assessment based on actual field operation of these equipment. Results of these calculations are provided in **Table 4-5**.

Table 4-5. Ranges to threshold criteria for permanent threshold shift and behavioral disturbances in marine mammals for high-resolution geophysical survey equipment

HRG Equipment Category	PTS Onset Range (m) Low-Frequency Cetaceans		Mid-Frequency Cetaceans		High-Frequency Cetaceans		Phocid Pinnipeds		Behavior Range (m) All Marine Mammals
Medium-penetration SBP	*PK*	*SEL_{24h}*	*PK*	*SEL_{24h}*	*PK*	*SEL_{24h}*	*PK*	*SEL_{24h}*	*SPL*
Boomers	0	< 1	0	< 1	5	< 1	0	< 1	224
Sparkers	2	24	0	< 1	14	116	2	13	501
Bubble guns	0	1	0	1	1	1	0	1	79
Shallow-penetration, non-parametric SBP (CHIRPs)	*SEL_{24h}*		*SEL_{24h}*		*SEL_{24h}*		*SEL_{24h}*		*SPL*
EdgeTech 512i	< 1		< 1		< 1		< 1		7
Knudsen 3202	< 1		1		53		< 1		53

CHIRP = Compressed High-Intensity Radiated Pulses; HRG = high-resolution geophysical; NMFS = National Marine Fisheries Service; PK = zero-to-peak sound pressure level; PTS = permanent threshold shift; SBP = sub-bottom profiler; SEL_{24h} = sound exposure level over 24 hours, a measure of the total sound energy of an event or multiple events over 24 hours; SL = source level; SPL = sound pressure level.
PTS onset ranges were calculated with the NMFS User Spreadsheet Tool (NMFS 2018) for omnidirectional sources, and a MATLAB script developed by NMFS for sources with beamwidths < 180°. Behavioral disturbance ranges were calculated using interim guidance from NMFS (2020b) for sources with beamwidths < 180° and by applying spherical spreading loss to the SL for omnidirectional equipment. All sound source characteristics were found in Crocker and Fratantonio (2016) or manufacturer specifications.

The results of the analysis (**Table 4-5**) show the risk of PTS in marine mammals is low, with the largest range to the PK threshold of 14 m for high-frequency (HF) cetaceans for the sparkers, and the largest SEL_{24h} threshold range of 116 m for HF cetaceans for the sparkers. Ranges for all other hearing groups and equipment were also relatively small (< 25 m). However, as stated previously, the source information used to estimate these ranges was based on the maximum source output measured by Crocker and Fratantonio (2016) when, in actuality, sources may be operated using a range of power and frequency options, which would reduce the source level. Therefore, these ranges should be viewed as conservative estimations of actual sound levels that would be expected during future surveys. Furthermore, the SEL_{24h} threshold criteria assumes that the animal remains within the ensonified area for a full 24 hours to receive sound level sufficient to result in PTS, but this assumption is very unlikely to occur given animal movement and visual monitoring by protected species observers (PSOs).

The maximum range to behavioral threshold criteria was 501 m for sparker sources; ranges for all other sources were smaller (< 250 m). The threshold range for the sparkers was calculated using source information, which assumed the maximum power output of 2,400 J (Crocker and Fratantonio 2016). Data from surveys conducted in wind farm leases up to this point indicate that developers operate sparker sources at a lower power setting (< 800 J), which reduces the source level and subsequent threshold range (86 *FR* 18943, 86 *FR* 26465, 86 *FR* 11930). Therefore, monitoring by PSOs of a 500-m zone would be effective for detecting most marine mammals exposed to above-threshold noise levels (**Section 5**). Shutdown procedures initiated by PSOs when marine mammals are inside the exclusion zone would minimize the number of individuals affected and the severity of their responses.

The results of this analysis indicate that a 100-m exclusion zone is adequate to minimize the potential for hearing injury (Level A Harassment under the MMPA), as well as the majority of behavioral impacts (Level B Harassment under the MMPA) for the sound sources associated with HRG surveys. Additionally, the Proposed Action would be conducted in accordance with NMFS's ESA assessment (Anderson 2021), which found that HRG surveys are not likely to adversely affect threatened and endangered marine mammals when PDCs are met and avoidance and minimization measures are applied.

However, BOEM regulations require that, if there is reason to believe that marine mammals may be incidentally taken as a result of a lessee's Proposed Action, the lessee must apply for an ITA under the MMPA and adhere to the requirements of the authorization (30 CFR §585.801(e)). Exact numbers of marine mammals affected by HRG surveys were not determined in this assessment as they will depend on the densities of animals within the location and time of year of proposed survey activities. But, as a part of the ITA process, if "takes" of marine mammals cannot be avoided, the developers would need to calculate the predicted amount of take to meet the small number requirement of the MMPA and ensure population-level effects are prevented. Given the low likelihood of PTS (injury) impacts without mitigation applied and the high likelihood of eliminating potential for PTS with mitigation, no permanent physiological impacts to marine mammals are expected. Impacts would likely be limited to behavioral disturbances, which would be temporary in nature. No changes are expected to result from noise produced by HRG survey activities that would permanently alter biologically significant behaviors (e.g., feeding, mating) or the viability of these populations. Based on the results of this assessment and the proposed mitigation measures, the risk of acoustic impacts on marine mammals from HRG surveys is likely to be **minor**.

Potential impacts to marine mammals include strikes from vessels used during site assessment and site characterization activities. BOEM anticipates that a range of 766 to 806 round trips of various vessel types may occur as a result of the activities covered in this EA (**Appendix A**). Because the volume of commercial vessel traffic in the NY Bight is high (**Section 4.2.5**), it is unlikely that any site characterization and site assessment activities or vessels would measurably increase the risk of a collision between a marine mammal and vessels operating in the vicinity of the WEAs, including those involved in the Proposed Action. Considering BOEM's required implementation of the SOCs for HRG and geotechnical surveys (**Section 5**), any slight increase in vessel strike risk by vessels would be reduced to **negligible** levels. BOEM's SOCs were designed to minimize potential vessel strikes to marine mammals (**Section 5**). NMFS (2013) concluded that, during site characterization and site assessment activities, the potential for construction- and maintenance-related vessel strike to marine mammals is extremely low. Similarly, Baker and Howson (2021) concluded that the potential for effects to all listed species from vessel traffic associated with site characterization and site assessment activities are expected to be reduced to discountable levels with the implementation of the PDCs for vessel operations. Nonetheless, if a low-probability vessel strike did occur as a result of this Proposed Action, it could result in significant impacts to ESA-listed marine mammals such as the NARW, given that population estimates for that species are less than 400 animals. Because of the low probability of such an event, potential impacts to marine mammals from vessel strikes resulting from site assessment activities are therefore expected to be **negligible.**

The potential for marine mammals to interact with a buoy and become entangled in the buoy or mooring system is extremely unlikely given the low probability of a marine mammals encountering a buoy or mooring system within the expanse of the WEA, and the high tension of the chain, which further reduces risk of entanglement (Anderson 2021; NMFS 2013). Potential impacts to marine mammals from met buoy operation and decommissioning are expected to be **negligible** since only one to two vessels would be utilized and for a short duration. During met buoy removal, disturbance of the sediment can cause elevated levels of turbidity, which may negatively affect prey items in a localized area. However, impacts would be of lower magnitude than those resulting from installation activities and are expected to be **negligible**. The installation and presence of met buoys and associated mooring chains would result in a temporary disturbance and a loss of benthic habitat over a very small area in the WEAs. Two met buoys within each lease of the WEA are unlikely to alter distribution of any forage species for marine mammals. The anchor and chain sweep for the buoy mooring is expected to denude a small area around the anchor, but the area of benthic habitat loss would be very small compared to the available habitat in the WEAs and is not expected to have a negative impact on foraging abilities for marine mammals. Potential impacts to marine mammals due to loss of habitat, changes to prey abundance, and distribution from installation of met buoys are expected to be **negligible**. As more information becomes available, BOEM will continue to reassess required mitigation measures.

Generally, benthic impacts from biological surveys (**Section 4.3.1**) are not expected to impact marine mammals. Additionally, the potential for marine mammals to interact with biological sampling gear and to become entangled is extremely unlikely given the dispersed nature of biological survey activities and the limited number of surveys (Baker and Howson 2021); impacts are expected to be **negligible**.

Non-Routine Events

Non-routine events that could affect marine mammals consist of the recovery of lost equipment through additional vessel traffic and noise and the potential impact from entanglement stemming from the dragging of grapnel lines. Traffic and noise associated with non-routine activities likely would be from a single vessel and therefore **negligible**. The extent of impacts from the grapnel lines would be dependent upon the type of lost equipment, which would dictate the number of attempts made at recovery. Regardless, the potential for marine mammals to interact with the grapnel line and to become entangled is extremely unlikely given the low probability of a marine mammal encountering the line within the expanse of the WEAs and transmission cable routes; therefore, impacts are expected to be **negligible**.

Conclusion

Overall, impacts from site characterization and site assessment activities to marine mammals in the WEAs are expected to be **minor**. However, impacts would range from **negligible** to **minor** depending on the activity being conducted as effects would be notable, but the resource would be expected to recover completely without remedial or mitigating action. While it is possible for more significant impacts to occur (i.e., vessel strike, entanglement), the probability of such an occurrence is very low. Vessel strike and noise are two of the most important factors that may affect marine mammals. Implementing the vessel strike avoidance measures in the SOCs (**Section 5**) would minimize the potential for vessel strikes. BOEM's SOCs related to site characterization surveys and site assessment would minimize the potential for noise impacts to marine mammals.

BOEM will evaluate actual HRG survey equipment proposed for use when any future survey plan is submitted in support of any site characterization activities that may occur in the WEAs, and BOEM will continue to reevaluate the SOCs as new information becomes available.

In the context of the changing baseline and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor** for marine mammals, and impacts from ongoing and planned actions are expected to be several times greater than the incremental impacts of the Proposed Action alone. BOEM anticipates that the combined overall impacts associated with the Proposed Action and with ongoing and reasonably foreseeable planned actions would be **moderate** for marine mammals in the geographic analysis area because, though the impacts are unavoidable, the viability of the resource is not threatened, and affected marine mammals would recover completely when stressors are removed or remedial actions are taken. The main impact drivers stem from construction-related noise related to planned wind projects and increased vessel traffic associated with the Planned Action Scenario (**Appendix D**).

4.3.5 Military Use and Navigation/Vessel Traffic

Vessels associated with the Proposed Action could interact with military aircraft and military vessels during site characterization and site assessment activities. Potential use conflicts with military OPAREAs, danger zones, restricted areas, the USCG Weapons Training Area, and proposed tug and tow extension safety fairway are expected to be avoided by coordinating with military commanders and USCG prior to surveys; also, most conflicting areas were previously removed from consideration (BOEM 2021a). All authorizations for permitted site characterization and site assessment activities would include guidance for military coordination with the relevant agency. Vessel and aircraft operators would be required to establish and maintain early contact and coordination with the appropriate military command headquarters or point of contact. For areas that could not be removed from consideration, military activities have the potential to create temporary space-use conflicts on the OCS.

To avoid or minimize potential conflicts with existing DOD activities, site-specific stipulations may be necessary. Such stipulations would be identified during BOEM's future coordination with DOD if a lease is issued in these areas and a COP is submitted for approval. With implementation of DOD stipulations, impacts on military use are expected to be **negligible**.

Increased vessel traffic associated with site characterization surveys and the construction, operation, and decommissioning of a met buoy would be anticipated as a result of the Proposed Action. BOEM estimates that the number of vessel round trips from routine activities would range from 766 to 806 over a 5- to 7-year period (**Appendix A**). Vessel traffic anticipated as a result of Proposed Action would add to the existing vessel traffic in the NY Bight (**Section 4.2.5**).

The additional vessel traffic associated with the Proposed Action increases the potential for interference with other marine uses in the area. However, the estimated number of round trips over a 5- to 7-year span is a relatively small amount of activity, and impacts can be minimized with proper scheduling and notification to the marine community. BOEM anticipates that the impacts of vessel traffic associated with Proposed Action would be **negligible**.

The majority of vessel traffic in the NY Bight is within TSS lanes, follows distinct patterns to approach/depart the TSS lanes, and is in a corridor parallel and close to the NJ coast (BOEM 2021a). The WEAs are not within designated routing measures, such as a TSS, and are also not within 1 nm from the edge of an adjacent TSS; therefore, any installed met buoys are not likely to pose an obstruction to navigation, and impacts on navigation are expected to be **negligible**. As currently proposed in the USCG Advanced Notice of Proposed Rulemaking (85 *FR* 37034; June 19, 2020), a tow-tug extension lane would overlap three of the WEAs (Hudson North, Fairways South, and Fairways North) as shown in **Figure 4-6**. There is the potential for conflict with the proposed tow-tug extension lane and site characterization activities, such as the installation of met buoys and slow-moving survey vessels with limited maneuverability. The impacts on navigation for these three WEAs should be re-evaluated when the USCG finalizes its rulemakings, because there is the potential that impacts on navigation could be greater than negligible.

Non-Routine Events

Similar to **Section 4.3.2**, non-routine events that could potentially have impacts on military use and navigation/vessel traffic include recovery of lost survey equipment through temporary space-use conflicts. The extent of impacts would depend on the type of lost equipment. The size of the lost equipment and/or the replacement cost would dictate the number of attempts made at recovery. The number of recovery attempts could affect the size of resultant impact area and time spent searching. Additionally, the location of the lost equipment could affect the impact on other resources. Regardless, the potential for recovery operations to interact with military use activities or vessel traffic is unlikely, given that recovery operations would likely involve one vessel for a short period of time; therefore, impacts are expected to be **negligible**.

Conclusion

Because site-specific coordination would be required to minimize multiple-use conflicts on the OCS in and around the WEAs, impacts on military use from the placement of met buoys are expected to be **negligible**. Overall, BOEM anticipates that impacts to navigation and vessel traffic from site characterization and site assessment activities are expected to be **negligible**. Because the vessel activity associated with the Proposed Action is expected to be relatively small compared to existing vessel traffic at the ports, in the WEAs, and between the shore and the WEAs, impacts on navigation from the additional vessels are expected to be **negligible** over the 5- to 7-year span of activities. With the use of navigation aids, and because the WEAs were designed to avoid the major shipping lanes, impacts on navigation from the placement of a maximum of 20 met buoys across the WEAs are expected to be **negligible**. The overall effect would be small, and the resource would be expected to return to a condition with no measurable effects without any mitigation.

In the context of the changing baseline and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor** for military use and navigation/vessel traffic. BOEM anticipates that the combined overall impacts associated with the Proposed Action and with ongoing and reasonably foreseeable planned actions would be **minor** for military use and navigation/vessel traffic in the geographic analysis area, because proper mitigation and coordination would avoid adverse impacts on the military and traffic related activities. Additionally, military use and navigation/vessel traffic are not expected to be disrupted from routine functions and activities in the geographic analysis area. The main impact drivers stem from construction of offshore structures related to planned wind projects resulting in increased navigational complexity and associated risks.

4.3.6 Sea Turtles

In addition to the PEIS and EA documents provided in **Table 2-1**, impacts from site characterization have been analyzed in the NMFS Biological Opinion (Anderson 2021; NMFS 2013) and ESA consultation conducted for the Proposed Action (Anderson 2021). Despite regional differences in some of the assessments, the conclusions on impact levels are applicable to this EA, as there is substantial overlap in the species considered. No critical habitat for sea turtles is designated in the WEAs. The following conclusions for site characterization that were made in the previous analyses are expected to be the same for the Proposed Action:

- Impacts from HRG active acoustic sound sources are expected to be **minor**. Available data suggests that sea turtle hearing is less sensitive than that of marine mammals and is thought to be more comparable to fish hearing (Finneran et al. 2017; Popper et al. 2014). This finding indicates that, though noise produced by HRG survey equipment, vessels, and equipment may be audible to sea turtles, it is unlikely to result in any long-term, population-level impacts (Anderson 2021; Baker and Howson 2021; NSF and USGS 2011). Acoustic signals from boomers and sparkers are the only HRG equipment that operate within the hearing range of sea turtles and may be audible to sea turtles. The potential for PTS and TTS is considered possible in close proximity to these active acoustic surveys, but impacts are unlikely as turtles would be expected to avoid such exposure and survey vessels would pass relatively quickly (Baker and Howson 2021; NSF and USGS 2011). As such, BOEM would require a lessee to implement SOCs to minimize acoustic impacts (**Section 5**), and new stipulations will be developed if needed for compliance with best management practices identified in Anderson (2021).
- Impacts from vessel and equipment noise, including geotechnical sampling (e.g., coring), are expected to be **negligible** to **minor**. BOEM assessed the impact level on the basis that vessel and equipment source levels could be high enough to exceed the threshold criteria for behavioral disturbance, and undetected sea turtles may occur in the ensonified area during sampling (Baker and Howson 2021; NSF and USGS 2011). BOEM would require a lessee to implement a clearance zone for sea turtles prior to commencing surveys (**Section 5**), and new stipulations could be developed if needed for the Proposed Action.
- Impacts from vessel traffic resulting from the Proposed Action are expected to be **negligible** because SOCs require that all vessel operators and crew maintain a vigilant watch for sea turtles and implement BOEM PDCs developed under the June 29, 2021, programmatic consultation (Anderson 2021) (**Section 5**). In general, lease stipulations that have been developed for other projects would be used as appropriate (**Section 5**), and new stipulations could be developed if needed for the Proposed Action.

Therefore, impacts to sea turtles are briefly summarized here. The impacts on sea turtles from routine activities include vessel traffic associated with surveys and the installation, operation, and decommissioning of met buoys.

Sea turtles have potential to be struck by vessels resulting from activities under the Proposed Action. Because of their limited swimming abilities, hatchlings may be more susceptible than juveniles or adults to vessel collisions. The likelihood of collision would vary depending upon sea turtle species and life stage, and the location, speed, and visibility of the vessel.

The WEAs are adjacent to major shipping lanes. The annual number of vessel trips associated with the proposed lease would range from 766 to 806 round trips based on the total trips for site characterization and site assessment and would be spread out over the timeframe of the Proposed Action. The number of annual trips from site characterization and site assessment activities represents a fraction of the vessel trips occurring in the NY and NJ ports area each year (**Section 4.2.5**). A high risk of vessel strikes from the Proposed Action is not anticipated because the number of vessel trips is relatively low, and high densities of sea turtles are not expected to be concentrated in the vicinity of the WEAs (NYSERDA 2017c). The area is considered a low-density habitat because the WEAs are not offshore of nesting beaches, biologically important foraging areas, critical habitat, or migratory areas in which sea turtles may occur in high densities at certain times of year.

In addition to the low risk of strikes, survey and work vessels generally travel at slow operational speeds (typically 4 to 6 knots), further reducing the risk of a turtle strike by allowing vessel captains to spot sea turtles and allowing a greater reaction time for sea turtles to avoid an approaching vessel. Lessees will be required to follow the vessel strike avoidance SOC (**Section 5**). The risk of a vessel strike with any species of sea turtles is minimal considering the low number of vessel trips from the Proposed Action relative to existing vessel traffic in the region, that the trips would be spread out over a 5- to 7-year period, and vessel strike avoidance requirements. Potential impacts to sea turtles from vessel traffic associated with site characterization and site assessment activities are expected to be **negligible**.

The installation and presence of met buoys and associated mooring chains would result in a temporary disturbance and a loss of benthic habitat over a very small area in the WEAs. Two met buoys within each lease of the WEA are unlikely to alter distribution of any forage species or appreciably alter the available foraging habitat for sea turtles (Baker and Howson 2021). Potential impacts to sea turtles due to loss of habitat, changes to prey abundance, and distribution from installation of met buoys are expected to be **negligible**.

Potential impacts on sea turtles during met buoy operation and decommissioning include associated vessel traffic for routine maintenance, possible entanglement in moorings, and disturbance of sediments from buoy removal. An increase in vessel traffic may cause an increase in sea turtle collisions or boat-related injuries, behavioral changes, or displacement from the area (Anderson 2021; NMFS 2013). However, considering the small number of vessels associated with the operation and decommissioning activities and with the implementation of the vessel strike avoidance measures required by the SOCs (**Section 5**), the potential for maintenance-related vessels to strike sea turtles would be extremely low. The potential for sea turtles to interact with a buoy and to become entangled in the buoy or mooring system is extremely unlikely given the low probability of a sea turtle encountering a buoy or mooring system within the expanse of the WEAs and the high tension of the chain, which further reduces risk of entanglement (Anderson 2021; NMFS 2013). Therefore, potential impacts to sea turtles from met buoy operation and decommissioning are expected to be **negligible**. During met buoy removal, disturbance of the sediment can cause elevated levels of turbidity that may negatively affect foraging sea turtles. However, impacts would be temporary, confined to a small area, and of lower magnitude than those resulting from installation activities; therefore, impacts are expected to be **negligible**.

Benthic impacts from biological surveys (**Section 4.3.1**) could affect prey items of sea turtles and may alter the diet composition of these ESA-listed species. However, because the amount of benthic habitat affected by the survey activities would be temporary and extremely small relative to the available foraging habitat in the region, any effects to listed species resulting from benthic disturbance would be **negligible**. Additionally, the potential for sea turtles to interact with biological sampling gear and to become entangled would be extremely unlikely, given the dispersed nature of biological survey activities and the limited number of surveys; therefore, impacts are expected to be **negligible**.

Non-Routine Events

Non-routine events that could affect sea turtles consist of the recovery of lost equipment through additional vessel traffic and noise and entanglement risk related to the dragging of grapnel lines. Traffic and noise associated with non-routine activities would likely be from a single vessel and therefore be **negligible**. The extent of impacts from the grapnel lines would be dependent upon the type of lost equipment, which would dictate the number of attempts made at recovery. The potential for sea turtles to interact with the grapnel line and to become entangled is extremely unlikely given the low probability of a sea turtle encountering the line within the expanse of the WEAs and transmission cable routes; therefore, impacts are expected to be **negligible**.

Conclusion

Overall, impacts to sea turtles are expected to be **minor**, with potential impacts to sea turtles ranging from **negligible** to **minor** depending on the activity being conducted; effects could be notable, but the resource would be expected to recover completely without remedial or mitigating action. Vessel strike and noise are two of the most important factors that may affect sea turtles. However, SOCs (**Section 5**) would minimize the potential for vessel strikes and adverse impacts on sea turtles.

In the context of the changing baseline and planned actions, the incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor** for sea turtles. BOEM anticipates that the combined overall impacts associated with the Proposed Action and with ongoing and reasonably foreseeable planned actions would be **moderate** for sea turtles in the geographic analysis area, because impacts are unavoidable, but the viability of the resource is not threatened and affected sea turtles would recover completely when stressors are removed or remedial actions are taken. The main impact drivers stem from construction-related noise related to planned wind projects and increased vessel traffic associated with the Planned Action Scenario (**Appendix D**).

5 Standard Operating Conditions

The Proposed Action includes SOCs to reduce or eliminate potential risks to or conflicts with specific environmental resources. If leases or grants are issued, BOEM will require the lessee to comply with the SOCs through lease stipulations and/or as conditions of SAP approval. The lessee's SAP must contain a description of environmental protection features or measures that the lessee will use.

For offshore cultural resources and biologically sensitive habitats, BOEM's primary mitigation strategy has been and will continue to be avoidance. For example, the exact location of met buoys would be adjusted to avoid adverse effects to offshore cultural resources or biologically sensitive habitats, if present.

Utilizing the best available science and in consultation with NMFS (the agency primarily responsible for overseeing protected species conservation and recovery), BOEM has devised a protective suite of balanced SOCs to minimize the effects of site characterization and site assessment activities associated with offshore wind leasing. Specifically, these conditions are part of the Proposed Action (Alternative B) in order to mitigate, minimize, or eliminate impacts on protected species of marine mammals, sea turtles, fish, and birds listed as threatened or endangered under the ESA and MMPA. The proposed SOCs include requirements for geophysical survey shutdown zone monitoring, survey equipment powerup, and post-shutdown shutdown protocols for all ESA-listed species, in addition to any applicable ITA requirements under the MMPA for marine mammals. The SOCs for threatened and endangered species are described in Addendum C of each proposed Commercial Lease;[4] the NMFS ESA consultation concurrence letter (Anderson 2021);[5] and the Data Collection Biological Assessment (Baker and Howson 2021).[6] These SOCs were developed through the analyses presented in Baker and Howson (2021) and through consultation with other Federal and state agencies. Some biological surveys may also impact ESA-listed species. Because details on the type of biological survey, timing, and location are essential for understanding the potential impacts, BOEM is proposing to prohibit lessees from conducting fisheries surveys until BOEM has reviewed the proposed fisheries survey plan and notified the lessee that all necessary ESA Section 7 consultations addressing the proposed fishery survey have concluded.

For non-ESA-listed marine mammals, it is anticipated that NMFS project-specific mitigation would be required under any applicable ITAs. If an ITA is not obtained, standard SOCs for non-ESA-listed marine mammals include powering up survey equipment and providing a 328-foot (100-meter) clearance zone, which must be clear of all small cetaceans and seals for 15 minutes and humpback whales, Kogia, and beaked whales for 30 minutes. If any non-ESA-listed marine mammal is observed within the clearance zone during the monitoring period, the clock must be paused for 15 or 30 minutes, depending on the species sighted. If the PSO confirms that the animal has exited the shutdown zone and is headed away from the survey vessel, the clock that was paused may resume. The clock resets to 15 minutes for small cetaceans and seals or 30 minutes for humpback whales, Kogia, and beaked whales if an observed marine mammal dives and is not resighted by the PSO. Following pre-clearance and commencement of equipment operation, any time any marine mammal is sighted by a PSO within the applicable shutdown

[4] Available at www.boem.gov/renewable-energy/state-activities/new-york-bight
[5] Available at www.boem.gov/sites/default/files/documents/renewable-energy/Final-NLAA-OSW-Programmatic_0.pdf
[6] Available at www.boem.gov/sites/default/files/documents/renewable-energy/OREP-Data-Collection-BA-Final.pdf

zone, the PSO must immediately notify the resident engineer or other authorized individual, who must shut down the survey equipment. Geophysical survey equipment may be allowed to continue operating if small cetaceans or seals voluntarily approach the vessel to bow ride, as determined by the PSO on duty, when the sound sources are at full operating power. Following a shutdown, the survey equipment may resume operating immediately only if visual monitoring of the shutdown zone continues throughout the shutdown, the animals causing the shutdown were visually followed and confirmed by PSOs to be outside of shutdown zone and heading away from the vessel, and the shutdown zone remains clear of all protected species.

Additional conditions and/or revisions to these conditions may be developed as new information becomes available or as may be required through any MMPA ITAs applied for by project proponents.

More specific information on the SOCs is available in **Appendix H**.

6 Consultation and Coordination

This section discusses public involvement and consultations in the preparation of this EA, including a summary of public scoping comments and formal consultations.

6.1 Public Involvement

6.1.1 NY Bight Renewable Energy Intergovernmental Task Force Meetings

BOEM held a NY Bight Renewable Energy Intergovernmental Task Force (Task Force) meeting on May 9, 2018. The meeting's purpose was to present necessary background information to facilitate an informed discussion about BOEM's Call, published on April 11, 2018 (**Section 2.1**), which requested comments from the public about areas of the OCS deemed in need of consideration and analysis for the potential development of renewable energy. At the meeting, BOEM also set out to solicit feedback from the Task Force on BOEM's approach to Area ID analysis and stakeholder engagement; update the Task Force and stakeholders on recent state and developer activities; and provide opportunities for public input about the topics being considered by the Task Force.

During the meeting, members of the Task Force, other regional representatives, and the public heard updates on the BOEM's leasing effort in the NY Bight. BOEM staff reviewed the Call, which identified four potential areas for offshore wind leasing, as well as next steps for Area ID. The Task Force heard subject matter presentations on visual impacts, avian and marine protected species, navigation and technical analysis, and fisheries. Representatives from the States of NY and NJ presented updates on state initiatives, procurement, and stakeholder engagement efforts. Representatives of developers with leases in the region also presented updates on their respective lease activities. Task Force members had an opportunity to discuss the Call Area in small groups, and the meeting provided two opportunities for public input on topics being considered by the Task Force.

A second meeting was held on November 28, 2018. During that meeting, members of the Task Force, other regional representatives, and the public heard updates on the BOEM's leasing effort in the NY Bight. BOEM staff reviewed the Call, which identified four potential areas for offshore wind leasing and the development process for the draft WEAs. The Task Force heard updates and reactions to the draft WEAs from DOD, USCG, NMFS, and the Responsible Offshore Development Alliance (a new organization representing a broad range of fisheries interests). Representatives from the States of NY and NJ presented updates on their procurement plans and reactions to the draft WEAs. Task Force members had an opportunity to discuss the draft WEAs in small groups. Representatives of regional wind energy and infrastructure developers also presented updates on their respective activities. The meeting closed with a presentation on the next steps and timeline for this leasing process, and the meeting provided two opportunities for public input on topics being considered by the Task Force.

Two additional meetings were held on April 14 and 16, 2021. During these meetings, members of the Task Force, other regional representatives, and the public heard updates on the BOEM's leasing effort in the NY Bight. BOEM staff introduced the NY Bight WEAs proposed to be offered for lease in late 2021 and provided an overview of and sought in-depth feedback on the Proposed Sale Notice (PSN) and related auction format. The WEAs included in the PSN are a subset of the WEAs analyzed in this EA;

Fairways North and Fairways South were not included in the PSN. The Task Force also heard updates and reactions to the Draft PSN from DOD, USCG, NMFS, and USACE. Representatives from the States of NY and NJ presented their reflections on the PSN and updated the Task Force on offshore wind energy development activities in their respective states. Task Force members also had an opportunity to discuss the Draft PSN in small groups. Over the two days, there were also two opportunities for public input on topics being considered by the Task Force. The meeting closed with a presentation on the next steps and timeline for the leasing process.

On June 11, 2021, BOEM published the PSN.[7]

At each Task Force meeting, all attendees were provided opportunity to raise issues and concerns about the Call and the draft WEAs in order to assist BOEM in developing documentation to support the final WEA decision. Full summaries of each meeting and associated presentations made at each meeting can be found at the relevant links here by clicking on the "History" tab at www.boem.gov/renewable-energy/state-activities/new-york-bight.

6.1.2 Notices to Stakeholders

On March 29, 2021, BOEM released the Announcement of Area ID.[8] The Area ID Memorandum documents the analysis and rationale used to develop recommendations for WEAs in the NY Bight. Also on March 29, 2021, BOEM released a Notice to Stakeholders to indicate BOEM's intent to prepare an EA for the *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf of the New York Bight*. BOEM solicited input on issues and alternatives to be analyzed in the EA and accepted comments until April 28, 2021. During the 30-day comment period, BOEM received approximately 3,000 comments from a variety of stakeholders, including renewable and other businesses and associations; environmental and other public-interest groups; Federal, state, and local governmental entities; and the general public. Some commenters expressed general support or opposition, but most raised specific areas of concern:

- Concern that the process is moving too quickly and should be paused for information, analysis, and results from existing projects (most common concern)
- Concern that BOEM should conduct an EIS instead of an EA in order to include cumulative analysis and address the entire process, not just pre-lease activities
- Concern for impacts of various species, with most concern for whales
- Concern for navigation, including spacing of turbines and increased traffic in an already crowded area
- Concern for impacts on the fishing industry access to areas, as well as effects on fish both behavioral and from habitat changes

The comments can be viewed at www.regulations.gov by searching for docket ID BOEM-2021-0021.

A Notice to Stakeholders issued on August 10, 2021, in conjunction with the publication of the Draft EA initiated a 30-day public comment period, which was extended by 14 days due to weather events in the project area, technical issues with BOEM's website, and several requests for extension from

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[7] Available at regulations.gov/document/BOEM-2021-0033-0001

[8] Available at www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/NYBight-Wind-Energy-Areas-Summary.pdf

stakeholders. The comment period ended on September 23, 2021. Comments were submitted via www.regulations.gov under docket ID **BOEM-2021-0054**. Two virtual public meetings were held on August 25 and 26, 2021, to exchange information between BOEM, stakeholders, and the general public. Current information about the project and public meetings is available online at www.boem.gov/renewable-energy/state-activities/new-york-bight. **Appendix G** provides an overview of the stakeholders who submitted substantive comments along with their affiliation, type of organization, a summary of the comments, and BOEM's responses.

6.2 Consultations

6.2.1 ESA

Section 7(a)(2) of the ESA of 1973, as amended (16 U.S.C. §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 may affect a protected species or its critical habitat, that agency is required to consult with either NMFS or USFWS, depending upon the protected species that may be affected. BOEM has consulted informally with USFWS and formally with NMFS for activities considered in this EA and species under their respective jurisdictions. The status of consultations for each of the Services is described below.

USFWS

BOEM prepared a biological assessment to cover the species and critical habitat that may be affected by activities associated with the issuance of a lease and preparation of a SAP within the NY Bight. BOEM submitted the biological assessment to USFWS on August 10, 2021, and requested concurrence with BOEM's determination that the impacts of the proposed activities are expected to be discountable and insignificant and thus not likely to adversely affect ESA-listed bird and bat species. On October 25, 2021, USFWS provided a response to BOEM's biological assessment indicating USFWS' concurrence with BOEM's "not likely to adversely affect" determinations and acknowledging the bureau's "no effect" determinations. However, UFSWS did request clarification on some of the finer points and conclusion reached in studies referenced by BOEM in support of its determinations.

NMFS

The activities that may ensue as a result of the issuance of leases in the NY Bight are subject to a programmatic consultation with NMFS (Anderson 2021; Baker and Howson 2021). BOEM submitted a biological assessment to NMFS in February 2021 and provided supplemental information through June 11, 2021. NMFS conducted a broad assessment of the effects of installing met buoys, conducting geophysical and geotechnical surveys with specified HRG equipment, and conducting associated vessel activities for offshore wind energy development projects off the U.S. Atlantic Coast (Anderson 2021). The area considered included the NY Bight WEAs. NMFS found that if projects meeting the PDCs implement certain avoidance and mitigation measures, the activities are not likely to adversely affect any ESA-listed species under NMFS's jurisdiction. If additional activities that are beyond the scope of the programmatic consultation are identified, additional consultation will be completed before those activities occur.

6.2.2 Magnuson-Stevens Fishery Conservation and Management Act

Pursuant to Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act of 1976, 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 Magnuson-Stevens Fishery Conservation and Management Act can be found at 50 CFR 600. On August 10, 2021, BOEM submitted an EFH Assessment to NMFS that identified potential adverse effects to designated EFH from activities described in the Proposed Action. BOEM determined that the Proposed Action would not significantly affect the quality and quantity of EFH. NMFS suggested conservation measures to minimize impacts from site assessment and characterization activities on EFH and sensitive habitats. The EFH consultation concluded on October 28, 2021.

6.2.3 Coastal Zone Management Act

The Coastal Zone Management Act requires that Federal actions that are reasonably likely to affect any land or water use or natural resource of the coastal zone be “consistent to the maximum extent practicable” with relevant enforceable policies of the state’s federally approved coastal management program (15 CFR 930 Subpart C). BOEM prepared a Consistency Determination (CD) under 15 CFR 930.36(a) to determine whether issuing leases and site assessment activities (including the construction/installation, operation and maintenance, and decommissioning of met buoys) in the NY Bight WEAs were consistent to the maximum extent practicable with the provisions identified as enforceable by the Coastal Zone Management Programs of NJ and NY.

BOEM determined that NJ and NY share common coastal management issues and have similar enforceable policies as identified by their respective coastal zone management plans. Given the proximity of the WEAs to each state, the similarity of the reasonably foreseeable activities for the WEAs, and the similarity of impacts on environmental and socioeconomic resources and uses within each state, BOEM prepared a single CD under 15 CFR 930.36(a) to determine whether issuing a lease for site assessment activities (including the installation, operation, and decommissioning of met buoys) in the WEAs is consistent with the enforceable policies of the NJ and NY coastal zone management plans to the maximum extent practicable.

The EA provides the comprehensive data and information required under 30 CFR 939.39 to support BOEM’s CD. The states received the CD on August 18, 2021, and the 60 days to review the CD ended on October 16, 2021. No response was received from the State of New Jersey; therefore, BOEM presumed concurrence. The State of New York requested a 15-day extension to October 16, 2021, which resulted in the State of New York providing concurrence on October 30, 2021.

6.2.4 Government-to-Government Consultations with Federally Recognized Tribes

BOEM recognizes the unique legal relationship of the U.S. with tribal governments as set forth in the U.S. Constitution, treaties, statutes, Executive Orders, and court decisions. BOEM is required to consult with federally recognized Tribes if a BOEM action has tribal implications, defined as any departmental regulation, rulemaking, policy, guidance, legislative proposal, grant funding formula changes, or operational activity that may have substantial direct effect on an Indian Tribe. In recognition of this special relationship, BOEM initiated consultations with the following nine federally recognized Native American Tribes with historic and cultural ties to the region under consideration in the EA: Absentee-

Shawnee Tribe of Indians of Oklahoma, Delaware Tribe of Indians, Mashantucket Pequot Tribal Nation, Mohegan Tribe of Connecticut, Shawnee Tribe, Stockbridge-Munsee Community Band of Mohican Indians, the Delaware Nation, the Narragansett Indian Tribe, and the Shinnecock Indian Nation. On May 13, 2021, as part of the consultation process, BOEM invited these nine federally recognized Tribes to participate in the National Historic Preservation Act (NHPA) Section 106 consultations for the issuance of commercial wind energy leases within the NY Bight WEAs and associated site assessment and site characterization activities. On July 8, 2021, BOEM also invited these nine federally recognized Tribes to a government-to-government consultation meeting to discuss the PSN for the NY Bight. The Delaware Tribe of Indians attended the government-to-government consultation held on July 27, 2021. Three additional federally recognized Tribes—the Delaware Nation, the Stockbridge-Munsee Community Band of Mohican Indians, and the Shinnecock Nation—either expressed interest in attending future consultations or receiving notes.

6.2.5 National Historic Preservation Act (Section 106)

Section 106 of the NHPA (54 U.S.C. § 306108) and its implementing regulations (36 CFR 800) require Federal agencies to consider the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation an opportunity to comment. BOEM has determined that issuing commercial or research leases within the NY Bight WEAs and granting ROWs and RUEs within the region constitutes an undertaking subject to Section 106 of the NHPA (16 U.S.C. 470f) and its implementing regulations (36 CFR § 800) as the resulting site characterization and site assessment activities have the potential to cause effects on historic properties.

BOEM has implemented Programmatic Agreements pursuant to 36 CFR § 800.14(b) to fulfill its obligations under Section 106 of the NHPA for renewable energy activities on the OCS offshore NY, NJ, and RI. BOEM initiated consultation through letters on May 3, 2021, with the NY State Historic Preservation Office (SHPO), NJ SHPO, RI SHPO, Advisory Council on Historic Preservation, and the following federally recognized Tribes: Absentee-Shawnee Tribe of Indians of Oklahoma, Delaware Tribe of Indians, Mashantucket Pequot Tribal Nation, Mohegan Tribe of Connecticut, Narragansett Indian Tribe, Shawnee Tribe, Shinnecock Indian Nation, Stockbridge-Munsee Community, and the Delaware Nation. BOEM further identified potential consulting parties pursuant to 36 CFR § 800.3(f) through a May 3, 2021, letter to over 500 entities—including certified local governments, historical preservation societies, museums, and state-recognized Tribes—to solicit public comment and input regarding the identification of, and potential effects on, historic properties for the purpose of obtaining public input for the Section 106 review (36 CFR § 800.2(d)(3)) and to invite the recipients to participate as a consulting party. BOEM prepared a Finding of No Historic Properties Affected (Finding), consistent with 36 CFR § 800.4(d)(1), which was provided to the consulting parties on July 6, 2021.

BOEM received concurrence on the Finding from the NY SHPO on July 12, 2021, and from the RI SHPO on August 5, 2021. No other comments were received on the Finding. Per 40 CFR§ 800.4(d)(1)(i), "[i]f the SHPO/THPO, or the Council if it has entered the Section 106 process, does not object within 30 days of receipt of an adequately documented finding, the agency official's responsibilities under Section 106 are fulfilled." The Finding is available on BOEM's website at www.boem.gov/renewable-energy/state-activities/mid-atlantic-wind-energy-areas.

7 Preparers

Table 7-1. BOEM Contributors

Name	Role/Resource Area
NEPA Coordinators	
Stork, Allison	NEPA Compliance
Mann, Frances	NEPA Compliance
Resource Scientists and Contributors	
Baker, Arianna	Navigation and Vessel Traffic
Bedard, Justin	Government to Government
Bigger, David	Birds and Bats
Cable, Samuel	Comment Analysis
Cameron, Brian	Coastal Zone Management Act Compliance
Chaiken, Emma	Socioeconomics
Chen, Paulina	Document Editing and Production
Edenfield, Lorena	Benthic; Finfish; Invertebrates; and Essential Fish Habitat
Feinberg, Lucas	Project Coordinator
Hoffman, Willie	Cultural Resources
Jensen, Mark	Socioeconomics
Klein, Kimberly	Marine Mammals; Sea Turtles
Mansfield, Laura	Government to Government; Environmental Justice; Cultural Resources
Melendez-Arreaga, Pedro	Solicitor
Morin, Michelle	Chief, Environment Branch for Renewable Energy; NEPA Compliance
Roberts, Jane	Comment Analysis
Rose, Jennifer	Recreation and Tourism
Vorkoper, Stephen	Solicitor
Wolvovsky, Eric	Air Quality

Table 7-2. Consultants

Name	Role/Resource Area
CSA Ocean Sciences Inc.	
Balcom, Brian	Senior Scientist 3; Scientific Editor
Cahill, Melanie	Project Manager; Technical Reviewer
Cady, Robert	Project Scientist 3; Technical Lead and Lead Author
Hartigan, Kayla	Project Scientist 1; Marine Mammals Section Author
Snyder, David	Senior Scientist 1; Essential Fish Habitat Assessment Author

ESS Group	
Bachand, Kristen	Coastal Environmental Scientist; Birds, Bats, Military Use, and Navigation/Vessel Traffic Sections Author
Chase, Anna	Environmental Scientist and Taxonomist; Commercial and Recreational Fishing Section Author
Fisher, Heidi	Environmental Technician; Water Quality and Coastal Habitat Sections Author
Snow, Stacey	Senior Environmental Compliance Engineer; Air Quality Section Author
HDR Inc.	
Robinson, Meghan	Environmental Scientist; Demographics and Employment, Environmental Justice, Recreation, and Tourism Author
Solomon, Patrick	Senior NEPA Specialist; Demographics and Employment, Environmental Justice, Recreation, and Tourism Reviewer
Kearns and West	
Vint, Kyle	Graphic Designer
Search	
Blackwell, Liz	Architectural Historian; Viewshed Section Author
Bleichner, Barry	Maritime Project Manager; Cultural, Historical, and Archaeological Resources Section Author

Appendix A: Vessel Trips and Scenarios

This appendix provides the Proposed Action scenario assessed in the New York Bight environmental assessment. **Tables A-1 through A-5** provide the estimated quantification of site characterization and site assessment survey effort and activities, including survey lengths in kilometers, estimated durations and vessel trips, as well as timing of some surveys.

Table A-1. Summary of high-resolution geophysical survey calculations

Location	Vessel Type	Kilometers	Hours	Days	Months	Distance (km) Transited to/from Shore Monthly (24 hr vessel)	Vessel Trips
Grand Total Export Cable Routes	24 hr vessel 70%	56,946.54	6,833.04	284.71	9.49	5,158.94	10
	12 hr vessel 30%	24,405.66	2,928.44	244.04	8.13	n/a	245
Grand Total Transmission Backbone	24 hr vessel 30%	6,932.17	831.79	34.66	1.16	628.00	2
	12 hr vessel 70%	16,175.06	1,940.85	161.74	5.39	n/a	162
Grand Total Wind Energy Areas	24 hr vessel 100%	166,221.91	19,945.03	831.04	27.70	15,058.50	28
Grand Combined Totals	--	**270,681.34**	**32,479.16**	**1,556.19**	**51.87**	**20,845.45**	**447**

Assumptions:
Transit Speed = 18.52 km/hr
Survey Speed = 8.334 km/hr
Survey corridor for transmission lines are 1,000 m wide.
30-m line spacing for transmission corridor for archaeological surveys.
150-m line spacing for Wind Energy Areas (WEAs) and transmission corridor for hazard surveys.
Perpendicular tie-lines occur every 500 m.
Includes an 800-m buffer around each WEA to account for line turns, anchoring, or other activities that may occur beyond the WEA boundary.

Table A-2. Vessel trip calculations associated with benthic and geotechnical sampling

Samples per day	Days	Trips
10 geotechnical samples per 24-hr day	324	11
20 benthic samples per 24-hr day	128	4

Assumptions:

Disturbance Areas (estimated maximum)

Standard van veen Benthic	0.1 m^2/sample
Other Benthic	1 m^2/sample
Sediment Profile Imaging	4 m^2/sample
Cone Penetration Test (CPT)	4 m^2/sample
Vibracore	3 m^2/sample
If anchoring	10 m^2/sample

Number of Samples

One geotechnical sample (vibracore, CPT, and/or deep boring) at every potential wind turbine location and transmission station location	689
One geotechnical sample (vibracore, CPT, and/or deep boring) every kilometer of transmission cable corridor	2,548
One benthic sample every kilometer of transmission cable corridor	2,548
One benthic sample at each buoy site	20
TOTAL	**5,805**

Table A-3. Vessel trip calculations associated with site assessment buoys

Installation					
Number of leases	# buoys	Round trips for construction per buoy – low	Total round trips – low	Round trips for construction per buoy – high	Total round trips – high
10	2	1	20	2	40

Maintenance – Quarterly/Monthly				
Number of leases	# buoys	# visits	Years	Total trips
10	2	4	5	200
10	2	12	5	600

Decommission					
Number of leases	# buoys	Round trips for construction per buoy – low	Total round trips – low	Round trips for construction per buoy – high	Total round trips – high
10	2	1	20	2	40

Total		
Alternative	Low range	High range
A	240	280

Table A-4. Vessel trip calculations associated with fish surveys

Survey	Vessel Days
1. Trawl	40
2a. Gill net	48
2b. Beam trawl	24
3. Ventless trap	16
4. Molluscan shellfish	Concurrent with Benthic
TOTAL	**128**

Assumptions:

Based on June 2019: *Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf*

1. Otter Trawl Survey Protocols. Demersal Fish

• Trawl speed of 2.9–3.3 knots

• 2 years x 4 quarters = 8 surveys

• 30 trawls per survey = 240 samples (trawls)

• Vessel trips = 2 days travel round trip (RT) + 3 days on site = 5 days per survey

• 5 days/survey x 8 surveys = 40 vessel days

2. Gill Net and Beam Trawls Protocols. Microscale Distribution of Fish

a. Gill net:

• 2 years x 2 quarters (spring and fall) x 3 events/quarter = 12 surveys

• 6 samples per survey = 72 samples

• Vessel trips = 2 days RT + 2 day (1–2 days) on site = 4 days per survey

• 4 days/survey x 12 surveys = 48 vessel days

b. Beam trawl (might be able to piggyback with trawl survey):

• 2 years x 4 quarters = 8 surveys

• 6 samples/survey = 48 samples

• Vessel trips = 2 days RT + 1 day on site = 3 days per survey

• 3 days/survey × 8 surveys = 24 vessel days

3. Ventless Trap Survey

• 2 years x 4 quarters = 8 surveys

• 3 locations/survey = 24 samples (each sample consists of a 5-trap trawl)

• Vessel trips = 2 days RT (day 1 travel and set, three days later day 2 travel and haul)

• 2 days/survey × 8 surveys = 16 vessel days

4. Molluscan Shellfish Survey

• Assume concurrent with benthic survey

Table A-5. Vessel trip calculations associated with marine mammal, sea turtle, and avian surveys

Vessel-based surveys	• Vessel speed 10 knots • Round trip distance 240 km • Marine mammal surveys 3 years x monthly = 36 surveys • Avian may be conducted in a minimum of 2 years
Aerial-based surveys	• Aircraft speed 100 knots • Round trip distance 240 km • Marine mammal surveys 3 years x monthly = 36 surveys • Avian may be conducted in a minimum of 2 years
PAM surveys	• Assume concurrent with vessel-based surveys

Assumptions:

Based on June 2020: *Guidelines for Providing Information on Marine Mammals and Sea Turtles for Renewable Energy Development on the Atlantic Outer Continental Shelf*

Based on May 27, 2020: *Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf*

Appendix B: Assessment of Resources with Negligible Impacts

B.1 Introduction

This appendix provides an assessment of resources with negligible impacts from implementation of the Proposed Action. **Section 4.1** of the environmental assessment (EA) provides the assessment methodology used to determine impact levels.

B.2 Alternative A – No Action Alternative and Affected Environment

B.2.1 Air Quality and Greenhouse Gas Emissions

Air quality is characterized by comparing the ambient air concentrations of criteria pollutants to the National Ambient Air Quality Standards (NAAQS), which have been established by the U.S. Environmental Protection Agency (EPA) to be protective of human health and welfare. The NAAQS have been established in 40 CFR Part 50 for each of the six criteria pollutants: sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$, particulate matter with a diameter less than or equal to 10 and 2.5 micrometers [μm], respectively), and lead (Pb). Ozone forms in the atmosphere from precursor pollutants such as nitrogen oxides (NO_x) and volatile organic compounds (VOCs).

When the monitored pollutant levels in an area exceed the NAAQS for any pollutant, the area is classified as being in "nonattainment" for that pollutant. The coastal counties in New Jersey (NJ) and New York (NY) nearest the Wind Energy Areas (WEAs) include Monmouth, Ocean, and Hudson in NJ and Suffolk, Queens, Kings (also known as Brooklyn), Nassau, and Richmond (also known as Staten Island) in NY. All these counties are in moderate non-attainment for O_3 (except Ocean, which is marginal), maintenance areas for $PM_{2.5}$ (except Ocean), and maintenance areas for CO (except Suffolk). All other criteria pollutants are in attainment.

Section 162(a) of the Clean Air Act establishes air quality protections for designated Federal Class I areas such as national parks, national wilderness areas, and national monuments. The Class I area closest to the WEAs is Brigantine Wilderness Area in NJ, which is approximately 88 km from the WEAs. Federal Land Managers must be notified of facilities that will be located within 100 km of a Class I area. It is not anticipated that activities in the WEAs will impact visibility in the Brigantine Wilderness Area.

Climate change is a global issue that results from the increase in greenhouse gases (GHGs) in the atmosphere. The most recent available data on GHG emissions in the U.S. indicate that annual emissions in 2019 were an estimated 6,558 million metric tons (EPA 2021). Additional information about the impacts of climate change is presented in **Appendix D**.

Conclusion

Under the No Action Alternative, the Bureau of Ocean Energy Management (BOEM) would not issue any commercial or research wind energy leases in the NY Bight WEAs, and there would be no effects on air quality attributable to the Proposed Action; however, BOEM expects climate change, ongoing activities, and planned actions to have continuing regional air quality impacts over the timeframe considered in the EA (**Appendix D**).

Under the No Action Alternative, local impacts to air quality are likely to be small, incremental, and difficult to discern from effects of other pollutant sources over the time frame equivalent to the life of the Proposed Action. Offshore, the largest contributors to pollutant emissions are commercial marine vessels. Furthermore, fossil-fuel energy facilities could increase in number and/or level of pollution, or may be kept on-line to meet future power demand and fired by natural gas, oil, or coal. These larger impacts would be mitigated partially by other future offshore wind projects surrounding the geographic analysis area, including other projects offshore NY and NJ (**Appendix D**).

Considering all the impact-producing factors (IPFs) together, BOEM anticipates that the overall impacts associated with ongoing and reasonably foreseeable planned actions in the geographic analysis area may result in **minor** adverse impacts due to criteria pollutant emissions. The other reasonably foreseeable planned offshore wind projects could lead to reduced emissions from fossil-fuel power generating facilities and result in beneficial impacts on air quality.

B.2.2 Cultural, Historical, and Archaeological Resources

A number of documents report on the potential for submerged cultural resources within the NY Bight and Mid-Atlantic regions and are incorporated herein by reference (BOEM 2012; BOEM 2016a; NYSERDA 2017; TRC Environmental Corporation [TRC] 2012). Submerged historic properties that may be located within the proposed WEAs include indigenous archaeological sites, shipwrecks, downed aircraft, and submerged architectural or built resources (NYSERDA 2017). Although no submerged pre-Contact era archaeological sites have been identified within the proposed WEAs, it has been theorized that such sites do exist. Much of the Outer Continental Shelf (OCS) offshore NY and NJ was subaerial before sea levels began to rise following the Last Glacial Maximum, approximately 20,000 before present. The exposed landscape would have supported human populations from the Paleoindian through the Early Archaic periods, before sea levels submerged much of the proposed WEAs by 10,000 before present (BOEM 2016a). Portions of the OCS closer to shore, through which export cable routes might traverse, were submerged later and thus would have supported more recent populations. A theorized paleoshoreline reconstruction (**Figure B-1**) depicts the timing of marine transgression through the NY Bight. The TRC (2012) study determined that much of the seabed covered by the proposed WEAs is within an area considered to possess high sensitivity for containing submerged indigenous archaeological sites.

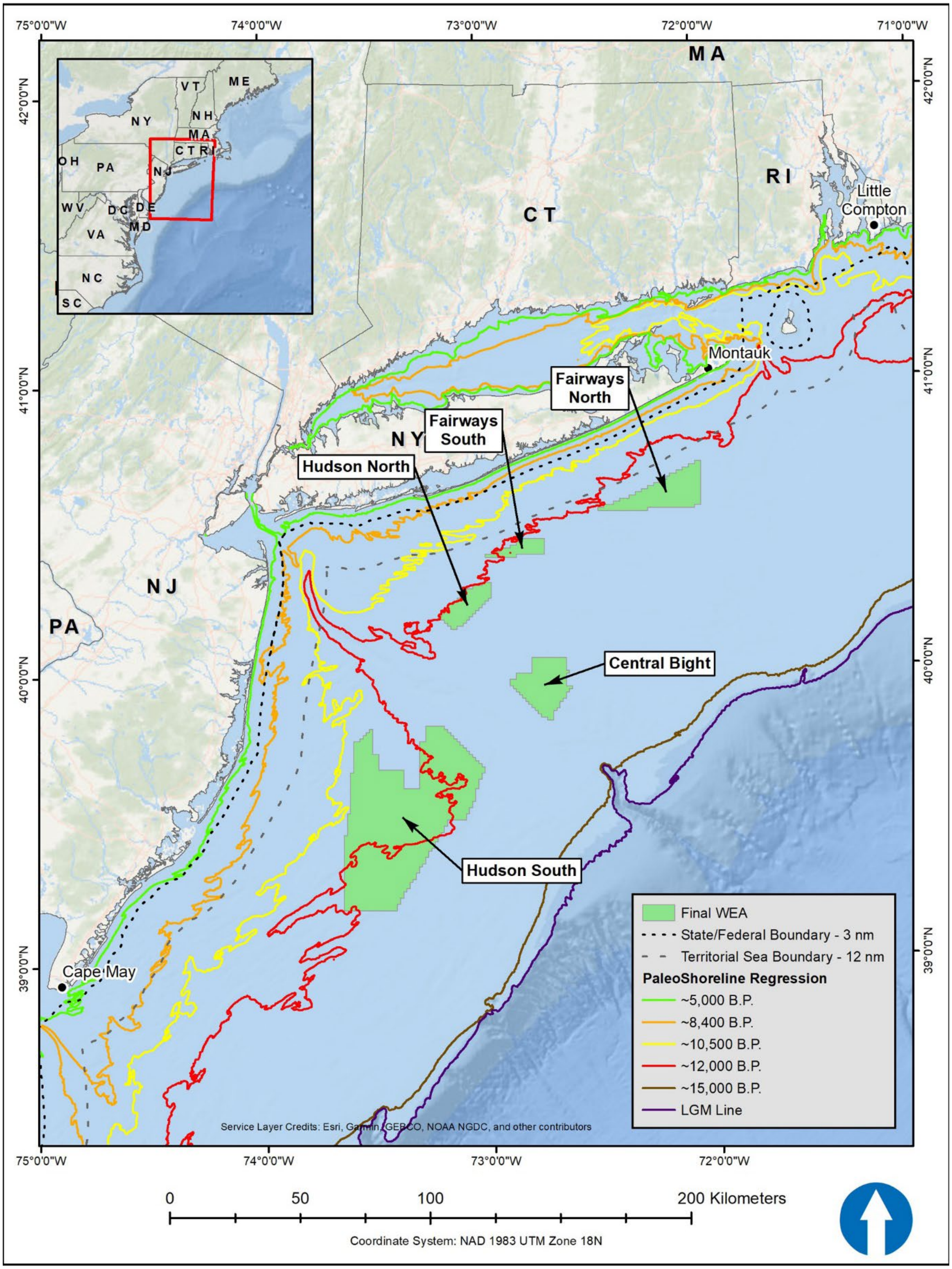

Figure B-1. Theorized paleoshoreline reconstruction in the New York Bight
B.P. = before present; LGM = Last Glacial Maximum; WEA = wind energy area

Since the advent of colonial expansion into North America, NY has served as a major regional and global commercial hub. Numerous vessels have plied the waters offshore NY and NJ and, consequently, shipwrecks are a type of historic submerged cultural resources expected to be found within the NY Bight and the navigation routes that filter vessel traffic to the ports of NY and NJ. Several shipwreck databases (i.e., Automated Wreck and Obstruction Information System, Electronic Navigation Charts, Global Maritime Wrecks Database, New Jersey Maritime Museum) were consulted to assess the number of shipwrecks in the vicinity of the NY Bight; the number of reported wrecks range from roughly 500 to over 950 shipwrecks. The frequency of shipwrecks increases dramatically in nearshore areas; the database recording the largest number of shipwrecks within the proposed WEAs reports only 11 shipwrecks. Examples of other historic-era submerged cultural resources that may be encountered within the proposed WEAs and nearshore are downed aircraft, subsea cables, and other infrastructure (BOEM 2016a; NYSERDA 2017; TRC 2012).

Historic property types that may be within the onshore affected environment could include districts, sites, buildings, structures, or objects within the viewshed of site characterization and site assessment activities. Klein et al. (2012) includes an overview of common coastal historic property types that could fall within the viewshed of these types of characterization and assessment activities in the NY Bight. The affected environment for onshore historic properties could include portions of both the NY and NJ coastlines between Barnegat Light, NJ, and Southampton, NY. The WEAs vary from 23 to 69 nm off the coast of NJ, and from 15 to 45 nm off the coast of NY. Coastal properties with ocean views are potentially within the viewshed of site characterization and site assessment activities. Local topography is generally flat, and development in these areas is generally limited to one to three story buildings. Due to flat topography and consistent building heights, ocean views are generally limited to the first developed block along the coast. Beyond this area, views are blocked by intervening development. Outside of this area, the affected environment may also include resource types with elevated viewing platforms, such as lighthouses or lifesaving stations. Some historic properties have already been identified in Klein et al. (2012); however, additional historic properties are expected to fall within the affected environment.

Conclusion

Under the No Action Alternative, BOEM would not issue any commercial or research wind energy leases in the NY Bight WEAs, and there would be no effects on cultural, historical, and archaeological resources attributable to the Proposed Action. Although leases would not be issued under the No Action Alternative, BOEM expects climate change, ongoing activities, and planned actions to have continuing regional impacts on cultural, historical, and archaeological resources over the timeframe considered in the EA (**Appendix D**).

Ongoing and planned actions could adversely impact potentially significant submerged cultural resources. However, Federal law requires that offshore activities associated with renewable energy development, gas pipelines, and other submarine cable installers submit archaeological survey results and assessment of seafloor impacts to potential submerged cultural resources when bottom-disturbing activities are planned. Submerged cultural resource surveys identify significant resources and support a determination of their National Register of Historic Places eligibility. Based on the results of those surveys and assessments, the planned actions would be designed to avoid impacting known submerged cultural resources or minimize impacts to varying degrees. If potentially significant submerged cultural resources cannot be avoided, other measures to mitigate impacts would be required.

Additionally, ongoing and planned actions have the potential to impact the viewshed of coastal aboveground historic properties with open views in the direction of the NY Bight from the addition of wind energy structures (turbines and offshore substations) and vessels, and associated lighting.

Considering all the IPFs together, BOEM anticipates that the impacts associated with ongoing and reasonably foreseeable planned actions in the geographic analysis area may result in **minor** to **major** adverse impacts. The duration of impacts would range from temporary to permanent, but the extent and frequency of impacts is largely dependent on the unique characteristics of individual cultural, historical, and archaeological resources. If submerged cultural resources can be avoided, the overall effect would be small; if not avoided, the overall effect would be large, and the resource would not be recoverable.

While impacts to cultural, historical, and archaeological resources could range from **minor** to **major**, BOEM anticipates that implementation of existing state and Federal cultural resource laws and regulations would reduce the magnitude of overall impacts on cultural resources due to requirements to avoid, minimize, or mitigate project-specific impacts on cultural resources. These state and Federal requirements may not be able reduce the severity of impacts on some cultural resources due to the unique character of specific resources but would reduce the severity of potential impacts in a majority of cases, resulting in overall **moderate** impacts to cultural resources.

B.2.3 Recreation and Tourism

The analysis for recreation and tourism includes areas within 15 to 45 nm of the coastline of NY and 23 to 69 nm to the coastline of NJ (BOEM 2021). Though many recreation and tourism opportunities exist in inland portions of coastal counties in NJ and NY, the assessment for the EA focuses on the areas located along the shoreline that may depend on coastal settings. In 2012, BOEM conducted a study to identify areas on the Atlantic Coast likely to experience impacts on tourism and recreational economies from offshore wind development (ICF Incorporated LLC 2012), and this study is incorporated in this section by reference. The study identified communities sensitive to impacts on tourism for employment and business and that have relatively higher levels of tourism jobs. The most recent data available by the National Oceanic and Atmospheric Administration (NOAA) on ocean-related jobs linked to recreation and tourism is provided in **Table B-1** for the coastal counties near the WEAs. In all the coastal communities, recreational activities and tourism are a mix of land and ocean activities and attractions, such as bird watching, biking, historic landmarks, swimming, surfing, boating, and fishing. Generally, these activities are anticipated to continue with no discernable trend for the timeframe of the Proposed Action.

Table B-1. Percentage of ocean-related recreation and tourism jobs by county

County/State	Percent of Ocean-Related Recreation and Tourism Jobs
New Jersey	**69.1**
Bergen	83.1
Hudson	72.9
Union	38.8
Middlesex	13.9
Monmouth	94.9
Ocean	94.7
Atlantic	95.9
Cape May	94.9
New York	**91.7**
Kings (also known as Brooklyn)	94.0
Queens	83.8
Nassau	93.6
Suffolk	88.7

Source: NOAA (2015).

Conclusion

Under the No Action Alternative, BOEM would not issue any commercial or research wind energy leases in the NY Bight WEAs, and there would be no effects on recreation and tourism attributable to the Proposed Action. Although leases would not be issued under the No Action Alternative, BOEM expects climate change, ongoing activities, and planned actions to have continuing regional impacts on recreation and tourism over the timeframe considered in the EA (**Appendix D**).

Ongoing actions that may result in impacts to recreation and tourism in the geographic analysis area are primarily marine transportation (commercial shipping), commercial fishing, and military use; however, these activities have co-existed in the NY Bight for a significant amount time. Planned activities described in **Appendix D** may generate increased onshore and offshore 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. These planned actions could also generate increased nearshore and offshore vessel traffic; for wind energy development projects, this increased traffic would primarily occur during construction, along routes between ports and the offshore wind construction areas.

In-water structures (wind turbines and offshore substations) associated with planned offshore wind projects could affect recreation and tourism. 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, and presence of cables and infrastructure. Offshore routes for recreational boaters, anglers, sailboat races, and sightseeing boats could require adjustment to avoid allision risks with in-water structures.

Conversely, 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.

Considering all the IPFs together, BOEM anticipates that the overall impacts associated with ongoing and reasonably foreseeable planned actions in the geographic analysis area may result in **minor** adverse impacts to recreation and tourism, because the overall effect would be small, and the resource would be expected to recover completely.

B.3 Alternative B – Proposed Action/Preferred Alternative

B.3.1 Air Quality and Greenhouse Gas Emissions

Air emission sources for site assessment activities include vessels for site characterization activities and installation, operation, and decommissioning of up to 20 met buoys. Vessel traffic due to site characterization surveys and site assessment activities would add to current vessel traffic levels in NY Bight and to the existing ports used by the survey vessels. The additional vessel activity would be temporary and negligible when compared with existing vessel traffic levels in the region (**Section 4.2.5**). Impacts from criteria pollutant emissions associated with these vessels would be localized within the WEAs and in the vicinity of vessel activity. Estimated potential criteria pollutant emissions and greenhouse gas emissions for the vessel operations were calculated and the results are provided in **Appendix C**. Estimated annual emissions for Years 1–7 are summarized in **Appendix C** (**Table C-1**). The numbers of vessel trips and associated emission calculations, along with the assumptions used to complete the calculations, are provided in **Appendix A**. Air emissions from onshore activities are assumed to be negligible in comparison with the existing activities because existing port facilities would be utilized, and no expansion would be needed of these facilities to accommodate the Proposed Action.

Major source thresholds for the counties closest to the WEAs are as follows:

- 100 tons/year of NO_x (O_3 precursor)
- 50 tons/year of VOCs (O_3 precursor)
- 100 tons/year of CO
- 100 tons/year of PM
- 100 tons/year of SO_2

As indicated in **Appendix C** (**Table C-1**), estimated annual potential criteria pollutant emissions are expected to be less than major source thresholds, are not expected to lead to any violation of the NAAQS, and, therefore, are expected to be **negligible**.

Non-Routine Events

Non-routine events that could affect air quality consist of the recovery of lost equipment through additional vessel traffic. Traffic associated with non-routine activities would likely be from a single vessel for a short duration; impacts are expected to be **negligible**.

Conclusion

As shown in **Table C-1** in **Appendix C**, criteria pollutant concentrations due to emissions from the Proposed Action are not expected to lead to any violation of the NAAQS. The main impact drivers stem from construction of planned wind projects. Although the emissions estimates from the Proposed Action are measurable, they would not be distinguishable from other air emissions onshore or offshore; therefore, criteria pollutant emissions (**Appendix C**) associated with the Proposed Action are expected to be **negligible**.

The incremental impacts under the Proposed Action resulting from individual IPFs are expected to be **negligible** for air quality. BOEM anticipates that the combined overall impacts associated with the Proposed Action and with ongoing and reasonably foreseeable planned actions would be **minor** for air quality in the geographic analysis area because impacts are unavoidable; however, the overall effect is expected to be small, and planned wind projects could generate long-term, beneficial impacts by providing energy to the region from a renewable resource and reducing health events due to onshore criteria pollutant emissions.

B.3.2 Cultural, Historical, and Archaeological Resources

Expected impacts to offshore historic properties during routine activities would be similar to those described in previous EAs (**Table 2-1**; **Section 2.1**). As noted, high-resolution geophysical (HRG) surveys do not create bottom disturbances, and thus impacts would not be expected to occur to historic properties during routine survey. Subsurface geotechnical investigations, benthic sampling, and installation of met buoys would disturb the seabed. However, existing Programmatic Agreements (BOEM 2011; BOEM 2016b), regulatory requirements (e.g., BOEM's *Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585*), and lease stipulations require that a qualified marine archaeologist identify historic properties through analysis of HRG data before bottom disturbance occurs. Consequently, those resources can be avoided during site characterization activities. Implementation of an Unanticipated Discovery Plan in the event submerged cultural resources are encountered during site characterization further reduces the risk of impacts to submerged resources. Accordingly, previous National Environmental Policy Act documentation developed for, or assessing, site characterization and site assessment campaigns have determined that the potential to impact historic properties are expected to be **negligible** (BOEM 2013; BOEM 2014; BOEM 2016a).

The Proposed Action is expected to include the temporary placement of met buoys and other site characterization activities, including geophysical, geotechnical, biological, and oceanographic surveys. These activities have the potential to impact the viewshed of coastal aboveground historic properties with open views in the direction of the WEAs. The physical presence of the temporary buoys (placed a minimum of 15 nm from shore) and increased boat traffic associated with surveys may fall within the viewshed of these properties. Potential impacts from buoys are addressed in the 2016 Programmatic Agreement regarding *Review of Outer Continental Shelf Renewable Energy Activities Offshore New Jersey and New York Under Section 106 of the NHPA*. In stipulation III-B of the Programmatic Agreement, stakeholder signatories agreed that the placement of met buoys should be exempt from Section 106 review. The Programmatic Agreement reasons that the buoys would have "no effect on onshore historic properties since they are temporary in nature and indistinguishable from lighted vessel traffic." This conclusion presented in the Programmatic Agreement demonstrates stakeholder concurrence that the placement of met buoys are expected to result in **negligible** impacts to aboveground historic properties. Potential increased vessel traffic associated with site characterization surveys also would be temporary in nature. These vessels would be indistinguishable from existing vessel traffic and only result in a nominal increase in vessel traffic over the 5- to 7-year span of activities. Because the vessel traffic would be both temporary and indistinguishable in nature, it is expected to have a **negligible** impact to aboveground historic properties.

Non-routine Events

The retrieval of lost equipment could result in seafloor disturbance that could impact potential historic properties. Lost equipment may be located and/or retrieved through dragging anchors or some other form of grapnel tool across the seafloor. Such activities have the potential to impact submerged cultural resources by disturbing the bottom during search and retrieval. Regardless, the potential for recovery operations to interact with submerged cultural resources is extremely unlikely given the expanse of the proposed WEAs and transmission cable routes, and the limited area affected by recovery operations; therefore, impacts are expected to be **negligible**. However, potential impacts could be lessened or avoided if potential historic properties that have already been identified are avoided during retrieval, or, if geophysical data exists for the area, it could be reviewed to identify potential resources.

Conclusion

Overall, impacts to cultural, historical, and archaeological resources are expected to be **negligible**. Impacts to submerged historic properties from site characterization activities are expected to be **negligible** given the geophysical surveying requirements and lease conditions discussed above. Impacts to submerged historic properties from installation of met buoys are expected to be **negligible**, as avoidance would be required by BOEM. If avoidance of potential historic properties is not feasible, BOEM will continue its Section 106 consultation (**Section 6.2.6**) to resolve adverse effects. Vessel traffic associated with the Proposed Action would be indistinguishable from existing vessel traffic and short-term. Therefore, impacts to onshore historic properties from site characterization activities are expected to be **negligible**.

The incremental impacts under the Proposed Action resulting from individual IPFs would be **negligible** for cultural, historical, and archaeological resources. BOEM anticipates that the combined overall impacts associated with the Proposed Action and with ongoing and reasonably foreseeable planned actions would be **moderate** for cultural, historical, and archaeological resources in the geographic analysis area. BOEM anticipates that implementation of existing state and Federal cultural resource laws and regulations would reduce the magnitude of overall impacts on cultural resources due to requirements to avoid, minimize, or mitigate project-specific impacts on cultural resources leading to a reduction in the severity of potential impacts in a majority of cases.

B.3.3 Recreation and Tourism

Impacts on recreational resources and tourism are not anticipated in connection with the Proposed Action. It is anticipated that the number of vessels associated with the Proposed Action would be nominal relative to existing vessel traffic in the geographic analysis area. As discussed in **Section 3.3**, existing ports or industrial areas are expected to be used by vessels associated with the Proposed

Action, and expansion of these existing facilities is not anticipated. Due to the distance to shore of the WEAs, it is estimated that the met buoys would not be visible from shore or would be indistinguishable from existing vessel traffic (**Section 4.3.5**). It is most likely that vessel traffic associated with Proposed Action would use established vessel traffic lanes. As tourism and recreation exists in its current state in the context of existing military, commercial, and recreational water and air vessels that currently traverse these coastal areas, it is unlikely that there would be any detrimental impact on tourism and recreation from the nominal additional vessels associated with the Proposed Action.

Non-Routine Events

Non-routine events that could affect recreation and tourism consist of the recovery of lost equipment through additional vessel traffic. Traffic associated with non-routine activities would likely be from a single vessel for a short duration and therefore are expected to be **negligible**.

Conclusion

Impacts on recreation and tourism resulting from routine and non-routine activities would be short-term and are expected to be **negligible**. No new onshore coastal construction would occur under the Proposed Action, and the amount of vessel traffic associated with the Proposed Action is expected to be relatively minimal, thereby limiting vessel traffic.

The incremental impacts under the Proposed Action resulting from individual IPFs would be **negligible** for recreation and tourism. BOEM anticipates that the combined overall impacts associated with the Proposed Action and with ongoing and reasonably foreseeable planned actions would be **minor** for recreation and tourism in the geographic analysis area. The overall effect would be small, and the resource would be expected to recover completely, with no mitigating action required. Both short- and long-term impacts would result from the Proposed Action in combination with other reasonably foreseeable planned actions, including short-term noise disturbances affecting the potentially serene character of some recreational areas, especially during construction activities. Some navigation hindrances could occur that would impact recreational boating and fishing. However, some long-term, beneficial impacts could result from the reef effect of offshore wind energy and other in-water structures, which would provide additional hard habitat for marine species and landing areas for birds, thereby potentially enhancing recreational birding, sightseeing, and fishing activities.

B.4 References

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Appendix C: Air Emissions Calculations

This appendix provides air emissions calculations to support the analysis of air quality and greenhouse gas emissions presented in **Appendix B**. **Tables C-1 and C-2** provide emission summaries and **Tables C-3 through C-9** provide emissions calculations for the analyzed site characterization and site assessment activities.

Table C-1. Summary of annual emissions by activity

Action Alternative	Year	Activity/Year	CO	NO_x	VOC	$PM_{2.5}$	PM_{10}	SO_x	CO_2	N_2O	CH_4	CO_{2e}
			Emissions (tons/year)						Emissions (metric tons/year)			
A	No Action	No Action	No Action and, therefore, no emissions									
B	Year 1	Site Characterization: HRG Surveys Site Characterization: Geotech and Benthic Surveys Site Characterization: Biologic Surveys	7.44	89.24	3.38	4.72	4.87	0.01	4,231.99	0.12	0.55	4,282.34
	Year 2	Site Characterization: HRG Surveys Site Characterization: Geotech and Benthic Surveys Site Characterization: Biologic Surveys Site Assessment: Meteorological Buoy Installations Site Assessment: Meteorological Buoy Operations	7.61	91.32	3.46	4.83	4.98	0.01	4,330.26	0.13	0.56	4,381.78
	Year 3	Site Characterization: HRG Surveys Site Characterization: Geotech and Benthic Surveys Site Characterization: Biologic Surveys Site Assessment: Meteorological Buoy Operations	7.54	90.43	3.43	4.78	4.93	0.01	4,288.14	0.12	0.56	4,339.17
	Year 4	Site Characterization: HRG Surveys Site Characterization: Geotech and Benthic Surveys Site Characterization: Biologic Surveys Site Assessment: Meteorological Buoy Operations	7.54	90.43	3.43	4.78	4.93	0.01	4,288.14	0.12	0.56	4,339.17
	Year 5	Site Characterization: HRG Surveys Site Characterization: Geotech and Benthic Surveys Site Characterization: Biologic Surveys Site Assessment: Meteorological Buoy Operations	7.54	90.43	3.43	4.78	4.93	0.01	4,288.14	0.12	0.56	4,339.17
	Year 6	Site Assessment: Meteorological Buoy Operations	0.10	1.18	0.04	0.06	0.06	0.00	56.15	0.00	0.01	56.82
	Year 7	Site Assessment: Meteorological Buoy Decommissioning	0.07	0.89	0.03	0.05	0.05	0.00	42.11	0.00	0.01	42.62

CO = carbon monoxide; CO_2 = carbon dioxide; CO_{2e} = carbon dioxide equivalents; CH_4 = methane; HRG = high-resolution geophysical; N_2O = nitrogen dioxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less; PM_{10} = particulate matter with aerodynamic diameters of 10 microns or less; SO_x = sulfur oxides; VOC = volatile organic compounds

This appendix and its calculations are adapted from Appendix D of *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York: Revised Environmental Assessment (NY EA)*. BOEM 2016-070, October 2016. Available at www.boem.gov/renewable-energy/state-activities/lease-ocs-0512

Assumptions, data, table footnotes, and references—other than NY/NJ-specific lease area, port locations, vessel trip volumes, and distances—are taken from the NY EA

Assumes site characterization activities would take place equally over Years 1–5 and the meteorological buoys would be installed in Year 2, operate in Years 2–6, and be decommissioned in Year 7

Table C-2. Detailed emission estimation of annual emissions by activities for an average year

Emissions Summary for Average Year – Alternative B

Phase/Source Description	Emissions (tons/year)						Emissions (metric tons/year)			
	CO	NO_x	VOC	$PM_{2.5}$	PM_{10}	SO_x	CO_2	N_2O	CH_4	CO_{2e}
Surveys										
Site Characterization—Offshore Surveys										
Vessel Travel - HRG	2.91	34.89	1.32	1.85	1.90	0.00	1,654.49	0.05	0.22	1,674.17
Vessel Travel - Geotech and Benthic	1.36	16.34	0.62	0.86	0.89	0.00	774.98	0.02	0.10	784.20
Vessel Travel - Biologic	3.17	38.01	1.44	2.01	2.07	0.00	1,802.52	0.05	0.24	1,823.97
Site Characterization—Per Year from Years 1–5	**7.44**	**89.24**	**3.38**	**4.72**	**4.87**	**0.01**	**4,231.99**	**0.12**	**0.55**	**4,282.34**
Meteorological Buoys										
Site Assessment—Installation										
Vessel Travel	0.07	0.89	0.03	0.05	0.05	0.00	42.11	0.00	0.01	42.62
Site Assessment—Installation Year 2	**0.07**	**0.89**	**0.03**	**0.05**	**0.05**	**0.00**	**42.11**	**0.00**	**0.01**	**42.62**
Site Assessment—Offshore O&M										
Vessel Travel	0.10	1.18	0.04	0.06	0.06	0.00	56.15	0.00	0.01	56.82
Site Assessment—O&M Per Year from Years 2–6	**0.10**	**1.18**	**0.04**	**0.06**	**0.06**	**0.00**	**56.15**	**0.00**	**0.01**	**56.82**
Site Assessment—Offshore Decommission[1]										
Vessel Travel	0.07	0.89	0.03	0.05	0.05	0.00	42.11	0.00	0.01	42.62
SUBTOTAL Decommissioning—Year 7	**0.07**	**0.89**	**0.03**	**0.05**	**0.05**	**0.00**	**42.11**	**0.00**	**0.01**	**42.62**

CO = carbon monoxide; CO_2 = carbon dioxide; CO_{2e} = carbon dioxide equivalents; CH_4 = methane; HRG = high-resolution geophysical; N_2O = nitrogen dioxide; NO_x = nitrogen oxides; O&M = operations and maintenance; $PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less; PM_{10} = particulate matter with aerodynamic diameters of 10 microns or less; SO_x = sulfur oxides; VOC = volatile organic compounds

1. Assumes potential emissions for meteorological buoy decommissioning are the same as for installation

Table C-3. Site characterization activities – offshore surveys

Survey Vessel Details

Survey Task	Vessel Type	Alternative B					
		Total No. of Vessel Round Trips	Duration of Survey Task (years)	No. of Vessel Round Trips (per year)[3]	Avg. Miles Per Round Trip (nautical miles)[4]	Total (nautical miles/year)[5]	Activity (hours/year)[6]
HRG Survey - Export Cable Routes	Crew Boat	-	5	-	-	8,785	1,952
HRG Survey - Total Backbone	Crew Boat	-	5	-	-	2,495	555
HRG Surveys - Lease Areas	Crew Boat	-	5	-	-	17,951	3,989
Geotechnical Sampling[1]	Small Tug Boat	-	5	-	-	19,434	1,620
Avian Surveys[2,7]	Crew Boat	360	5	72	130	9,330	933
Fish Surveys[7]	Crew Boat	-	5	-	-	19,046	6,144
Marine Mammal Surveys[8]	Crew Boat	-	-	-	-	-	-

HRG = high-resolution geophysical

1. Assumes all round trips over the 5-year period were performed using Small Tug Boat in conjunction with Small Cargo Barge, which does not have an engine
 Assumes geotechnical and benthic sampling occur concurrently for export cable
 Assumes 12 megawatt turbines resulting in 816 total turbines for the lease areas
2. Assumes all avian surveys completed by boat to obtain worst-case scenario
3. Round trips per year estimated by dividing total round trips per task by the number of years over which the surveys would be conducted
4. Average miles per round trip was calculated by averaging the round trip to the centroid of each lease area from the nearest of the potential staging ports identified within the environmental assessment
5. Distances for HRG survey and HRG survey cable routes are based on vessel-hours and speed. Distances for other surveys based on calculated round trips multiplied by average round trip nautical miles
6. Assumes the following average speeds to estimated activity hours based on total nautical miles traveled

HRG Survey	4.5	knots	
Tugs Boats/Barges	12	knots	
Avian Survey	10	knots	
Fish Survey	3.1	knots	(average trawl speed)

 No time for the vessels spent at idle was captured in this calculation
7. Avian surveys are 3 years/lease area   Fish surveys are 2 years/lease area
 Assumes avian and fish surveys occur over 5 years over all lease areas
8. Assumes marine mammal/sea turtle survey conducted concurrent with vessel-based surveys

Table C-4. Estimated annual emissions for vessels from HRG site characterization survey activities

Emission Factors for Vessels

Vessel Type	Engine Size (hp)	Engine Power (kW)[1]	Emission Factors (g/kW-hr)[3] Load Factor (%)[2]	CO	NO_x	VOC	$PM_{2.5}$[4]	PM_{10}	SO_x[5]	CO_2	N_2O	CH_4
Crew Boat	1,000	746	45%	1.1	13.2	0.5	0.70	0.72	0.001	690	0.02	0.09

CO = carbon monoxide; CO_2 = carbon dioxide; CH_4 = methane; g/kW-hr = grams per kilowatt-hour; hp = horsepower; kW = kilowatt; N_2O = nitrogen dioxide; NO_x = nitrogen oxides;
$PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less; PM_{10} = particulate matter with aerodynamic diameters of 10 microns or less; SO_x = sulfur oxides; VOC = volatile organic compounds

1. Engine power (kW) estimated by dividing horsepower by a factor of 1.341
2. Load factor based upon Table 3.4 of *Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories*, U.S. EPA, April 2009
 Table 3-1 describes both crew boats and tug boats as Harbor Vessels; therefore, load factors are for Harbor Vessels
3. Emission factors were provided in the *Current Methodologies* document, Table 3-8. Tier 0, Category 2 (typically between 1,000 and 3,000 kW) factors were used for both types of boats since the crew boat is almost within that category, and it provides a conservative assumption for pollutants for which the areas are in non-attainment
4. Assumes PM2.5 = 97% PM10 based upon the Current Methodologies document
5. SO_x emission factor estimated based on sulfur content of 15 ppm and the *Current Methodologies* document

Emissions from Vessels – Average Year Over 5 Years

Alternative	Vessel Type	Emissions (tons/year, metric tons/year for GHG pollutants)[1,2] CO	NO_x	VOC	$PM_{2.5}$	PM_{10}	SO_x	CO_2	N_2O	CH_4	CO_{2e}[3]
Alternative B	Crew Boat - Export Cable Routes	0.87	10.49	0.40	0.55	0.57	0.00	497.25	0.01	0.06	503.17
	Crew Boat - Backbone	0.25	2.98	0.11	0.16	0.16	0.00	141.24	0.00	0.02	142.92
	Crew Boat - Lease Area	1.79	21.43	0.81	1.13	1.17	0.00	1,016.00	0.03	0.13	1,028.09
	TOTAL	**2.91**	**34.89**	**1.32**	**1.85**	**1.90**	**0.00**	**1,654.49**	**0.05**	**0.22**	**1,674.17**

CO = carbon monoxide; CO_2 = carbon dioxide; CH_4 = methane; GHG = greenhouse gas; g/kW-hr = grams per kilowatt-hour; hp = horsepower; kW = kilowatt; N_2O = nitrogen dioxide; NO_x = nitrogen oxides;
$PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less; PM_{10} = particulate matter with aerodynamic diameters of 10 microns or less; SO_x = sulfur oxides; VOC = volatile organic compounds

1. Emissions quantified using the following equation:
   Emissions (tons) = Engine Power Rating (kW) x Load Factor (%) x Activity (hrs) x Emission Factor (g/kW-hr) x Power Adjustment ÷ 453.59 ÷ 2,000 (or 2,204.62)
 For GHG pollutants CO_2, N_2O, and CH_4, emissions are in metric tons
2. Power adjustment of 1.1 was assumed for a crew boat to account for auxiliary engines based upon Table 3.10 of the *Current Methodologies* document
3. Global Warming Potential CO_2 1 N_2O 298 CH_4 25 USEPA 40 CFR 98 Table A-1 (5/19)

Table C-5. Estimated annual emissions for vessels from geotechnical and benthic site characterization survey activities

Emission Factors for Vessels

Vessel Type	Engine Size (hp)	Engine Power (kW)[1]	Emission Factors (g/kW-hr)[3]									
			Load Factor (%)[2]	CO	NO_x	VOC	$PM_{2.5}$[4]	PM_{10}	SO_x[5]	CO_2	N_2O	CH_4
Small Tug Boat	2,000	1,491	31%	1.1	13.2	0.5	0.70	0.72	0.001	690	0.02	0.09

CO = carbon monoxide; CO_2 = carbon dioxide; CH_4 = methane; g/kW-hr = grams per kilowatt-hour; hp = horsepower; kW = kilowatt; N_2O = nitrogen dioxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less; PM_{10} = particulate matter with aerodynamic diameters of 10 microns or less; SO_x = sulfur oxides; VOC = volatile organic compounds

1. Engine power (kW) estimated by dividing horsepower by a factor of 1.341
2. Load factor based upon Table 3.4 of *Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories*, U.S. EPA, April 2009
 Table 3-1 describes both crew boats and tug boats as Harbor Vessels; therefore, load factors are for Harbor Vessels
3. Emission factors were provided in the *Current Methodologies* document, Table 3-8. Tier 0, Category 2 (typically between 1,000 and 3,000 kW) factors were used for the tug boat
4. Assumes $PM_{2.5}$ = 97% PM_{10} based upon the Current Methodologies document
5. SO_x emission factor estimated based on sulfur content of 15 ppm and the *Current Methodologies* document

Emissions from Vessels – Average Year Over 5 Years

Alternative	Vessel Type	Emissions (tons/year, metric tons/year for GHG pollutants)[1,2]									
		CO	NO_x	VOC	$PM_{2.5}$	PM_{10}	SO_x	CO_2	N_2O	CH_4	CO_{2e}[3]
B	Small Tug Boat	1.36	16.34	0.62	0.86	0.89	0.00	774.98	0.02	0.10	784.20
	TOTAL	**1.36**	**16.34**	**0.62**	**0.86**	**0.89**	**0.00**	**774.98**	**0.02**	**0.10**	**784.20**

CO = carbon monoxide; CO_2 = carbon dioxide; CH_4 = methane; g/kW-hr = grams per kilowatt-hour; hp = horsepower; kW = kilowatt; N_2O = nitrogen dioxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less; PM_{10} = particulate matter with aerodynamic diameters of 10 microns or less; SO_x = sulfur oxides; VOC = volatile organic compounds

1. Emissions quantified using the following equation: Emissions (tons) = Engine Power Rating (kW) x Load Factor (%) x Activity (hrs) x Emission Factor (g/kW-hr) x Power Adjustment ÷ 453.59 ÷ 2,000 (or 2,204.62)
 For GHG pollutants CO_2, N_2O, and CH_4, emissions are in metric tons
2. Power adjustment of 1.1 was assumed for a crew boat to account for auxiliary engines based upon Table 3.10 of the *Current Methodologies* document
3. Global Warming Potential CO_2 1 N_2O 298 CH_4 25 USEPA 40 CFR 98 Table A-1 (5/19)

Table C-6. Estimated annual emissions for vessels from biological site characterization survey activities

Emission Factors for Vessels

Vessel Type	Engine Size (hp)	Engine Power (kW)[1]	Load Factor (%)[2]	Emission Factors (g/kW-hr)[3]								
				CO	NO_x	VOC	$PM_{2.5}$[4]	PM_{10}	SO_x[5]	CO_2	N_2O	CH_4
Crew Boat	1,000	746	45%	1.1	13.2	0.5	0.70	0.72	0.001	690	0.02	0.09

CO = carbon monoxide; CO_2 = carbon dioxide; CH_4 = methane; g/kW-hr = grams per kilowatt-hour; hp = horsepower; kW = kilowatt; N_2O = nitrogen dioxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less; PM_{10} = particulate matter with aerodynamic diameters of 10 microns or less; SO_x = sulfur oxides; VOC = volatile organic compounds

1. Engine power (kW) estimated by dividing horsepower by a factor of 1.341
2. Load factor based upon Table 3.4 of *Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories*, U.S. EPA, April 2009
 Table 3-1 describes both crew boats and tug boats as Harbor Vessels; therefore, load factors are for Harbor Vessels
3. Emission factors were provided in the *Current Methodologies* document, Table 3-8. Tier 0, Category 2 (typically between 1,000 and 3,000 kW) factors were used for both types of boats since the crew boat is almost within that category, and it provides a conservative assumption for pollutants for which the areas are in non-attainment
4. Assumes $PM_{2.5}$ = 97% PM_{10} based upon the Current Methodologies document
5. SO_x emission factor estimated based on sulfur content of 15 ppm and the *Current Methodologies* document

Emissions from Vessels – Average Year Over 5 Years

Alternative	Vessel Type	Emissions (tons/year, metric tons/year for GHG pollutants)[1,2]									
		CO	NO_x	VOC	$PM_{2.5}$	PM_{10}	SO_x	CO_2	N_2O	CH_4	CO_{2e}[4]
Alternative B	Crew Boat - Avian Surveys	0.42	5.01	0.19	0.27	0.27	0.00	237.65	0.01	0.03	240.47
	Crew Boat - Fish Surveys	2.75	33.00	1.25	1.75	1.80	0.00	1,564.87	0.05	0.20	1,583.49
	Crew Boat - Marine Mammals Survey[3]	-	-	-	-	-	-	-	-	-	-
	TOTAL	**3.17**	**38.01**	**1.44**	**2.01**	**2.07**	**0.00**	**1,802.52**	**0.05**	**0.24**	**1,823.97**

CO = carbon monoxide; CO_2 = carbon dioxide; CH_4 = methane; g/kW-hr = grams per kilowatt-hour; hp = horsepower; kW = kilowatt; N_2O = nitrogen dioxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less; PM_{10} = particulate matter with aerodynamic diameters of 10 microns or less; SO_x = sulfur oxides; VOC = volatile organic compounds

1. Emissions quantified using the following equation: Emissions (tons) = Engine Power Rating (kW) x Load Factor (%) x Activity (hrs) x Emission Factor (g/kW-hr) x Power Adjustment ÷ 453.59 ÷ 2,000 (or 2,204.62)
 For GHG pollutants CO_2, N_2O, and CH_4, emissions are in metric tons
2. Power adjustment of 1.1 was assumed for a crew boat to account for auxiliary engines based upon Table 3.10 of the *Current Methodologies* document
3. Assumes marine mammal surveys conducted concurrent with vessel-based surveys
4. Global Warming Potential CO_2 1 N_2O 298 CH_4 25 USEPA 40 CFR 98 Table A-1 (5/19)

Table C-7. Offshore site assessment activities

Vessel Details for Installation of Buoys

Vessel Type	Total No. of Vessel Round Trips/Year[1]	Avg. Miles Per Round Trip (nautical miles)	Total (nautical miles/year)	Activity (hours/year)[2]
Crew Boat	20	99	1,984	165

1. Assumes 1 trip/buoy, 2 buoys/lease area, 10 lease areas
2. Assumes an average speed of 12 knots for the crew boat
   Activity hours based upon total nautical miles traveled
   No time for the vessels spent at idle at the buoys was captured in this calculation

Vessel Details for Operation and Maintenance of Buoys

Vessel Type	Total No. of Vessel Round Trips/Year[1]	Avg. Miles Per Round Trip (nautical miles)	Total (nautical miles/year)	Activity (hours/year)[2]
Crew Boat	40	99	3,968	220

1. Assumes 1 trip/buoy pair, 4 times per year, 10 lease areas
2. Assumes an average speed of 18 knots for the crew boat
   Activity hours based upon total nautical miles traveled
   No time for the vessels spent at idle at the buoys was captured in this calculation
   Assumes buoys are operational for 5 years

Table C-8. Estimated annual emissions for vessels from meteorological buoy installation as a part of site assessment activities

Emission Factors for Vessels

Vessel Type	Engine Size (hp)	Engine Power (kW)[2]	Emission Factors (g/kW-hr)[4]									
			Load Factor (%)[3]	CO	NO_x	VOC	$PM_{2.5}$[5]	PM_{10}	SO_x[6]	CO_2	N_2O	CH_4
Crew Boat[1]	1,000	746	45%	1.1	13.2	0.5	0.70	0.72	0.001	690	0.02	0.09

CO = carbon monoxide; CO_2 = carbon dioxide; CH_4 = methane; g/kW-hr = grams per kilowatt-hour; hp = horsepower; kW = kilowatt; N_2O = nitrogen dioxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less; PM_{10} = particulate matter with aerodynamic diameters of 10 microns or less; SO_x = sulfur oxides; VOC = volatile organic compounds

1. Supply vessels are typically used to deploy meteorological buoys, assume similar emission factors to crew boat as listed in same category in *Current Methodologies*
2. Engine power (kW) estimated by dividing horsepower by a factor of 1.341
3. Load factor based upon Table 3.4 of *Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories*, U.S. EPA, April 2009
 Table 3-1 describes crew boats as Harbor Vessels; therefore, the load factor is for Harbor Vessels
4. Emission factors were provided in the *Current Methodologies* document, Table 3-8. Tier 0, Category 2 (typically between 1,000 and 3,000 kW) factors were used for the crew boat since it is almost within that category, and it provides a conservative assumption for pollutants for which the areas are in non-attainment
5. Assumes $PM_{2.5}$ = 97% PM_{10} based upon the Current Methodologies document
6. SO_x emission factor estimated based on sulfur content of 15 ppm and the *Current Methodologies* document

Emissions from Vessels – One Year

Vessel Type	Emissions (tons/year, metric tons/year for GHG pollutants)[1,2]									
	CO	NO_x	VOC	$PM_{2.5}$	PM_{10}	SO_x	CO_2	N_2O	CH_4	CO_{2e}[3]
Crew Boat	0.07	0.89	0.03	0.05	0.05	0.00	42.11	0.00	0.01	42.62
TOTAL	**0.07**	**0.89**	**0.03**	**0.05**	**0.05**	**0.00**	**42.11**	**0.00**	**0.01**	**42.62**

CO = carbon monoxide; CO_2 = carbon dioxide; CH_4 = methane; g/kW-hr = grams per kilowatt-hour; hp = horsepower; kW = kilowatt; N_2O = nitrogen dioxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less; PM_{10} = particulate matter with aerodynamic diameters of 10 microns or less; SO_x = sulfur oxides; VOC = volatile organic compounds

1. Emissions quantified using the following equation: Emissions (tons) = Engine Power Rating (kW) x Load Factor (%) x Activity (hrs) x Emission Factor (g/kW-hr) x Power Adjustment ÷ 453.59 ÷ 2,000 (or 2,204.62)
 For GHG pollutants CO_2, N_2O, and CH_4, emissions are in metric tons
2. Power adjustment of 1.1 was assumed for a crew boat to account for auxiliary engines based upon Table 3.10 of the *Current Methodologies* document
3. Global Warming Potential CO_2 1 N_2O 298 CH_4 25 USEPA 40 CFR 98 Table A-1 (5/19)

Table C-9. Offshore site assessment activities – routine maintenance and evaluation

Maintenance Vessel Details

Task	Vessel Type	Total No. of Vessel Round Trips[1]	Duration of Task (years)	No. of Vessel Round Trips (per year)	Avg. Miles Per Round Trip (nautical miles)	Total (nautical miles/year)	Activity (hours/year)[2]
Routine Maintenance	Crew Boat	200	5	40	99	3,968	220

1. Assumes 1 trip/buoy, 2 buoys/lease area, 10 lease areas
2. Assumes an average speed of 12 knots for the crew boat
   Activity hours based upon total nautical miles traveled
   No time for the vessels spent at idle at the buoys was captured in this calculation

Emission Factors for Vessels

			Emission Factors (g/kW-hr)[3]									
Vessel Type	Engine Size (hp)	Engine Power (kW)[1]	Load Factor (%)[2]	CO	NO_x	VOC	$PM_{2.5}$[4]	PM_{10}	SO_x[5]	CO_2	N_2O	CH_4
Crew Boat	1,000	746	45%	1.1	13.2	0.5	0.70	0.72	0.001	690.0	0.02	0.09

CO = carbon monoxide; CO_2 = carbon dioxide; CH_4 = methane; g/kW-hr = grams per kilowatt-hour; hp = horsepower; kW = kilowatt; N_2O = nitrogen dioxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less; PM_{10} = particulate matter with aerodynamic diameters of 10 microns or less; SO_x = sulfur oxides; VOC = volatile organic compounds

1. Engine power (kW) estimated by dividing horsepower by a factor of 1.341
2. Load factor based upon Table 3.4 of *Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories*, U.S. EPA, April 2009
   Table 3-1 describes crew boats as Harbor Vessels; therefore, the load factor is for Harbor Vessels
3. Emission factors were provided in the *Current Methodologies* document, Table 3-8. Tier 0, Category 2 (typically between 1,000 and 3,000 kW) factors were used for the crew boat since it is almost within that category, and it provides a conservative assumption for pollutants for which the areas are in non-attainment
4. Assumes $PM_{2.5}$ = 97% PM_{10} based upon the Current Methodologies document
5. SO_x emission factor estimated based on sulfur content of 15 ppm and the *Current Methodologies* document

Emissions from Vessels – Average Year Over 5 Years

Vessel Type	Emissions (tons/year, metric tons/year for GHG pollutants)[1,2]									
	CO	NO_x	VOC	$PM_{2.5}$	PM_{10}	SO_x	CO_2	N_2O	CH_4	CO_{2e}[3]
Crew Boat	0.10	1.18	0.04	0.06	0.06	0.00	56.15	0.00	0.01	56.82
TOTAL	**0.10**	**1.18**	**0.04**	**0.06**	**0.06**	**0.00**	**56.15**	**0.00**	**0.01**	**56.82**

CO = carbon monoxide; CO_2 = carbon dioxide; CO_{2e} = carbon dioxide equivalents; CH_4 = methane; GHG = greenhouse gas; N_2O = nitrogen dioxide; NO_x = nitrogen oxides; $PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less; PM_{10} = particulate matter with aerodynamic diameters of 10 microns or less; SO_x = sulfur oxides; VOC = volatile organic compounds

1. Emissions quantified using the following equation: Emissions (tons) = Engine Power Rating (kW) x Load Factor (%) x Activity (hrs) x Emission Factor (g/kW-hr) x Power Adjustment ÷ 453.59 ÷ 2,000 (or 2,204.62)

For GHG pollutants CO_2, N_2O, and CH_4, emissions are in metric tons

2. Power adjustment of 1.1 was assumed for a crew boat to account for auxiliary engines based upon Table 3.10 of the *Current Methodologies* document
3. Global Warming Potential CO_2 1 N_2O 298 CH_4 25 USEPA 40 CFR 98 Table A-1 (5/19)

Appendix D: Planned Action Scenario

D.1 Introduction

This appendix discusses resource-specific ongoing and reasonably foreseeable planned actions that could occur if impacts from the Proposed Action occur in the same location and timeframe as impacts from these other actions. The Proposed Action is issuance of commercial and research wind energy leases within the Wind Energy Areas (WEAs) that the Bureau of Ocean Energy Management (BOEM) has designated on the Outer Continental Shelf (OCS) in the New York Bight (NY Bight) (defined as an offshore area extending generally northeast from Cape May in New Jersey [NJ] to Montauk Point on the eastern tip of Long Island, NY) and the granting of rights-of-way (ROWs) and rights-of-use and easement (RUEs) in support of wind energy development.

BOEM used a localized geographic scope to evaluate impacts from planned actions for resources that are fixed in nature (i.e., their location is stationary such as benthic and archaeological resources), or for resources where impacts from the Proposed Action would only occur in waters in and directly around the NY Bight proposed lease areas (e.g., water quality). This scope includes potential activities that would occur on the Atlantic OCS offshore NY and NJ, as well as activities that would take place in state waters (**Figure 1-1** of the environmental assessment [EA]). However, the geographic boundaries for the analysis for marine mammals, sea turtles, fish/fishing, and birds include the entire NY Bight and some waters offshore Rhode Island and Massachusetts to the north and Delaware to the south given their migratory nature (**Figure D-1**). Additionally, the area for cultural, historical, and archaeological resources encompasses the depth and breadth of the seabed between shore and the WEAs as far south as a line drawn between the southwestern corner of the Hudson South WEA to Cape May, NJ, and as far north as a line drawn between the northeastern corner of the Fairways North WEA to the eastern edge of Narragansett Bay. BOEM has not defined onshore areas from which the site characterization activities would be visible as part of the study area, because BOEM has concluded that the equipment and vessels performing these activities would be indistinguishable from existing lighted vessel traffic from an observer onshore. In addition, there is no indication that the issuance of a lease or grant of a RUE or ROW and subsequent site characterization would involve expansion of existing port infrastructure. Therefore, onshore staging activities are not considered as part of the cultural, historical, and archaeological resources study area. This scenario addresses ongoing and planned actions occurring between the start of Proposed Action activities in 2022 and the completion of decommissioning of meteorological (met) buoys in 2027 or 2028, depending on when the leases are issued.

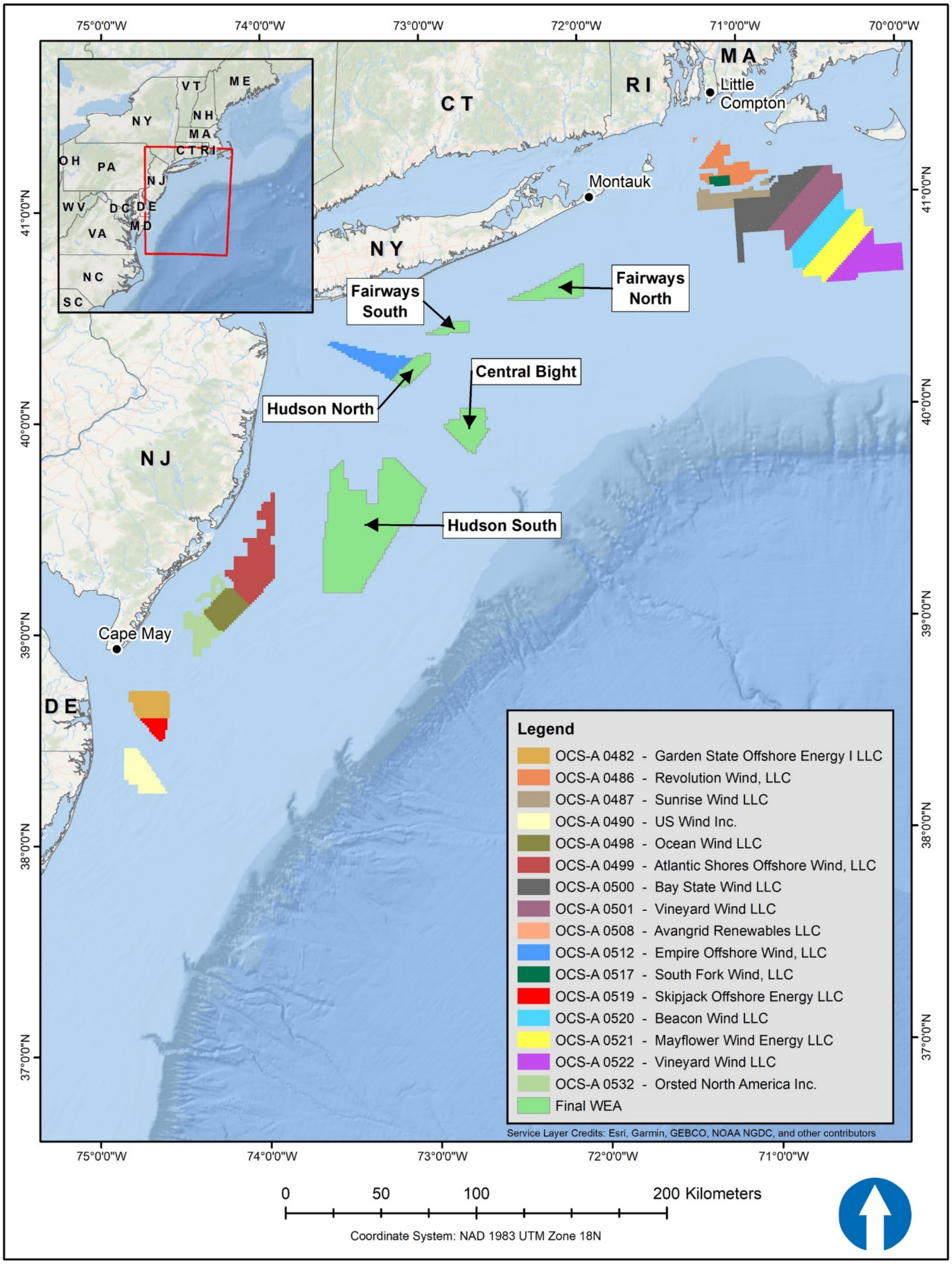

Figure D-1. New York Bight Wind Energy Areas (WEAs) shown with the geographic analysis area considered for migratory species along with other wind energy development activities

D.2 Ongoing and Reasonably Foreseeable Planned Actions

This section includes a list of the projects and the impact-producing factors (IPFs) that BOEM has identified as potentially contributing to reasonably foreseeable impacts when combined with impacts from the Proposed Action over the geography and time scale described above. Reasonably foreseeable planned actions, which are discussed below, include eight types of actions: (1) other wind energy development activities, such as site characterization surveys; site assessment activities; and construction, operation, and decommissioning of wind energy facilities; (2) hydrokinetic projects; (3) undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); (4) marine minerals use and ocean dredged material disposal; (5) military use; (6) marine transportation; (7) fisheries use and management; and (8) global climate change.

BOEM has completed a study of IPFs on the North Atlantic OCS to consider in an offshore wind development impacts scenario for ongoing and reasonably foreseeable planned actions (Avanti Corporation and Industrial Economics Inc. 2019). 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. Other documents that provide additional information on planned actions in the region include the 2016 New York EA (BOEM 2016), the South Fork Wind Farm and South Fork Export Cable Project Draft Environmental Impact Statement (EIS) (BOEM 2021c), and the Vineyard Wind 1 Offshore Wind Energy Project Final EIS (BOEM 2021d). However, the South Fork and Vineyard Wind EIS documents consider projects much larger in scope than the Proposed Action.

IPFs associated with the Proposed Action include:

- Increased vessel presence and traffic resulting in associated noise, air emissions, lighting, vessel discharges; the potential for strikes and spills; and the potential for increased aircraft traffic from biological surveys and associated noise, lighting, and air emissions
- Additional underwater noise associated with high-resolution geophysical survey activities
- Installation and decommissioning of met buoys, geotechnical/sub-bottom sampling, and biological survey activities resulting in bottom disturbance
- Space-use conflicts during survey activities
- Presence of structures resulting in a fish aggregating device effect and entanglement in buoy or anchor components

The eight types of actions listed above are anticipated to all result in IPFs that overlap both spatially and temporally with the Proposed Action and that would affect the same resources. BOEM (2019) provides additional information about the IPFs associated with each action. The eight types of activities that make up the Planned Actions Scenario are described in the following sections.

D.2.1 Other Wind Energy Development Activities

These activities would include site characterization surveys and site assessment activities (like the Proposed Action), as well as construction and operation of wind turbines for any other wind energy projects in the timeframe that overlaps with the Proposed Action (2022–2027/2028). **Table D-1** provides a list of these Atlantic offshore wind development projects, which are also shown in **Figure D-1**.

Table D-1. Ongoing and planned wind energy development in the geographic analysis area

Region	Lease	Lease/Project/Lease Remainder	Status	Estimated Offshore Construction Schedule
NE	n/a	Aquaventis (state waters)	State project	2022
NE	n/a	Block Island (state waters)	Built	Built
MA/RI	OCS-A 0501	Vineyard Wind 1, part of OCS-A 0501	FEIS, ROD	2022–2024
MA/RI	OCS-A 0501	Vineyard Wind South OCS-A 0501 remainder (includes Park City Wind)	COP, PPA	2024–2025
MA/RI	OCS-A 0517	South Fork, part of OCS-A 0517	COP, PPA	2022–2023
MA/RI	OCS-A 0500 and OCS-A 0487	Sunrise, parts of OCS-A 0500 and OCS-A 0487	COP, PPA	2023–2024
MA/RI	OCS-A 0500	Bay State Wind Project, part of OCS-A 0500	COP (unpublished)	By 2030, spread over 2025–2030
MA/RI	OCS-A 0486	Revolution Wind, part of OCS-A 0486	COP, PPA	2023–2024
MA/RI	OCS-A 0521	Mayflower (North), part of OCS-A 0521	PPA	2024–2025
MA/RI	OCS-A 0521	OCS-A 0521 remainder	--	By 2030, spread over 2025–2030
MA/RI	OCS-A 0520	Beacon Wind	--	By 2030, spread over 2025–2030
MA/RI	OCS-A 0522	Liberty Wind, part of OCS-A 0522	--	By 2030, spread over 2025–2030
MA/RI	OCS-A 0522	OCS-A 0522 remainder	--	By 2030, spread over 2025–2030
NY/NJ	OCS-A 0498	Ocean Wind, part of OCS-A 0498	COP, PPA	2022–2023
NY/NJ	OCS-A 0498	OCS-A 0498 remainder	--	By 2030, spread over 2024–2030
NY/NJ	OCS-A 0512	Empire Wind, part of OCS-A 0512	COP, PPA	2023–2024
NY/NJ	OCS-A 0512	Empire Wind Phase 2 and 3, part of OCS-A 0512	--	By 2030, spread over 2024–2030
NY/NJ	OCS-A 0499	Atlantic Shores OCS-A 0499	--	By 2030, spread over 2024–2030
DE/MD	OCS-A 0519	Skipjack, part of OCS-A 0519	COP, PPA	2022–2023
DE/MD	OCS-A 0519	OCS-A 0519 remainder	--	By 2030, spread over 2023–2030
DE/MD	OCS-A 0490	US Wind, Inc.	COP, PPA	2022–2023
DE/MD	OCS-A 0482	Garden State Offshore Energy I,LLC	--	By 2030, spread over 2023–2030

State	Lease Number	Company Name	Description	Estimated Site Characterization Survey Schedule
MA/RI	OCS-A 0486	Revolution Wind	One met buoy; deployed 1/17/2019	2019–2023
MA/RI	OCS-A 0501	Vineyard Wind LLC	Two met buoys	2018–2022
MA/RI	OCS-A 0520	Beacon Wind	--	2020–2024
MA/RI	OCS-A 0521	Mayflower Wind	One met buoy	2020–2024
MA/RI	OCS-A 0522	Vineyard Wind LLC	Two met buoys	2020–2024
NJ	OCS-A 0498	Ocean Wind LLC	Two met buoys, one met/current buoy; installed 8/20/2018	2018–2022
NY	OCS-A 0512	Empire Wind	Two met buoys, one wave/met buoy, and one subsea current meter mooring	2019–2023
DE	OCS-A 0482	Garden State Offshore Energy I,LLC	One met buoy; deployed 1/20/2020	2020–2024
MD	OCS-A 0490	US Wind, Inc.	One met tower, seabed mountain sensors	2018–2022

-- = to be determined; COP = Construction and Operations Plan; DE = Delaware; FEIS = Final Environmental Impact Statement; MA = Massachusetts; MD = Maryland; met = meteorological; n/a = not applicable; NE = New England; NJ = New Jersey; NY = New York; OCS = Outer Continental Shelf; PPA=Power Purchase Agreement; RI = Rhode Island; ROD = Record of Decision.

D.2.2 Hydrokinetic Projects

The following tidal energy project has been developed in the geographic analysis area and is in operation:

- 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 Federal Energy Regulatory Commission (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. On October 22, 2020, Verdant Power installed three Gen5 Free Flow System Turbines on a TriFrame™ mount at the RITE Project (Verdant Power 2021a; 2021b).

D.2.3 Undersea Transmission Lines, Gas Pipelines, and Other Submarine Cables

A number of submarine cables include fiber-optic cables and trans-Atlantic cables exist with landings along the NY and NJ coastlines; additional cables are planned, such as Google's Grace Hopper Cable System, which is slated to be completed in 2022 (Koley 2020). Although no other cable systems were identified, BOEM anticipates that other projects could overlap with the Proposed Action within the NY Bight over the lifespan considered in the EA.

Additionally, the offshore wind projects listed in **Table D-1** that have a Construction and Operations Plan under review are presumed to include at least one identified transmission cable route. Cable routes have not yet been announced for the remainder of the projects.

D.2.4 Marine Minerals Use and Ocean Dredged Material Disposal

BOEM's Marine Minerals Program currently has no active leases for sand borrow areas offshore NY or NJ (BOEM 2021a). However, diminishing resources in state waters, the frequency and magnitude of storms along the Atlantic and Gulf of Mexico Coasts, and new infrastructure projects have led BOEM to conduct a study to prepare and meet future sand resource needs (W.F. Baird & Associates Ltd. 2018). According to the study, no projects have been listed in NY that are likely to use OCS resources over the next 10 years, but there are seven projects in NJ that are expected to need OCS leases in the next 10 years. This finding makes it likely that lease requests will occur, and active leases are possible over the lifespan considered in the EA.

U.S. Environmental Protection Agency (EPA) Region 2 is responsible for designating and managing ocean disposal sites for materials offshore in the region of the proposed lease area. U.S. Army Corps of Engineers (USACE) issues permits for ocean disposal sites, and all ocean sites are for the disposal of dredged material permitted or authorized under the Marine Protection, Research and Sanctuaries Act. There are several dredged material disposal sites in nearshore waters off NY and NJ that are no longer used for disposal and one active site (the Historic Area Remediation Site) located closer to shore than the proposed lease areas (USEPA 2021).

D.2.5 Military Use

Military activities can include various vessel training exercises, submarine and antisubmarine training, and U.S. Air Force exercises. The U.S. Navy, U.S. Army, U.S. Coast Guard (USCG), and U.S. Air Force have major and minor military installations located along the coasts of NY and NJ. USCG has a Weapons Training Area in the northern portion of the Hudson South Call Area (BOEM 2021b).

D.2.6 Marine Transportation

The number of one-way vessel trips associated with shipping in the WEA area was reported to be 30,768 domestic and foreign vessel trips in the lower entrance channels of NY Harbor, NY, and 5,115 vessel trips in Newark Bay, NJ, in 2014 (a total of 35,883 one-way trips) (USACE 2014). Other vessels using these ports include military vessels, commercial business craft (tugboats, fishing vessels, and ferries), commercial recreational craft (cruise ships and fishing/sight-seeing/diving charters), research vessels, and personal craft (fishing boats, houseboats, yachts and sailboats, and other pleasure craft). Over the timeframe assessed in the EA, BOEM assumes that shipping and marine transportation activities would increase above the present level, due in part to the finalized expansion of the Panama Canal, which allows larger vessels to travel through the canal, resulting in an increase in vessel traffic and the size of vessels on the U.S. East Coast (Medina et al. 2021). Several U.S. East Coast ports, including the Port Authority of NY and NJ, have deepened harbors and expanded cargo-handling facilities to accommodate and attract the larger vessels.

D.2.7 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 Proposed Action would primarily be located. The governing statute for Federal fisheries management is the Magnuson-Stevens Fishery Conservation and Management Act. This statute requires that fisheries be managed sustainably.

The Proposed Action overlaps two of NMFS' eight regional councils for managing Federal fisheries based on the fishery being considered: 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. For example, the NEFMC manages the Atlantic sea scallop fishery, while the MAFMC manages the surf clam and ocean quahog fisheries. The councils manage species with many fishery management plans, which are frequently updated, revised, and amended, and coordinate with each other to jointly manage species across jurisdictional boundaries. 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 states and NMFS, under the framework of the ASMFC's Amendment 3 to the Interstate Fishery Management Plan For American Lobster, cooperatively manage the American lobster resource and fishery (Lockhart and Estrella 1997).

The fishery management plans of the councils and ASMFC were established, in part, to manage fisheries to avoid overfishing, which is accomplished 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. National Oceanic and Atmospheric Administration (NOAA) Fisheries also manages highly migratory species, such as tuna and sharks, which can travel long distances and cross domestic boundaries.

D.2.8 Global Climate Change

Although climate change is not an action, its reach touches nearly all other actions included in this appendix. Climate change is altering the baseline against which the impacts of human actions are measured. It is included in this list as an action and has IPFs that interact with those of OCS wind development to potentially affect resources discussed in the main body of the EA.

The *Programmatic EIS for Alternative Energy Development and Production and Alternate Use of Activities on the Outer Continental Shelf* (MMS 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). Furthermore, current and future impacts of climate change and the way in which they overlap with renewable energy development as assessed in the *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Continental Shelf* (Avanti Corporation and Industrial Economics Inc. 2019).

The Intergovernmental Panel on Climate Change (IPCC) released a special report in October 2018 that assessed the risks and impacts associated with an increase of global warming of 1.5°C and also compared these to an increase of 2°C (IPCC 2019). 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.

D.3 References

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Appendix E: Essential Fish Habitat Assessment

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List of Abbreviations and Acronyms

Area ID	Announcement of Area Identification
BOEM	Bureau of Ocean Energy Management
CHIRP	compressed high-intensity radiated pulse
COP	Construction and Operations Plan
CPT	cone penetration test
dB	decibels
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FMP	Fishery Management Plan
HAPC	Habitat Area of Particular Concern
HRG	high-resolution geophysical
MAFMC	Mid-Atlantic Fishery Management Council
MFCMA	Magnuson Fishery Conservation and Management Act of 1976
MMS	Marine Minerals Service
NEFMC	New England Fishery Management Council
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NY Bight	New York Bight
OCS	Outer Continental Shelf
ROW	right-of-way
RUE	right-of-use and easement
SAV	submerged aquatic vegetation
USACE	U.S. Army Corps of Engineers
WEA	Wind Energy Area
YOY	young-of-the-year

E.1 Introduction

Relevant regulations regarding Essential Fish Habitat (EFH) include the Magnuson Fishery Conservation and Management Act of 1976 (MFCMA); Magnuson-Stevens Conservation and Management Act of 1996 (Magnuson-Stevens) and Sustainable Fisheries Act; and Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006.

The MFCMA established the Fishery Management Councils and mandates the preparation of Fishery Management Plans (FMPs) for important fishery resources within the Exclusive Economic Zone (EEZ) within U.S. waters. The Mid-Atlantic Fishery Management Council (MAFMC) and New England Fishery Management Council (NEFMC) prepare FMPs covering the New York Bight (NY Bight). The 1996 reauthorization of the MFCMA added a requirement for the description of EFH and definitions of overfishing.

"**Essential Fish Habitat**" as defined in the Magnuson-Stevens Act includes "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The final rules promulgated by the National Marine Fisheries Service (NMFS) in 2002 (50 CFR §§ 600.805 to 600.930) further clarify EFH with the following definitions: "**waters**" refers to aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "**substrate**" refers to sediment, hardbottom, structures underlying the waters, and associated biological communities; "**necessary**" refers to the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "**spawning, breeding, feeding, or growth to maturity"** refers to stages representing a species' full life cycle.

The purpose of this assessment is to evaluate if the Proposed Action would have an "**adverse effect**" on EFH in the proposed Wind Energy Areas (WEAs). The final EFH rules define an adverse effect as "any impact which reduces quality and/or quantity of EFH...[and] may include direct or indirect physical, chemical, or biological alterations of the waters or substrate, and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components if such modifications reduce the quantity and/or quantity of EFH. Adverse effects to EFH may result from action occurring within EFH or outside of EFH and may include specific or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions."

E.2 Proposed Action and Geographic Location

On March 29, 2021, the Bureau of Ocean Energy Management (BOEM) released the Announcement of Area Identification (Area ID) (BOEM 2021). The Area ID Memorandum documents the analysis and rationale used to develop the WEAs in the NY Bight. The NY Bight is an offshore area extending generally northeast from Cape May in New Jersey to Montauk Point on the eastern tip of Long Island, New York.

The purpose of the Proposed Action is to assess the physical characteristics of areas on the Outer Continental Shelf (OCS) of the NY Bight through the issuance of commercial and research leases within the WEAs and granting of rights-of-way (ROWs) and rights-of-use and easement (RUEs) in the region (the project area). BOEM's issuance of these leases and grants is needed (a) to confer the exclusive right to submit plans to BOEM for potential development, such that the lessees and grantees would commit to site characterization and site assessment activities necessary to determine the suitability of their leases and grants for commercial offshore wind production and/or transmission and development plans for BOEM's review; and (b) to ensure that site characterization and assessment activities are conducted in a safe and environmentally responsible manner.

Based on the process described in the Area ID Memorandum (BOEM 2021), the WEAs considered in this assessment are described in **Table E-1** and depicted in **Figure E-1**.

Table E-1. New York Bight Wind Energy Areas (WEAs) descriptive statistics

Parameter	Fairways North WEA	Fairways South WEA	Hudson North WEA	Central Bight WEA	Hudson South WEA	Total
Acres	88,246	23,841	43,056	84,688	567,552	807,383
Maximum depth (m)	56	46	45	61	59	--
Minimum depth (m)	42	39	41	52	32	--
Closest distance to New York (nm)	15	15	21	38	45	--
Closest distance to New Jersey (nm)	69	45	36	53	23	--

-- = not applicable.

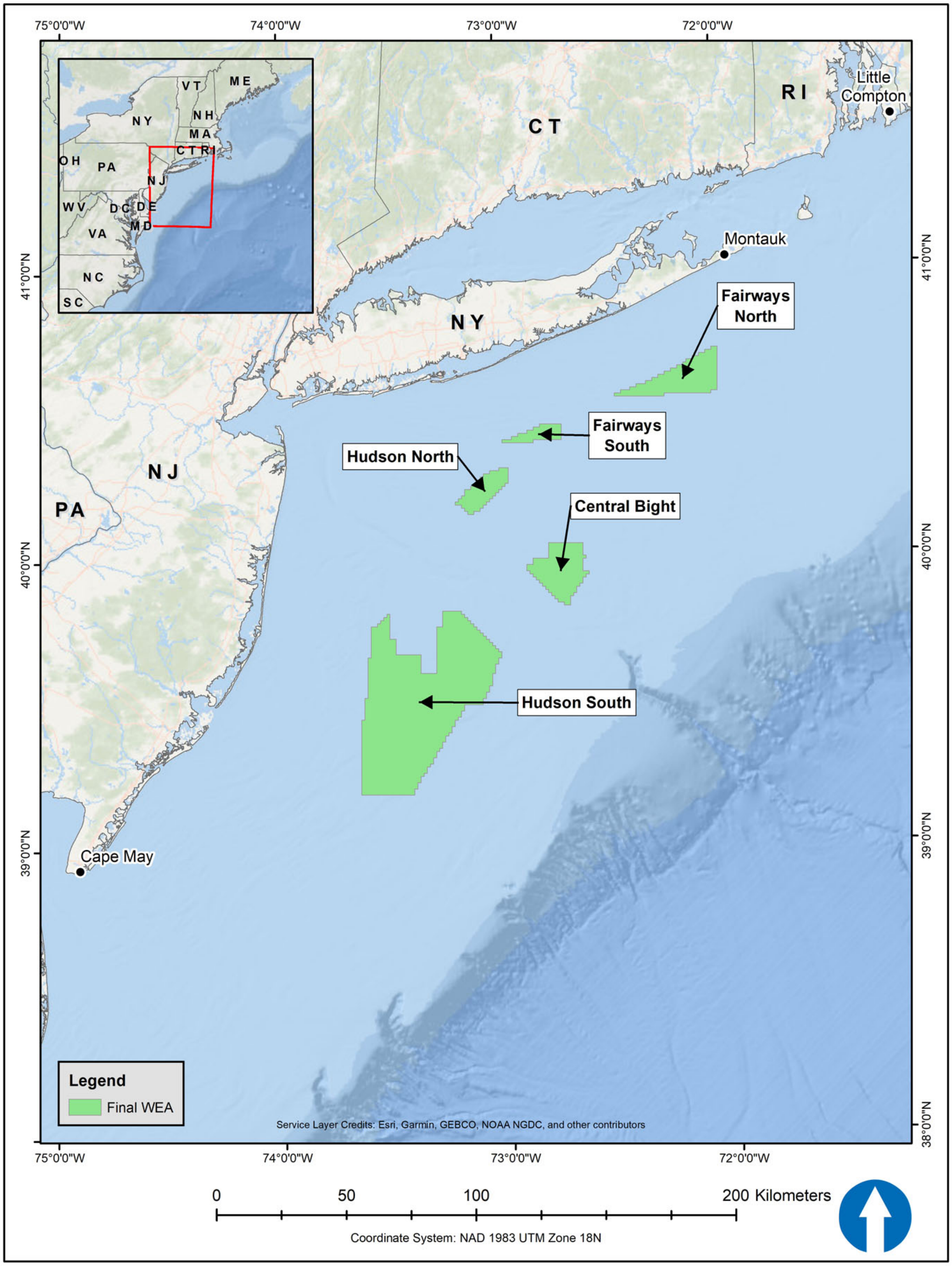

Figure E-1. New York Bight Wind Energy Areas (WEAs)

The Proposed Action for this assessment is the issuance of commercial and research wind energy leases within the WEAs that BOEM has designated on the OCS in the NY Bight, and the granting ROWs and RUEs in support of wind energy development. This assessment analyzes BOEM's issuance of up to 10 leases that may cover the entirety of the WEAs, the issuance of potential project easements associated with each lease, and the issuance of grants for subsea cable corridors and associated offshore collector/converter platforms. The ROWs, RUEs, and potential project easements would all be located within the NY Bight, and may include corridors that extend from the WEAs to the onshore energy grid. The Proposed Action would result in site assessment activities on leases and site characterization activities on the leases, grants, and potential project easements. Site assessment activities would most likely include the temporary placement of meteorological and oceanographic buoys (i.e., met buoys). Site characterization activities would most likely include geophysical and geotechnical, and biological surveys as described in **Tables E-2**, **E-3**, and **E-4**.

Table E-2. High-resolution geophysical survey equipment and methods

Equipment Type	Data Collection and/or Survey Types	Description of the Equipment	Line Spacing
Bathymetry/depth sounder (multi-beam echosounder)	Bathymetric charting	A depth sounder is a microprocessor-controlled, high-resolution survey-grade system that measures precise water depths in both digital and graphic formats. The system would be used in such a manner as to record with a sweep appropriate to the range of water depths expected in the survey area. This assessment assumes the use of multi-beam bathymetry systems, which may be more appropriate than other tools for characterizing those WEAs containing complex bathymetric features or sensitive benthic habitats, such as hardbottom areas.	The lessee would likely use a multi-beam echosounder at a line spacing appropriate to the range of depths expected in the survey area.
Magnetometer	Collection of geophysical data for shallow hazards and archaeological resources assessments	Magnetometer surveys would be used to detect and aid in the identification of ferrous or other objects having a distinct magnetic signature. The magnetometer sensor is typically towed as near as possible to the seafloor and anticipated to be no more than approximately 6 m above the seafloor.	For the collection of geophysical data for shallow hazards assessments (including magnetometer, side-scan sonar, and sub-bottom profiler systems), BOEM recommends surveying at a 150-m line spacing. For the collection of geophysical data for archaeological resources assessments (including magnetometers, side-scan sonar, and all sub-bottom profiler systems), BOEM recommends surveying at a 30-m line spacing.

Equipment Type	Data Collection and/or Survey Types	Description of the Equipment	Line Spacing
Side-scan sonar	Collection of geophysical data for shallow hazards and archaeological resources assessments	This survey technique is used to evaluate surface sediments, seafloor morphology, and potential surface obstructions (MMS 2007). A typical side-scan sonar system consists of a top-side processor, tow cable, and towfish with transducers (or "pingers") located on the sides, which generate and record the returning sound that travels through the water column at a known speed. BOEM assumes that the lessee would use a digital dual-frequency side-scan sonar system with 300–500 kHz frequency ranges or greater to record continuous planimetric images of the seafloor.	For the collection of geophysical data for shallow hazards assessments (including magnetometer, side-scan sonar, and sub-bottom profiler systems), BOEM recommends surveying at a 150-m line spacing. For the collection of geophysical data for archaeological resources assessments (including magnetometers, side-scan sonar, and all sub-bottom profiler systems), BOEM recommends surveying at a 30-m line spacing.
Shallow and medium (seismic) penetration sub-bottom profilers	Collection of geophysical data for shallow hazards and archaeological resources assessments and to characterize subsurface sediments	Typically, a high-resolution CHIRP System sub-bottom profiler is used to generate a profile view below the bottom of the seabed, which is interpreted to develop a geologic cross-section of subsurface sediment conditions under the track line surveyed. Another type of sub-bottom profiler that may be employed is a medium penetration system such as a boomer, bubble pulser, or impulse type system. Sub-bottom profilers are capable of penetrating sediment depth ranges of 3 m to greater than 100 m, depending on frequency and bottom composition.	For the collection of geophysical data for shallow hazards assessments (including magnetometer, side-scan sonar, and sub-bottom profiler systems), BOEM recommends surveying at a 150-m line spacing. For the collection of geophysical data for archaeological resources assessments (including magnetometers, side-scan sonar, and all sub-bottom profiler systems), BOEM recommends surveying at a 30-m line spacing.

BOEM = Bureau of Ocean Energy Management; CHIRP = Compressed High-Intensity Radiated Pulse; MMS = Marine Minerals Service; WEA = Wind Energy Area.

Table E-3. Geotechnical/benthic sampling survey methods and equipment

Survey Method	Use	Description of the Equipment and Methods
Bottom-sampling devices	Penetrating depths from a few centimeters to several meters to obtain samples of soft surficial sediments	A piston core or gravity core is often used to obtain samples of soft surficial sediments. Unlike a gravity core, which is essentially a weighted core barrel that is allowed to free-fall through the water column into the sediments, piston cores have a "piston" mechanism that triggers when the corer hits the seafloor. The main advantage of a piston core over a gravity core is that the piston allows the best possible sediment sample to be obtained by avoiding disturbance of the sample (MMS 2007). Shallow-bottom coring employs a rotary drill that penetrates through several feet of consolidated rock. Drilling produces low intensity, low frequency sound through the drill string. The above sampling methods do not use high-energy sound sources (Continental Shelf Associates Inc. 2004; MMS 2007).
Vibracores	Obtaining samples of unconsolidated sediment; may, in some cases, also be used to gather information to inform the archaeological interpretation of features identified through the HRG survey (BOEM 2020b)	Vibracore samplers typically consist of a core barrel and an oscillating driving mechanism that propels the core barrel into the sub-bottom. Once the core barrel is driven to its full length, the core barrel is retracted from the sediment and returned to the deck of the vessel. Typically, cores up to 6 m long with 8-cm diameters are obtained, although some devices have been modified to obtain samples up to 12 m long (MMS 2007; USACE 1987).
Deep borings	Sampling and characterizing the geological properties of sediments at the maximum expected depths of the structure foundations (MMS 2007)	A drill rig is used to obtain deep borings. The drill rig is mounted on a jack-up barge supported by four "spuds" that are lowered to the seafloor. Geologic borings can generally reach depths of 30–61 m within a few days (based on weather conditions). The acoustic levels from deep borings can be expected to be in the low frequency bands and below the 160 dB threshold established by NMFS to protect marine mammals (Erbe and McPherson 2017).
CPT	Supplement or use in place of deep borings (BOEM 2020b)	A CPT rig would be mounted on a jack-up barge similar to that used for the deep borings. The top of a CPT drill probe is typically up to 8 cm in diameter, with connecting rods less than 15 cm in diameter.

BOEM = Bureau of Ocean Energy Management; CPT = cone penetration test; dB = decibels; HRG = high-resolution geophysical; MMS = Marine Minerals Service; NMFS = National Marine Fisheries Service; USACE = U.S. Army Corps of Engineers.

Table E-4. Biological survey types and methods

Biological Survey Type	Survey Guidelines	Survey Method	Timing
Benthic habitat	BOEM. (2019a). Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585, Subpart F www.boem.gov/sites/default/files/renewable-energy-program/Regulatory-Information/BOEM-Renewable-Benthic-Habitat-Guidelines.pdf	Bottom sediment/fauna sampling and underwater imagery/sediment profile imaging (sampling methods described above under geotechnical surveys)	Concurrent with geotechnical/benthic sampling
Avian	BOEM. (2020a). Guidelines for Providing Avian Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 www.boem.gov/sites/default/files/documents/newsroom/Avian%20Survey%20Guidelines.pdf	Visual surveys from a boat	10 OCS blocks per day (Thaxter and Burton 2009); monthly for 2–3 years
		Plane-based aerial surveys	2 days per month for 2–3 years
Bats	None	Ultrasonic detectors installed on survey vessels being used for other biological surveys	Monthly for 3 months per year between March and November
Marine fauna (marine mammals, fish, and sea turtles)	BOEM. (2019b). Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 www.boem.gov/sites/default/files/renewable-energy-program/Regulatory-Information/BOEM-Fishery-Guidelines.pdf BOEM. (2019c). Guidelines for Providing Information on Marine Mammals and Sea Turtles for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585 www.boem.gov/sites/default/files/renewable-energy-program/Regulatory-Information/BOEM-Marine-Mammals-and-Sea-Turtles-Guidelines.pdf	Plane-based and/or vessel surveys—may be concurrent with other biological surveys, but would not be concurrent with any geophysical or geotechnical survey work	2 years of survey to cover spatial, temporal and inter-annual variance in the area of potential effect

BOEM = Bureau of Ocean Energy Management; OCS = Outer Continental Shelf.

The timing of lease issuance, as well as weather and sea conditions, would be the primary factors influencing timing of site characterization and site assessment survey activities. Under the reasonably foreseeable site characterization scenario, BOEM would issue leases as early as late 2021 and continue through late 2022. It is assumed lessees would begin survey activities as soon as possible after receiving a lease, after preparing a Site Assessment Plan and Survey Plan, and when sea states and weather conditions allow for site characterization and site assessment survey activities. The most suitable sea states and weather conditions would occur from April to August (Atlantic Renewable Energy Corporation and AWS Scientific Inc. 2004). For leases issued in late 2021, the earliest surveys would likely begin no sooner than April 2022. Lessees have up to 5 years to perform site characterization activities before they must submit a Construction and Operations Plan (COP) (30 CFR §585.235(a)(2)). For leases issued in late 2022, those lessees' surveys would continue through August 2027 prior to submitting their COPs.

E.3 EFH Presence Within the WEAs

In this section, fish and invertebrate resources expected for the NY Bight WEAs are characterized using broad ecological/habitat categories: soft bottom, hardbottom, and pelagic. These habitat categories are described and further characterized for offshore, nearshore, and inshore areas when possible. Within each category the composition and distribution of key resources as well as important, but lesser-known taxa are described. Detailed information for federally managed species for Mid- Atlantic Bight and southern New England may be found in NEFMC (2016; 2017) and BOEM (2014).

Species composition in the NY Bight project area is dynamic, with species migrating into the area from northern and southern waters in response to seasonally changing water temperatures. Because many species distributions overlap between the Mid-Atlantic and New England shelf, the WEAs fall under the jurisdiction of two regional Fishery Management Councils: MAFMC and NEFMC. In addition to these regional councils, the NMFS Highly Migratory Species Management Division, Office of Sustainable Fisheries manages billfishes, Atlantic tunas, swordfish, and sharks within a broad geographic region that encompasses the WEAs (NMFS 2017).

For this assessment, we relied on formal EFH descriptions for managed species and life stages provided by MAFMC and NEFMC (MAFMC 1998a; 1998b; 1998c; 1998d; NEFMC 2017). For highly migratory species, NMFS (2017) was consulted. All of these descriptions and information were accessed initially through the Greater Atlantic Regional Fisheries Office, Habitat Conservation Division EFH habitat mapper (NMFS 2021). This data source provided geographical distribution of various life stages of managed species as well as links to source documents mentioned above with formal EFH descriptions. Tables were prepared listing those species and life stages whose EFH overlapped the area of interest. More comprehensive information on life history and distribution of these managed species may be found in Able and Fahy (2010), BOEM (2014), NEFMC and NMFS (2017), and NYSERDA (2017).

The area of interest includes EFH by life stage for 48 managed species, including 5 invertebrate taxa (**Table E-5**), 17 elasmobranch species (sharks, rays, and skates; **Table E-6**), and 26 bony fish taxa (**Table E-7**). EFH for all life stages of Atlantic sea scallop (*Placopecten magellanicus*) and inshore squid (*Doryteuthis pealeii*) are present in the project area (**Table E-5**). The pelagic inshore squid deposits egg masses on the seafloor (**Table E-5**). Atlantic sea scallops are bottom-dwelling as adults but have pelagic eggs and larvae. The bottom-dwelling ocean quahog (*Arctica islanida*) and Atlantic surfclam also release eggs into the water column, but information on egg and larval distribution is not available (**Table E-5**).

Eggs and adults of offshore squid occur along the edge of continental shelf outside of the project area (**Table E-5**). Information on neonate (newborn) EFH for several shark species (e.g., basking shark, shortfin mako, bigeye thresher) is lacking for the project area, but EFH is present for neonate/juvenile sandbar shark, sand tiger shark, blue shark, dusky shark, and spiny dogfish (**Table E-6**). Skates deposit eggs on the seafloor in the project area, although little is known about habitat preferences of eggs or deposition sites. Juveniles and adults of all skate species are present in the area (**Table E-6**). EFH for all life stages (eggs, larvae, juveniles, adults) from 20 of the 26 bony fish species listed in **Table E-7** are present in the project area. Only adult and juvenile EFH for bigeye tuna, yellowfin tuna, skipjack tuna, albacore tuna, and swordfish are documented for the project area (**Table E-7**). Most of the bony fish species have pelagic eggs and larvae. Atlantic salmon, ocean pout, and winter flounder have demersal eggs. EFH for ocean pout and winter flounder eggs occurs in the project area, but Atlantic salmon deposit their eggs in the freshwater reaches of coastal rivers well outside of the project area (**Table E-7**).

In addition to species managed under MFCMA, other National Oceanic and Atmospheric Administration (NOAA) Trust Resources—such as American lobster (*Homarus americanus*), Jonah crab (*Cancer borealis*), horseshoe crab (*Limulus polyphemus*), Atlantic menhaden (*Brevoortia tyrannus*), weakfish (*Cynoscion regalis*), American shad (*Alosa sapidissima*), river herrings (*Alosa* spp.), and Atlantic striped bass (*Morone saxatilis*)—occur in the region. These species are managed by the Atlantic States Marine Fisheries Commission. Ecologically important prey species—such as bay anchovy (*Anchoa mitchilli*), killifishes (*Fundulus* spp.), Atlantic silversides (*Menidia menidia*), sand lances (*Ammodytes* spp.), and juveniles of some managed species—are present in the inshore habitats. Analyses of impacts to managed species and EFH will nominally include these additional NOAA Trust Resources due to their economic and ecologic importance in the project area.

Spatially limited EFH called Habitat Areas of Particular Concern (HAPCs) have also been identified in the WEAs. HAPCs are selected using the following criteria:

- Importance of ecological function provided by the habitat
- Extent to which the area or habitat is sensitive to human induced degradation
- Whether and to what extent development activities are stressing the habitat
- Rarity of the habitat type

Based on these criteria, NEFMC (2017) selected as HAPCs several canyons that lie offshore of New Jersey and New York including Baltimore, Wilmington, Toms, Middle Toms, Hendrickson, and Hudson Canyons. These canyons occur offshore of the WEAs; however, additional HAPCs that are more relevant to sampling and assessment activities include (1) sand tiger shark (*Carcharias taurus*) pupping area in Delaware Bay; (2) sandbar shark (*Carcharhinus plumbeus)* nursery areas in Great Bay (New Jersey); (3) inshore of the 20-m isobath for juvenile Atlantic cod in Narragansett Bay, Block Island, and Block Island Sound (Rhode Island); and (4) summer flounder (*Paralichthys dentatus*) submerged aquatic vegetation (SAV) nursery areas in all estuaries of the region including Narragansett Bay, Long Island Sound, and Delaware Bay. The map of HAPCs specific to individual species (**Figure E-2**) show the potential range of where an HAPC could occur, but an HAPC is restricted to specific conditions within those ranges.

The formal descriptions of the specific conditions for sand tiger shark, sandbar shark, juvenile cod, and summer flounder HAPCs are as follows:

- **Sand tiger shark (Delaware Bay):** Lower portions of Delaware Bay to areas adjacent to the mouth of Delaware Bay for all life stages. The inshore extent of the HAPC reflects a line drawn from Port Mahon east to Egg Point Island (39º11'N lat.), and from Egg Point Island southeast to Bidwell Creek. The HAPC excludes an area rarely used by sand tiger sharks, which is north of a line between Egg Point Island and Bidwell Creek that includes Maurice Cove. The HAPC spans the mouth of Delaware Bay between Cape Henlopen and Cape May, and also includes adjacent coastal areas offshore of Delaware Bay and areas south (between the Indian River inlet and Cape Henlopen, DE).

- **Sandbar shark:** Constitutes important nursery and pupping grounds—which have been identified in shallow areas and at the mouth of Great Bay, NJ; in lower and middle Delaware Bay, DE; lower Chesapeake Bay, MD; and offshore of the Outer Banks, NC—in water temperatures ranging from 15 to 30°C; salinities at least from 15 to 35 ppt; water depths ranging from 0.8 to 23 m; and sand and mud habitats (NEFMC 2017).

- **Inshore of the 20-m isobath for juvenile Atlantic cod:** Inshore areas of the Gulf of Maine and Southern New England between 0 to 20 m (relative to mean high water) with high benthic productivity and hardbottom habitats, which provide structured benthic habitat and food resources for cod and other demersal managed species.

- **Summer flounder SAV nursery area:** All native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH. In locations where native species have been eliminated from an area, then exotic species are included (www.habitat.noaa.gov/apps/efhmapper/). Note that summer flounder SAV nursery area has not been formally mapped and therefore is not included in **Figure E-2**.

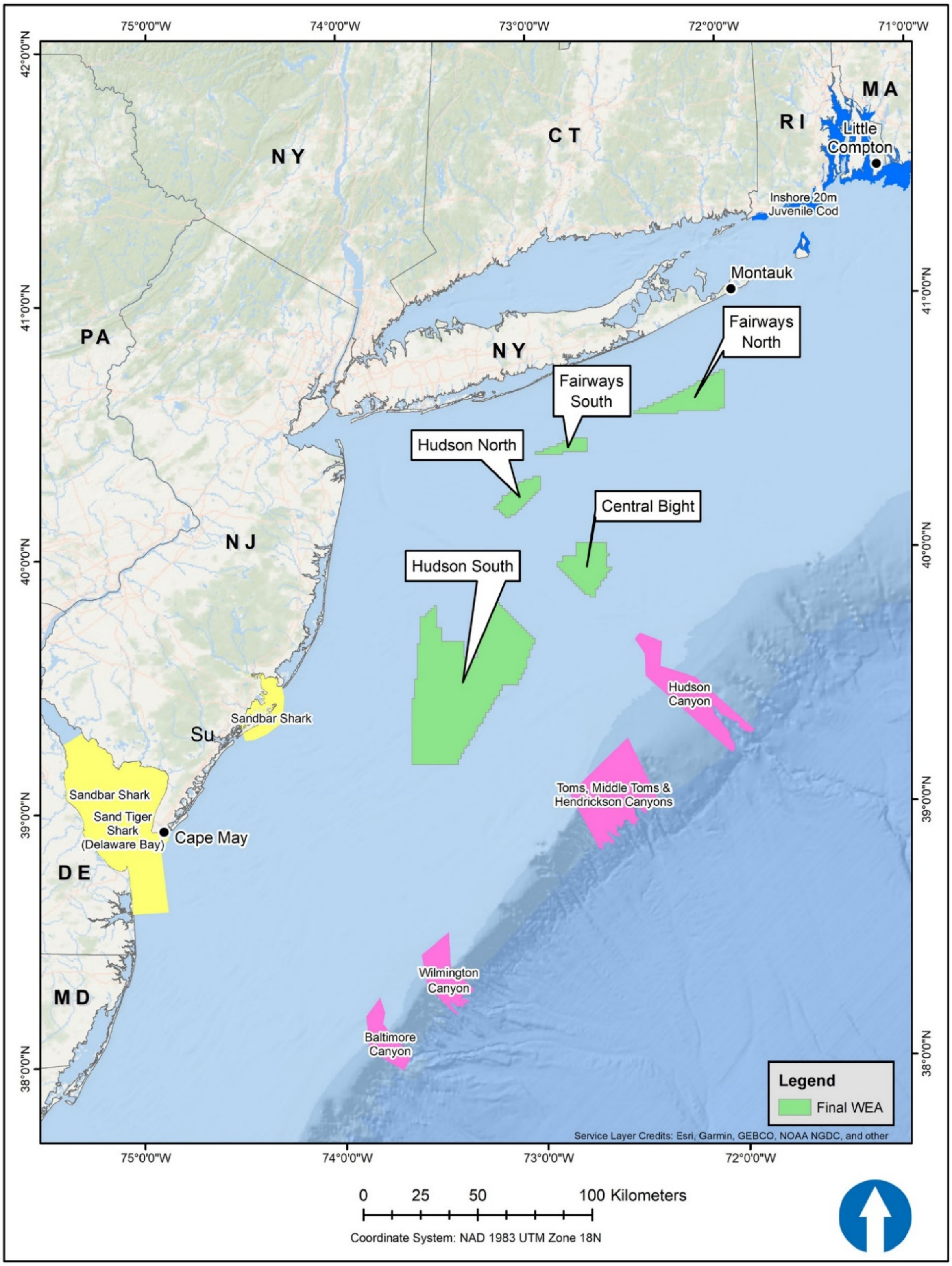

Figure E-2. Habitat Areas of Particular Concern (HAPCs) and in the vicinity of the New York Bight Wind Energy Areas (WEAs)

HAPCs shown in pink (canyons), yellow (sharks), and blue (Atlantic cod). Note that the summer flounder HAPC is not shown as the data is not currently available.

Table E-5. Invertebrate species with Essential Fish Habitat (EFH) identified in the vicinity of the New York Bight
(MAFMC 1998b; 1998c; NEFMC 2017)

Species	Eggs/Larvae	Juveniles	Adults
Longfin inshore squid (*Doryteuthis pealeii*)	**Eggs**: Inshore and offshore bottom habitats from Georges Bank southward to Cape Hatteras, generally where bottom water temperatures are between 10–23°C, salinities are between 30–32 ppt, and depth is less than 50 m. Eggs have also been collected in bottom trawls in deeper water at various places on the continental shelf. Like most loliginid squids, *D. pealeii* egg masses or “mops” are demersal and anchored to the substrates on which they are laid, which include a variety of hardbottom types (e.g., shells, lobster pots, piers, fish traps, boulders, rocks), SAV (e.g., *Fucus* sp.), sand, and mud.	Pelagic habitats in inshore and offshore continental shelf waters from Georges Bank to South Carolina, in the southwestern Gulf of Maine, and in embayments such as Narragansett Bay, Long Island Sound, and Raritan Bay. EFH for recruit longfin inshore squid is generally found where bottom depths are between 6–160 m, bottom water temperatures are 8.5–24.5°C, and salinities are 28.5–36.5 ppt. In the fall, pre-recruits migrate offshore, where they overwinter in deeper waters along the edge of the shelf. They make daily vertical migrations, moving up in the water column at night and down in the daytime. Small immature individuals feed on planktonic organisms, while larger individuals feed on crustaceans and small fish.	Pelagic habitats in inshore and offshore continental shelf waters from Georges Bank to South Carolina, in inshore waters of the Gulf of Maine, and in embayments such as Narragansett Bay, Long Island Sound, Raritan Bay, and Delaware Bay. EFH for recruit longfin inshore squid is generally found where bottom depths are between 6 and 200 m, bottom water temperatures are 8.5–14°C, and salinities are 24–36.5 ppt. Recruits inhabit the continental shelf and upper continental slope to depths of 400 m. They migrate offshore in the fall and overwinter in warmer waters along the edge of the shelf. Like the pre-recruits, they make daily vertical migrations. Individuals larger than 12 cm feed on fish, and those larger than 16 cm feed on fish and squid. Females deposit eggs in gelatinous capsules, which are attached in clusters to rocks, boulders, and aquatic vegetation and on sand or mud bottom, generally in depths less than 50 m.
Northern shortfin squid (*Illex illecebrosus*)	N/A	Pelagic waters of the continental shelf from the Gulf of Maine through Cape Hatteras, NC, from shore to 183 m water depths, where water temperatures range from 2.2–22.8°C.	Pelagic waters of the continental shelf from the Gulf of Maine through Cape Hatteras, NC, from shore to 183 m water depths in temperatures ranging between 3.8 and 19°C.

Species	Eggs/Larvae	Juveniles	Adults
Atlantic sea scallop (*Placopecten magellanicus)*	**Eggs:** Benthic habitats in inshore areas and on the continental shelf in the vicinity of adult scallops. Eggs are heavier than seawater and remain on the seafloor until they develop into the first free-swimming larval stage. **Larvae:** Benthic and water column habitats in inshore and offshore areas throughout the region. Any hard surface can provide an essential habitat for settling pelagic larvae ("spat"), including shells, pebbles, and gravel. They also attach to macroalgae and other benthic organisms such as hydroids.	Benthic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic, in depths of 18–110 m. Juveniles (5–12 mm shell height) leave the original substrate on which they settle (see spat, adjacent) and attach themselves by byssal threads to shells, gravel, and small rocks (pebble, cobble), preferring gravel. Juvenile scallops are relatively active and swim to escape predation. While swimming, they can be carried long distances by currents. Bottom currents stronger than 10 cm/sec retard feeding and growth. Essential habitats for older juvenile scallops are the same as for the adults (gravel and sand).	Benthic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic. Essential habitats for adult sea scallops are found on sand and gravel substrates in depths of 18–110 m. In the Mid-Atlantic, they are found primarily between 45 and 75 m. They often occur in aggregations called beds, which may be sporadic or essentially permanent, depending on how suitable the habitat conditions are (temperature, food availability, and substrate) and whether oceanographic features (fronts, currents) exist in the area. Bottom currents stronger than 25 cm/sec (half a knot) inhibit feeding. Growth of adult scallops is optimal between 10 and 15°C in areas of normal salinity.
Surfclam (*Spisula solidissimus*)	N/A	Surfclam juveniles occur throughout the substrate, to a depth of 1 m below the water/sediment interface, within Federal waters from the eastern edge of Georges Bank and the Gulf of Maine throughout the Atlantic EEZ. Surfclams generally occur from the beach zone to a depth of about 61 m, but abundance is low beyond about 38 m.	See juveniles
Ocean quahog (*Arctica islandica*)	N/A	Throughout the substrate, to a depth of 1 m below the water/sediment interface, within Federal waters from the eastern edge of Georges Bank and the Gulf of Maine throughout the Atlantic EEZ. Distribution in the western Atlantic ranges in depths from 9.1 m to about 244 m. Ocean quahogs are rarely found where bottom water temperatures exceed 16°C.	See juveniles

EEZ = Exclusive Economic Zone; MAFMC = Mid-Atlantic Fishery Management Council; N/A = not applicable; NMFS = National Marine Fisheries Service.

Table E-6. Shark and skate species and life stages with Essential Fish Habitat (EFH) identified within the project area (MAFMC 2014; NMFS 2017)

Species	Neonate/ Early Juveniles	Late Juveniles/ Subadults	Adults
Basking shark (*Cetorhinus maximus*)	N/A	N/A	Atlantic East Coast from the Gulf of Maine to the northern Outer Banks of North Carolina, and from mid-South Carolina to coastal areas of northeast Florida. Aggregations of basking sharks were observed from the south and southeast of Long Island; east of Cape Cod; and along the coast of Maine, in the Gulf of Maine and near the Great South Channel, approximately 95 km southeast of Cape Cod, MA, as well as approximately 75 km south of Martha's Vineyard and 90 km south of Moriche's Inlet, Long Island. These aggregations tend to be associated with persistent thermal fronts within areas of high prey density.
Common thresher shark (*Alopias vulpinus*)	N/A	Insufficient data are available to differentiate EFH between the juvenile and adult size classes; therefore, EFH is the same for those life stages. EFH is located in the Atlantic Ocean, from Georges Bank (at the offshore extent of the U.S. EEZ boundary) to Cape Lookout, NC; and from Maine to locations offshore of Cape Ann, MA.	N/A
Bigeye thresher shark (*Alopias superciliosus*)	N/A	Insufficient data are available to differentiate EFH between the juvenile and adult size classes; therefore, EFH is the same for those life stages. EFH in the Atlantic Ocean includes offshore pelagic habitats seaward of the continental shelf break between the seaward extent of the U.S. EEZ boundary on Georges Bank (off Massachusetts) to Georgia.	N/A

Species	Neonate/ Early Juveniles	Late Juveniles/ Subadults	Adults
Longfin mako (*Isurus paucus*)	N/A	EFH in the Atlantic Ocean occurs seaward of the 200-m depth contour between Cape Cod, MA, and Cape Hatteras, NC; and the Blake Plateau off Georgia and Florida.	N/A
Shortfin mako *(Isurus oxyrinchus)*	N/A	Insufficient data are available for the identification of EFH by life stage, therefore all life stages are combined in the EFH designation. EFH in the Atlantic Ocean includes pelagic habitats seaward of the continental shelf break between the seaward extent of the U.S. EEZ boundary on Georges Bank (off Massachusetts) to Cape Cod (seaward of the 200-m bathymetric line).	N/A
White shark (*Carcharodon carcharias*)	EFH includes inshore waters out to 105 km from Cape Cod, MA, to an area offshore of Ocean City, NJ.	EFH includes inshore waters to habitats 105 km from shore, in water temperatures ranging from 9–28°C, but more commonly found in water temperatures from 14–23°C from Cape Ann, MA, including parts of the Gulf of Maine, to Long Island, NY, and from Jacksonville to Cape Canaveral, FL.	See juveniles
Sand tiger shark (*Carcharias taurus*)	Neonate EFH ranges from Massachusetts to Florida, specifically the Plymouth, Kingston, Duxbury Bay system, Sandy Hook, and Narragansett Bay, as well as coastal sounds, lower Chesapeake Bay, Delaware Bay (and adjacent coastal areas).	Juveniles EFH includes habitats between Massachusetts and New York (notably the Plymouth, Kingston, Duxbury Bay system), and between mid-New Jersey and the mid-east coast of Florida. EFH can be described via known habitat associations in the lower Chesapeake Bay and Delaware Bay (and adjacent coastal areas) where temperatures range from 19–25°C, salinities range from 23–30 parts per thousand (ppt), depths range from 2.8–7.0 m, and in sand and mud areas.	In the Atlantic along the mid-east coast of Florida (Cape Canaveral) through Delaware Bay. Important habitats include lower Chesapeake Bay and Delaware Bay (and adjacent coastal areas), where sand tiger sharks spend 95%of their time in waters between 17 and 23°C.

Species	Neonate/ Early Juveniles	Late Juveniles/ Subadults	Adults
Sandbar shark (*Carcharhinus plumbeus)*	Atlantic coastal areas from Long Island, NY, to Cape Lookout, NC. Important neonate/young-of-the-year EFH includes: Delaware Bay (DE and NJ) and Chesapeake Bay (VA and MD), where the nursery habitat is limited to the southeastern portion of the estuaries (salinity is greater than 20.5 ppt and depth is greater than 5.5 m); Great Bay, NJ. In all nursery areas between New York and North Carolina, EFH is associated with water temperatures ranging from 15–30°C; salinities ranging from 15–35 ppt; water depths ranging from 0.8–23 m; and sand, mud, shell, and rocky sediments/benthic habitat.	EFH includes coastal portions of the Atlantic Ocean between southern New England (Nantucket Sound, MA) and Georgia in water temperatures ranging from 20–24°C and depths from 2.4–6.4 m. Important nurseries include Delaware Bay, DE and NJ; Chesapeake Bay, VA; Great Bay, NJ; and the waters off Cape Hatteras, NC. For all EFH, water temperatures range from 15–30°C, salinities range from 15–35 ppt, water depth ranges from 0.8–23 m, and substrate includes sand, mud, shell, and rocky habitats.	EFH in the Atlantic Ocean includes coastal areas from southern New England to the Florida Keys, ranging from inland waters of Delaware Bay and the mouth of Chesapeake Bay to the continental shelf break.
Dusky shark (*Carcharhinus obscurus*)	EFH in the Atlantic Ocean includes offshore areas of southern New England to Cape Lookout, NC. Specifically, EFH is associated with habitat conditions including temperatures from 18.1–22.2°C, salinities of 25–35 ppt, and depths at 4.3–15.5 m. Seaward extent of EFH for this life stage in the Atlantic is 60 m in depth.	Coastal and pelagic waters inshore of the continental shelf break (<200 m in depth) along the Atlantic East Coast from habitats offshore of southern Cape Cod to Georgia, including the Charleston Bump and adjacent pelagic habitats. Inshore extent for these life stages is the 20-m bathymetric line, except in habitats of southern New England, where EFH is extended seaward of Martha's Vineyard, Block Island, and Long Island. Pelagic habitats of southern Georges Bank and the adjacent continental shelf break from Nantucket Shoals and the Great South Channel to the eastern boundary of the U.S. EEZ. Adults are generally found deeper (to 2,000 m) than juveniles, however there is overlap in the habitats utilized by both life stages.	See juveniles

Species	Neonate/ Early Juveniles	Late Juveniles/ Subadults	Adults
Tiger shark (*Gaelocerdo cuvier*)	EFH in the Atlantic Ocean includes coastal areas from the North Carolina/Virginia border to the Florida Keys.	EFH in the Atlantic Ocean extends from offshore pelagic habitats associated with the continental shelf break at the seaward extent of the U.S. EEZ boundary (south of Georges Bank, off Massachusetts) to the Florida Keys, inclusive of offshore portions of the Blake Plateau.	See juveniles
Blue shark (*Prionace glauca*)	In the Atlantic in areas offshore of Cape Cod through New Jersey, seaward of the 30-m bathymetric line (and excluding inshore waters such as Long Island Sound). EFH follows the continental shelf south of Georges Bank to the outer extent of the U.S. EEZ in the Gulf of Maine.	Localized areas in the Atlantic Ocean in the Gulf of Maine, from Georges Bank to North Carolina, South Carolina, Georgia, and off Florida.	See juveniles
Spiny dogfish (*Squalus acanthias*)	Pelagic and epibenthic habitats, primarily in deep water on the OCS and slope between Cape Hatteras and Georges Bank and in the Gulf of Maine. Young are born mostly on the offshore wintering grounds from November to January, but newborns (neonates or "pups") are sometimes taken in the Gulf of Maine or southern New England in early summer.	Pelagic and epibenthic habitats throughout the region. Sub-adult females are found over a wide depth range in full salinity seawater (32–35 ppt), where bottom temperatures range from 7–15°C. Sub-adult females are widely distributed throughout the region in the winter and spring, when water temperatures are lower, but very few remain in the Mid-Atlantic area in the summer and fall after water temperatures rise above 15°C.	See juveniles
Clearnose skate (*Raja eglanteria*)	N/A	EFH for juvenile clearnose skates occurs from the shoreline to 30 m in depth, primarily on mud and sand, but also on gravelly and rocky bottom.	EFH for adult clearnose skates occurs from the shoreline to 40 m in depth, primarily on mud and sand, but also on gravelly and rocky bottom.

Species	Neonate/ Early Juveniles	Late Juveniles/ Subadults	Adults
Barndoor skate (*Dipturus laevis*)	N/A	EFH for juvenile and adult barndoor skates occurs on mud, sand, and gravel substrates. Both life stages are usually found on the continental shelf in depths less than 160 m, but the adults also occupy benthic habitats between 300 and 400 m on the outer shelf.	See juveniles
Little skate (*Leucoraja erinacea*)	N/A	EFH for juvenile little skates occurs on sand and gravel substrates, but they are also found on mud.	EFH for adult little skates occurs on sand and gravel substrates, but they are also found on mud.
Winter skate (*Leucoraja ocellata*)	N/A	EFH for juvenile winter skates occurs on sand and gravel substrates, but they are also found on mud.	EFH for adult winter skates occurs on sand and gravel substrates, but they are also found on mud.
Rosette skate (*Leucoraja garmani*)	N/A	Benthic habitats with mud and sand substrates on the OCS in depths of 80–400 m from approximately 40°N latitude to Cape Hatteras, NC.	See juveniles

EEZ = Exclusive Economic Zone; MAFMC = Mid-Atlantic Fishery Management Council; N/A = not applicable; NMFS = National Marine Fisheries Service.

Table E-7. Bony fish species by life stages with Essential Fish Habitat (EFH) identified within project area
(MAFMC 1998c; 1998d; 2011; 2014; NEFMC 2017; NMFS 2017)

Species	Eggs and Larvae	Juveniles/Subadults	Adults
Monkfish (*Lophius americanus*)	**Eggs and Larvae:** Pelagic habitats in inshore areas, and on the continental shelf and slope throughout the region. Monkfish eggs are shed in very large buoyant mucoidal egg "veils." Monkfish larvae are more abundant in the Mid-Atlantic region and occur over a wide depth range, from the surf zone to depths of 1,000–1,500 m on the continental slope.	Sub-tidal benthic habitats in depths of 50–400 m in the Mid-Atlantic, between 20 and 400 m in the Gulf of Maine, and to a maximum depth of 1,000 m on the continental slope. A variety of habitats are essential for juvenile monkfish, including hard sand, pebbles, gravel, broken shells, and soft mud; they also seek shelter among rocks with attached algae. Young-of-the-year (YOY) juveniles have been collected primarily on the central portion of the shelf in the Mid- Atlantic, but also in shallow nearshore waters off eastern Long Island, up the Hudson Canyon shelf valley, and around the perimeter of Georges Bank. They have also been collected as deep as 900 m on the continental slope.	Sub-tidal benthic habitats in depths of 50–400 m in southern New England and Georges Bank, between 20–400 m in the Gulf of Maine, and to a maximum depth of 1,000 m on the continental slope. EFH for adult monkfish is composed of hard sand, pebbles, gravel, broken shells, and soft mud. They seem to prefer soft sediments (fine sand and mud) over sand and gravel, and, like juveniles, utilize the edges of rocky areas for feeding.
Atlantic herring (*Clupea harengus*)	**Eggs:** Inshore and offshore benthic habitats in the Gulf of Maine and on Georges Bank and Nantucket Shoals in depths of 5–90 m on coarse sand, pebbles, cobbles, and boulders and/or macroalgae. Eggs adhere to the bottom, often in areas with strong bottom currents, forming egg "beds" that may be many layers deep. **Larvae:** Inshore and offshore pelagic habitats in the Gulf of Maine, on Georges Bank, and in the upper Mid-Atlantic Bight, in the bays and estuaries. Atlantic herring have a very long larval stage, lasting 4–8 months, and are transported long distances to inshore and estuarine waters where they metamorphose into early-stage juveniles ("brit") in the spring.	Intertidal and sub-tidal pelagic habitats to 300-m depths throughout the region, including bays and estuaries. One- and two-year-old juveniles form large schools and make limited seasonal inshore-offshore migrations. Older juveniles are usually found in water temperatures of 3–15°C in the northern part of their range and as high as 22°C in the Mid-Atlantic. YOY juveniles can tolerate low salinities, but older juveniles avoid brackish water.	Sub-tidal pelagic habitats with maximum depths of 300 m throughout the region, including bays and estuaries. Adults make extensive seasonal migrations between summer and fall spawning grounds on Georges Bank and the Gulf of Maine and overwintering areas in southern New England and the Mid-Atlantic region. They seldom migrate beyond a depth of about 100 m and unless they are preparing to spawn, and they usually remain near the surface. They generally avoid water temperatures above 10°C and low salinities. Spawning takes place on the bottom, generally in depths of 5–90 m on a variety of substrates (see eggs).

Species	Eggs and Larvae	Juveniles/Subadults	Adults
Atlantic salmon (*Salmo salar*)	Not present in project area	Juveniles begin metamorphosis into smolts while still in fresh water, in preparation for downstream migration into brackish and fully saline seawater in the spring. The timing of downstream migration depends on a variety of factors, including temperature, salinity, and the physiological adaptations that make it possible for the smolts to tolerate higher salinity.	EFH for spawning adult salmon also includes coastal marine, estuarine, lacustrine, and riverine habitats used during upstream migration.
Scup (*Stenotomus chrysops*)	**Eggs:** EFH for scup eggs is "mixing" and "seawater" salinity zones of estuaries. In general, scup eggs are found from May through August in southern New England to coastal Virginia, in waters between 13 and 23°C, and in salinities greater than 15 ppt. **Larvae:** Scup larvae are most abundant nearshore from May through September in waters between 13 and 23°C and in salinities greater than 15 ppt.	**Offshore:** EFH is the demersal waters over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, NC. **Inshore:** EFH includes "mixing" and "seawater" salinity zones of estuaries. In general during the summer and spring juvenile scup are found in estuaries and bays between Virginia and Massachusetts in association with various sands, mud, mussel, and eelgrass bed type substrates and in water temperatures greater than 7.2°C and salinities greater than 15 ppt.	**Offshore:** EFH is the demersal waters over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, NC. **Inshore:** EFH is the "mixing" and "seawater" salinity zones of estuaries. Generally, wintering adults (November through April) are usually offshore, south of New York to North Carolina, in waters above 7.2°C.
Black seabass (*Centropristis striatus*)	**Eggs:** EFH is the "mixing" and "seawater" salinity zones of estuaries. Generally, black sea bass eggs are found from May through October on the continental shelf, from southern New England to North Carolina. **Larvae:** North of Cape Hatteras, EFH is the pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, NC. Generally, the habitats for the transforming larvae (to juveniles) are near the coastal areas and into marine parts of estuaries between Virginia and New York. When larvae become	**Offshore:** EFH is the demersal waters over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, NC. **Inshore:** EFH is the "mixing" and "seawater" salinity zones of estuaries. Juveniles are found in the estuaries in the summer and spring. Generally, juvenile black sea bass are found in waters warmer than 6°C with salinities greater than 18 ppt and coastal areas between Virginia and Massachusetts, but they winter offshore from New Jersey and south. Juvenile black sea bass are usually found in association	**Offshore:** EFH is the demersal waters over the continental shelf (from the coast out to the limits of the EEZ), from the Gulf of Maine to Cape Hatteras, NC. **Inshore:** EFH is estuaries. Black sea bass are generally found in estuaries from May through October. Wintering adults (November through April) are generally offshore, south of New York to North Carolina. Temperatures above 6°C seem to be the minimum requirements. Structured habitats (natural and man-made), sand, and shell are usually the substrate preference.

Species	Eggs and Larvae	Juveniles/Subadults	Adults
	demersal, they are generally found on structured inshore habitat such as sponge beds.	with rough bottom, shellfish, and eelgrass bed,s and man-made structures in sandy shelly areas; offshore clam beds and shell patches may also be used during the wintering.	
American plaice (*Hippoglossoides platessoides*)	**Eggs:** Pelagic habitats in the Gulf of Maine and on Georges Bank, including the high salinity zones of the bays and estuaries. **Larvae:** Pelagic habitats in the Gulf of Maine, on Georges Bank, and in southern New England, including the high salinity zones of the bays and estuaries.	Sub-tidal benthic habitats in the Gulf of Maine and the western portion of Georges Bank, between 40 and 180 m, as well as mixed and high salinity zones in the coastal bays and estuaries. EFH for juvenile American plaice consists of soft bottom substrates (mud and sand), but they are also found on gravel and sandy substrates bordering bedrock.	Sub-tidal benthic habitats in the Gulf of Maine and the western portion of Georges Bank, between depths of 40 and 300 m, including high salinity zones in the coastal bays and estuaries. EFH for adult American plaice consists of soft bottom substrates (mud and sand), but they are also found on gravel and sandy substrates bordering bedrock.
Atlantic cod (*Gadus morhua*)	**Eggs:** Pelagic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region, and in the high salinity zones of the bays and estuaries. **Larvae:** Pelagic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region, and in the high salinity zones of bays and estuaries.	Intertidal and sub-tidal benthic habitats in the Gulf of Maine, southern New England, and on Georges Bank, to a maximum depth of 120 m, including high salinity zones in bays and estuaries. Structurally complex habitats, including eelgrass, mixed sand and gravel, and rocky habitats (gravel pavements, cobble, and boulder) with and without attached macroalgae and emergent epifauna, are essential habitats for juvenile cod. In inshore waters, YOY juveniles prefer gravel and cobble habitats and eelgrass beds after settlement. Older juveniles move into deeper water and are associated with gravel, cobble, and boulder habitats, particularly those with attached organisms. Gravel is a preferred substrate for YOY juveniles on Georges Bank and they have also been observed along the small boulders and cobble margins of rocky reefs in the Gulf of Maine.	Sub-tidal benthic habitats in the Gulf of Maine, south of Cape Cod, and on Georges Bank, between 30 and 160 m, including high salinity zones in bays and estuaries. Structurally complex hardbottom habitats composed of gravel, cobble, and boulder substrates with and without emergent epifauna and macroalgae are essential habitat for adult cod. Adult cod are also found on sandy substrates and frequent deeper slopes of ledges along shore. South of Cape Cod, spawning occurs in nearshore areas and on the continental shelf, usually in depths less than 70 m.

Species	Eggs and Larvae	Juveniles/Subadults	Adults
Haddock (*Melanogrammus aeglefinus*)	**Eggs**: Pelagic habitats in coastal and offshore waters in the Gulf of Maine, southern New England, and on Georges Bank. **Larvae**: Pelagic habitats in coastal and offshore waters in the Gulf of Maine, the Mid-Atlantic, and on Georges Bank.	Sub-tidal benthic habitats at depths between 40 and 140 m in the Gulf of Maine, on Georges Bank and in the Mid-Atlantic region, and as shallow as 20 m along the coast of Massachusetts, New Hampshire, and Maine. EFH for adult haddock occurs on hard sand (particularly smooth patches between rocks), mixed sand and shell, gravelly sand, and gravel. YOY juveniles settle on sand and gravel on Georges Bank, but are found predominantly on gravel pavement areas within a few months after settlement. As they grow, they disperse over a greater variety of substrate types on the bank. YOY haddock do not inhabit shallow, inshore habitats.	Sub-tidal benthic habitats at depths between 50 and 160 m in the Gulf of Maine, on Georges Bank, and in southern New England. EFH for adult haddock occurs on hard sand (particularly smooth patches between rocks), mixed sand and shell, gravelly sand, and gravel substrates. They also are found adjacent to boulders and cobbles along the margins of rocky reefs in the Gulf of Maine.
Ocean pout (*Macrozoarces americanus*)	**Eggs**: Hardbottom habitats on Georges Bank, in the Gulf of Maine, and in the Mid-Atlantic Bight, as well as the high salinity zones of bays and estuaries. Eggs are laid in gelatinous masses, generally in sheltered nests, holes, or rocky crevices. EFH for ocean pout eggs occurs in depths less than 100 m on rocky bottom habitats. **Larvae**: species does not have a true larval stage.	Intertidal and sub-tidal benthic habitats in the Gulf of Maine and on the continental shelf north of Cape May, NJ; on the southern portion of Georges Bank; and in the high salinity zones of a number of bays and estuaries north of Cape Cod, extending to a maximum depth of 120 m. EFH for juvenile ocean pout occurs on a wide variety of substrates, including shells, rocks, algae, soft sediments, sand, and gravel.	Sub-tidal benthic habitats between 20 and 140 m in the Gulf of Maine; on Georges Bank; in coastal and continental shelf waters north of Cape May, NJ; and in the high salinity zones of a number of bays and estuaries north of Cape Cod. EFH for adult ocean pout includes mud and sand, particularly in association with structure-forming habitat types (i.e., shells, gravel, or boulders). In softer sediments, they burrow tail first and leave a depression on the sediment surface. Ocean pout congregate in rocky areas prior to spawning and frequently occupy nesting holes under rocks or in crevices in depths less than 100 m.

Species	Eggs and Larvae	Juveniles/Subadults	Adults
Pollack (*Pollachius virens*)	**Eggs**: Pelagic inshore and offshore habitats in the Gulf of Maine, on Georges Bank, and in southern New England, including bays and estuaries. **Larvae**: Pelagic inshore and offshore habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region, including the bays and estuaries.	Inshore and offshore pelagic and benthic habitats from the intertidal zone to 180 m in the Gulf of Maine, Long Island Sound, and Narragansett Bay; between 40 and 180 m on western Georges Bank and the Great South Channel; and in mixed and full salinity waters in a number of bays and estuaries north of Cape Cod. EFH for juvenile pollock consists of rocky bottom habitats with attached macroalgae (rockweed and kelp), which provide refuge from predators. Shallow water eelgrass beds are also essential habitats for YOY pollock in the Gulf of Maine. Older juveniles move into deeper water into habitats also occupied by adults.	Offshore pelagic and benthic habitats in the Gulf of Maine and, to a lesser extent, on the southern portion of Georges Bank at depths between 80 and 300 m, and in shallower sub-tidal habitats in Long Island Sound, Massachusetts Bay, and Cape Cod Bay. Essential habitats for adult pollock are the tops and edges of offshore banks and shoals (e.g., Cashes Ledge) with mixed rocky substrates, often with attached macro algae.
Silver hake (*Merluccius bilinearis*)	**Eggs and Larvae:** Pelagic habitats from the Gulf of Maine to Cape May, NJ, including Cape Cod and Massachusetts Bays.	Pelagic and benthic habitats in the Gulf of Maine, including coastal bays and estuaries and on the continental shelf as far south as Cape May, NJ; at depths greater than 10 m in coastal waters in the Mid-Atlantic; and at depths between 40 and 400 m in the Gulf of Maine, on Georges Bank, and in the middle continental shelf in the Mid-Atlantic, on sandy substrates. Juvenile silver hake are found in association with sand waves, flat sand with amphipod tubes and shells, and in biogenic depressions. Juveniles in the NY Bight settle to the bottom at mid-shelf depths on muddy sand substrates and find refuge in amphipod tube mats.	Pelagic and benthic habitats at depths greater than 35 m in the Gulf of Maine and coastal bays and estuaries; between 70 and 400 m on Georges Bank and the OCS in the northern portion of the Mid-Atlantic Bight; and in some shallower locations nearer the coast, on sandy substrates. Adult silver hake are often found in bottom depressions or in association with sand waves and shell fragments. They have also been observed at high densities in mud habitats bordering deep boulder reefs, resting on boulder surfaces, and foraging over deep boulder reefs in the southwestern Gulf of Maine. This species makes greater use of the water column (for feeding, at night) than red or white hake.

Species	Eggs and Larvae	Juveniles/Subadults	Adults
Red hake (*Urophycis chuss*)	**Eggs and Larvae:** Pelagic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic, and in bays and estuaries.	Intertidal and sub-tidal benthic habitats throughout the region on mud and sand substrates to a maximum depth of 80 m, including bays and estuaries. Bottom habitats providing shelter are essential for juvenile red hake, including mud substrates with biogenic depressions, substrates providing biogenic complexity (e.g., eelgrass, macroalgae, shells, anemone, polychaete tubes), and artificial reefs. Newly settled juveniles occur in depressions on the open seabed. Older juveniles are commonly associated with shelter or structure and often inside live bivalves.	Benthic habitats in the Gulf of Maine and the OCS and slope in depths of 50 to 750 m and as shallow as 20 m in a number of inshore estuaries and embayments as far south as Chesapeake Bay. Shell beds, soft sediments (mud and sand), and artificial reefs provide essential habitats for adult red hake. They are usually found in depressions in softer sediments or in shell beds and not on open sandy bottom. In the Gulf of Maine, they are much less common on gravel or hardbottom, but they are reported to be abundant on hardbottoms in temperate reef areas of Maryland and northern Virginia.
White hake (*Urophycis tenuis*)	**Eggs**: Pelagic habitats in the Gulf of Maine, including Massachusetts and Cape Cod bays, and the OCS and slope. **Larvae**: Pelagic habitats in the Gulf of Maine, in southern New England, and on Georges Bank. Early-stage white hake larvae have been collected on the continental slope but cross the shelf-slope front and use nearshore habitats for juvenile nurseries. Larger larvae and pelagic juveniles have been found only on the continental shelf.	Intertidal and sub-tidal estuarine and marine habitats in the Gulf of Maine, on Georges Bank, and in southern New England, including mixed and high salinity zones in a number of bays and estuaries north of Cape Cod, to a maximum depth of 300 m. Pelagic phase juveniles remain in the water column for about two months. In nearshore waters, EFH for benthic phase juveniles occurs on fine-grained, sandy substrates in eelgrass, macroalgae, and unvegetated habitats. In the Mid-Atlantic, most juveniles settle to the bottom on the continental shelf, but some enter estuaries, especially those in southern New England. Older YOY juveniles occupy the same habitat types as the recently settled juveniles but move into deeper water (>50 m).	Sub-tidal benthic habitats in the Gulf of Maine, including depths greater than 25 m in certain mixed and high salinity zones portions of a number of bays and estuaries, between 100 and 400 m in the outer gulf, and between 400 and 900 m on the OCS and slope. EFH for adult white hake occurs on fine-grained, muddy substrates and in mixed soft and rocky habitats. Spawning takes place in deep water on the continental slope and in Canadian waters.

Species	Eggs and Larvae	Juveniles/Subadults	Adults
Summer flounder (*Paralichthys dentatus*)	**Eggs:** North of Cape Hatteras, EFH is the pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) from the Gulf of Maine to Cape Hatteras, NC. In general, summer flounder eggs are found between October and May, and are most abundant between Cape Cod and Cape Hatteras, with the heaviest concentrations within 9 miles of shore off New Jersey and New York. Eggs are most commonly collected at depths of 10–110 m **Larvae:** North of Cape Hatteras, EFH is the pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) from the Gulf of Maine to Cape Hatteras, NC, in nearshore waters (out to 80 km from shore). Inshore, EFH is the "mixing" (0.5–25.0 ppt) and "seawater" (>25 ppt) salinity zones of estuaries. In general, summer flounder larvae are most abundant nearshore (20–80 km from shore) at depths between 10–80 m. They are most frequently found in the northern part of the Mid-Atlantic Bight from September to February, and in the southern part from November to May.	North of Cape Hatteras, EFH is the demersal waters over the continental shelf (from the coast out to the limits of the EEZ) from the Gulf of Maine to Cape Hatteras, NC. In inshore waters EFH includes the "mixing" and "seawater" salinity zones of estuaries. In general, juveniles use several estuarine habitats as nursery areas, including salt marsh creeks, seagrass beds, mudflats, and open bay areas in water temperatures greater than 37°C and salinities ranging 10–30 ppt.	North of Cape Hatteras, EFH is the demersal waters over the continental shelf (from the coast out to the limits of the EEZ) from the Gulf of Maine to Cape Hatteras, North Carolina. In inshore waters EFH is the "mixing" and "seawater" salinity zones of estuaries. Generally, summer flounder inhabit shallow coastal and estuarine waters during warmer months and move offshore on the OCS at depths of 150 m in colder months.
Windowpane flounder (*Scophthalmus aquosus*)	**Eggs and Larvae:** Pelagic habitats on the continental shelf from Georges Bank to Cape Hatteras and in mixed and high salinity zones of coastal bays and estuaries throughout the region.	Intertidal and sub-tidal benthic habitats in estuarine, coastal marine, and continental shelf waters from the Gulf of Maine to northern Florida, including mixed and high salinity zones in bays and estuaries. EFH for juvenile windowpane flounder is found on mud and sand substrates and extends from the intertidal zone to a maximum depth of 60 m. YOY juveniles prefer sand over mud.	Intertidal and sub-tidal benthic habitats in estuarine, coastal marine, and continental shelf waters from the Gulf of Maine to Cape Hatteras, including mixed and high salinity zones in bays and estuaries. EFH for adult windowpane flounder is found on mud and sand substrates and extends from the intertidal zone to a maximum depth of 70 m.

Species	Eggs and Larvae	Juveniles/Subadults	Adults
Winter flounder (*Pseudopleuronectes americanus*)	**Eggs:** Sub-tidal estuarine and coastal benthic habitats from mean low water to 5-m water depths from Cape Cod to Absecon Inlet (39° 22′ N), and as deep as 70 m on Georges Bank and in the Gulf of Maine, including mixed and high salinity zones in bays and estuaries. The eggs are adhesive and deposited in clusters on the bottom. Essential habitat for winter flounder eggs include mud, muddy sand, sand, gravel, macroalgae, and SAV. Bottom habitats are unsuitable if exposed to excessive sedimentation, which can reduce hatching success. Larvae hatch in nearshore waters and estuaries or are transported shoreward from offshore spawning sites where they metamorphose and settle to the bottom as juveniles. They are initially planktonic but become increasingly less buoyant and occupy the lower water column as they get older.	Estuarine, coastal, and continental shelf benthic habitats from the Gulf of Maine to Absecon Inlet (39° 22′ N), including Georges Bank; and in mixed and high salinity zones in bays and estuaries. EFH for juvenile winter flounder extends from the intertidal zone (mean high water) to a maximum depth of 60 m and occurs on a variety of bottom types, such as mud, sand, rocky substrates with attached macroalgae, tidal wetlands, and eelgrass. YOY juveniles are found inshore on muddy and sandy sediments in and adjacent to eelgrass and macroalgae, in bottom debris, and in marsh creeks. They tend to settle to the bottom in soft-sediment depositional areas, where currents concentrate late-stage larvae and disperse into coarser-grained substrates as they get older.	Estuarine, coastal, and continental shelf benthic habitats extending from the intertidal zone (mean high water) to a maximum depth of 70 m from the Gulf of Maine to Absecon Inlet (39° 22′ N), including Georges Bank; and in mixed and high salinity zones in bays and estuaries. EFH for adult winter flounder occurs on muddy and sandy substrates, and on hardbottom on offshore banks. In inshore spawning areas, EFH includes a variety of substrates where eggs are deposited on the bottom (see eggs).
Witch flounder (*Glyptocephalus cynoglossus*)	Pelagic habitats on the continental shelf throughout the Northeast region.	Sub-tidal benthic habitats at depths between 50 and 400 m in the Gulf of Maine and as deep as 1,500 m on the OCS and slope, with mud and muddy sand substrates.	Sub-tidal benthic habitats at depths between 35 and 400 m in the Gulf of Maine and as deep as 1,500 m on the OCS and slope, with mud and muddy sand substrates.
Yellowtail flounder (*Pleuronectes ferruginea*)	**Eggs:** Coastal and continental shelf pelagic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region as far south as the upper Delmarva peninsula, including the high salinity zones of bays and estuaries. **Larvae**: Coastal marine and continental shelf pelagic habitats in the Gulf of Maine, and from Georges Bank to Cape Hatteras, including the high salinity zones of bays and estuaries.	Sub-tidal benthic habitats in coastal waters in the Gulf of Maine and on the continental shelf on Georges Bank and in the Mid-Atlantic, including the high salinity zones of bays and estuaries. EFH for juvenile yellowtail flounder occurs on sand and muddy sand at depths between 20 and 80 m. In the Mid- Atlantic, YOY juveniles settle to the bottom on the continental shelf, primarily at depths of 40–70 m, on sandy substrates.	Sub-tidal benthic habitats in coastal waters in the Gulf of Maine and on the continental shelf on Georges Bank and in the Mid-Atlantic, including the high salinity zones of bays and estuaries. EFH for adult yellowtail flounder occurs on sand and sand with mud, shell hash, gravel, and rocks at depths between 25 and 90 m.

Species	Eggs and Larvae	Juveniles/Subadults	Adults
Atlantic mackerel (*Scomber scombrus*)	**Eggs:** EFH for Atlantic mackerel eggs is generally found over bottom depths of 100 m or less with average water temperatures of 6.5 to 12.5°C in the upper 15 m of the water column. **Larvae:** EFH is pelagic habitats in inshore estuaries and embayments from Great Bay, NH, to the south shore of Long Island, NY, inshore and offshore waters of the Gulf of Maine, and on the continental shelf from Georges Bank to Cape Hatteras, NC (mostly north of 38°N).	EFH is pelagic habitats in inshore estuaries and embayments from Great Bay, NH, to the south shore of Long Island, NY, inshore and offshore waters of the Gulf of Maine, and on the continental shelf from Georges Bank to Cape Hatteras, NC (mostly north of 38°N).	EFH is pelagic habitats in inshore estuaries and embayments from Passamaquoddy Bay, ME, to the Hudson River, and on the continental shelf from Georges Bank to Cape Hatteras, NC. EFH for adult Atlantic mackerel is generally found over bottom depths less than 170 m and in water temperatures of 5–20°C.
Atlantic butterfish (*Peprilus triacanthus*)	**Eggs:** EFH for Atlantic butterfish eggs are generally found over bottom depths of 1,500 m or less, where average temperatures in the upper 200 m of the water column are 6.5–21.5°C. **Larvae:** EFH is pelagic habitats in inshore estuaries and embayments from Massachusetts Bay to the south shore of Long Island, NY, in Chesapeake Bay, and on the continental shelf and slope, primarily from Georges Bank to Cape Hatteras, NC.	EFH is pelagic habitats in inshore estuaries and embayments from Massachusetts Bay to Pamlico Sound, NC; inshore waters of the Gulf of Maine and the South Atlantic Bight; on Georges Bank; on the inner continental shelf south of Delaware Bay; and on the OCS from southern New England to South Carolina. EFH for adult Atlantic butterfish is generally found over bottom depths between 10 and 250 m, where bottom water temperatures are between 4.5 and 27.5°C and salinities are above 5 ppt.	See juveniles
Bluefish (*Pomatomus saltatrix*)	**Eggs:** North of Cape Hatteras, pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) at mid-shelf depths, from Montauk Point, NY, south to Cape Hatteras in the pelagic waters over the continental shelf (from the coast out to the eastern wall of the Gulf Stream). Bluefish eggs are generally not collected in estuarine waters, and thus there is no EFH designation inshore. Generally, bluefish eggs are collected between April through August in temperatures greater than 18°C and normal shelf salinities (>31 ppt).	North of Cape Hatteras, pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) from Nantucket Island, MA, south to Cape Hatteras, NC. Atlantic estuaries from May through October, and South Atlantic estuaries March through December, within the "mixing" and "seawater" zones.	North of Cape Hatteras, over the continental shelf (from the coast out to the limits of the EEZ) from Cape Cod Bay, MA, south to Cape Hatteras.

Species	Eggs and Larvae	Juveniles/Subadults	Adults
	Larvae: North of Cape Hatteras, pelagic waters found over the continental shelf (from the coast out to the limits of the EEZ) most commonly above 15 m, from Montauk Point south to Cape Hatteras.		
Albacore tuna (*Thunnus alalunga*)	Not present in project area	Offshore, pelagic habitats of the Atlantic Ocean from the outer edge of the U.S. EEZ through Georges Bank to pelagic habitats south of Cape Cod, and from Cape Cod to Cape Hatteras, NC.	See juveniles
Bluefin tuna (*Thunnus thynnus*)	This life stage has been expanded into two areas of the Slope Sea (off the shelf between North Carolina and Georges Bank, north of the Gulf Stream) due to the presence of extremely young larvae. One area encompasses pelagic habitats on and off the continental shelf (off the coast of North Carolina) and extends to the shoreline between the NC/VA line and Oregon Inlet. The other area includes pelagic waters of the Slope Sea, extending to the outer United States' EEZ south of Georges Bank.	Coastal and pelagic habitats of the Mid-Atlantic Bight and the Gulf of Maine, between southern Maine and Cape Lookout, from shore (excluding Long Island Sound, Delaware Bay, Chesapeake Bay, and Pamlico Sound) to the continental shelf break. EFH in coastal areas of Cape Cod are located between the Great South Passage and shore. EFH follows the continental shelf from the outer extent of the U.S. EEZ on Georges Bank to Cape Lookout. EFH is associated with certain environmental conditions in the Gulf of Maine (16–19°C; 0–40 m deep). EFH in other locations associated with temperatures ranging from 4–26°C, often in depths of less than 20 m (but can be found in waters that are 40–100 m in depth in winter).	EFH is located in offshore and coastal regions of the Gulf of Maine from the mid-coast of Maine to Massachusetts; on Georges Bank; offshore pelagic habitats of southern New England; and from southern New England to coastal areas between the mouth of Chesapeake Bay and Onslow Bay, NC.

Species	Eggs and Larvae	Juveniles/Subadults	Adults
Yellowfin tuna (*Thunnus albacares*)	Not present in project area	Offshore pelagic habitats seaward of the continental shelf break between the seaward extent of the U.S. EEZ boundary on Georges Bank and Cape Cod, MA. Offshore and coastal habitats from Cape Cod to the mid-east coast of Florida and the Blake Plateau.	See juveniles
Skipjack tuna (*Katsuwonus pelamis*)	Not present in project area	Offshore pelagic habitats seaward of the continental shelf break between the seaward extent of the U.S. EEZ boundary and the seaward margin of Georges Bank (off Massachusetts); coastal and offshore habitats between Massachusetts and South Carolina.	Coastal and offshore habitats between Massachusetts and Cape Lookout, NC, and localized areas in the Atlantic off South Carolina and Georgia, as well as the northern east coast of Florida.
Swordfish (*Xiphias gladius*)	Not present in project area	Offshore pelagic habitats, seaward of the continental shelf break, between Georges Bank and the Florida Keys; EFH is in depths greater than 200 m in all areas.	Offshore pelagic habitats, seaward of the continental shelf break, between Georges Bank and the Florida Keys. EFH extends from the continental shelf to the U.S. EEZ boundary off Massachusetts, Virginia, and from South Carolina through the Florida Keys.

EEZ = Exclusive Economic Zone; MAFMC = Mid-Atlantic Fishery Management Council; N/A = not applicable; NEFMC = New England Fishery Management Council; NMFS = National Marine Fisheries Service; YOY = young-of-the-year.

E.4 Analysis of Effects

The purpose of this section is to evaluate if the Proposed Action would have an adverse effect on EFH, including managed and associated species, at the WEAs. The EFH rules define an adverse effect as "any impact which reduces quality and/or quantity of EFH...[and] may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions."

Three types of habitat are included in this analysis: soft bottom benthic, hardbottom benthic, and pelagic (water column). As mentioned above, site assessment activities would most likely include the temporary placement of metocean buoys. Site characterization activities would most likely include geophysical and geotechnical, biological, and oceanographic surveys. Impacts of high-resolution geophysical (HRG) surveys on the water column habitat would be localized and transient, with no significant adverse effect on EFH for any pelagic species. Minor disturbance of soft bottom benthic habitats where met buoys are placed and where geotechnical (bottom samples, deep borings, vibracores, cone penetrometers) and biological sampling (e.g., benthic grabs, bottom trawls, gillnets, ventless traps) may occur, but no adverse effects on soft bottom benthic habitats are expected due to the small spatial footprint of these activities. Hardbottom habitats would be avoided through the site selection and mapping process, and no adverse effects to these habitats are anticipated.

Equipment used during site characterization and site assessment activities (e.g., towed HRG survey equipment, cone penetration test [CPT] components, grab sampler, buoys, lines, cables) could be accidentally lost during survey operations. Additionally, it is possible (although unlikely) that the met buoy could disconnect from the clump anchor. In the event of lost equipment, recovery operations may be undertaken to retrieve the equipment. Recovery operations may be performed in a variety of manners depending on the equipment lost. A commonly used method for retrieval of lost equipment on the seafloor is through dragging grapnel lines (e.g., hooks, trawls). A single vessel deploys a grapnel line to the seafloor and drags it along the bottom until it catches the lost equipment, which is then brought to the surface for recovery. This process can result in significant bottom disturbances as it requires dragging the grapnel line along the bottom until it hooks the lost equipment, which may require multiple passes in a given area. In addition to dragging a grapnel line along the bottom, after the line catches the lost equipment, it would drag all the components along the seafloor until recovery.

Where lost survey equipment is not able to be retrieved because it is either small, buoyant enough to be carried away by currents, or is completely or partially embedded in the seafloor (for example, a broken vibracore), the equipment may become a potential hazard for bottom-tending fishing gear or cause additional bottom disturbance. For example, a broken vibracore that cannot be retrieved may need to be cut and capped 1 to 2 m below the seafloor. For the recovery of lost survey equipment, BOEM will work with the lessee/operator to develop an emergency response plan. Selection of a mitigation strategy will depend on the nature of the lost equipment, and further consultation may be necessary.

BOEM assumes that during site characterization, a lessee would survey potential transmission cable routes (for connecting future wind turbines to an onshore power substation) from the WEAs to shore using similar site assessments described above. BOEM assumes that survey grids for a proposed transmission cable route to shore would likely occur over a 1,000-m wide corridor centered on the potential transmission cable location. These cable routes would traverse inshore habitats, but at present specific locations are not known. Inshore habitats (soft bottom, SAV, emergent vegetation including salt marshes) represented in bays, estuaries, and river mouths of the project area support various life stages of managed species and their prey. These habitats include HAPCs for juvenile summer flounder, sand tiger sharks, sandbar sharks, and cod (**Figure E-2**).

Biological surveys, primarily fishery surveys including trawl, gillnet, ventless trap, and shellfish surveys, but also placement of fixed gear and passive acoustic monitoring mooring equipment, and the use of sediment profile and plan view imaging equipment would likely result in some direct mortality to finfish and invertebrates, including some federally managed species or their prey as well as result in some benthic disturbance and direct mortality to benthic species. However, the dispersed nature of biological survey-related vessel traffic and limited number of surveys reduces the potential for repeated disturbances (Baker and Howson 2021). Generally, methodologies employed in fisheries surveys include returning most of the animals back to the sea as quickly as possible. Nevertheless, sub-sampling and other trauma is expected to result in some mortality; BOEM recognizes that some fisheries surveys could impact listed species under the Endangered Species Act (ESA). This mortality is anticipated to be undetectable within the overall fishery management regime described in **Section 4.2.3**, and lasting adverse impacts to EFH are not expected.

E.4.1 Soft Bottom Benthic Habitat

The region of interest includes nearshore and offshore sub-tidal subsystems of the continental shelf from the shoreline of the coast to the shelf edge (~100-m water depths). The primary substrate is unconsolidated sediment, as the shelf is overlain mostly by medium-grained sand (0.25 to <0.5 mm). Some discrete patches with different sedimentary compositions exist within the region. Most notably are areas of muddy sand to mud (< 0.0625 mm) and gravelly sand to gravel (2 to <4,096 mm). The medium sand is arranged as a level plain or as ripples and megaripples generally oriented southwest to northeast. Waves (ripples) may be 1 to 2 m high, separated by about 5 km (Guida et al. 2017). The unconsolidated substrates support deep burrowing fauna, small surface burrowing fauna, larger tube-building fauna, scallop beds, clam beds, and sand dollars (*Echinarachnius parma*). Common benthic biota reported by NYSERDA (2017) included sand dollars, brachyuran crabs, gastropods, bivalves, burrowing anemones, and sea stars. In softer fine and very fine sand, infaunal tube-building and burrowing polychaetes, as well as abundant beds of thin *Ampelisca* amphipod tubes, were observed as well as orange sponges. Demersal fishes of the region associate with benthic habitats on a variety of spatial scales. Sand ridges provide a distinct habitat for adults, settled juveniles, and larvae for various fish species (Auster et al. 1997; Steves et al. 1999; Vasslides and Able 2008). At large scales (i.e., on the order of km), ridges and swales provide relief and habitat complexity, but, for juvenile fishes, structure at smaller scales (i.e., m to cm) is more important (Diaz et al. 2003). Small scale structure used by juvenile fishes as refuge from predation can be either physical (sand waves or bedforms) or biogenic (shell fragments, worm tubes, hydrozoans, and pits) in nature (Auster et al. 1997). Structure-forming biota present on the seafloor such as worm (*Diopatra*) or amphipod (*Ampelisca*) tubes, orange sponges, or mussel beds also provide habitat for juvenile and newly settled fish species (Diaz et al. 2003). Soft bottom habitats in inshore waters potentially traversed by transmission cables may be composed of detritus—clay-silt and sand-silt-clay sediments—which in some areas may include contaminants (Raposa and Schwartz 2009). Inshore soft bottom habitats also support SAV, shellfish beds, salt marshes, and other features that constitute important nursery areas for many federally managed species (Able and

Fahy 2010; Raposa and Schwartz 2009). For example, the summer flounder juvenile HAPC mentioned above exists primarily in inshore waters of the region. Important prey species such as Atlantic silversides, anchovies, and killifishes also inhabit inshore habitats. Benthic sampling could also include nearshore and estuarine waters as well as SAV habitats along the proposed transmission cable routes.

Effects on Managed and Associated Species

Demersal species inhabiting soft bottom benthic habitat in the project area include adult and juvenile Atlantic sea scallops, Atlantic surfclams, ocean quahogs, Atlantic lobster, Jonah crab, clearnose skate (*Raja eglanteria*), little skate (*Leucoraja erinacea*), black seabass, monkfish, summer flounder, winter flounder (*Pseudopleuronectes americanus*), and windowpane flounder (*Scophthalmus aquosus*). The demersal fishes feed on benthic crustaceans, polychaete worms, mollusks, and various fishes. These and other demersal species may be directly affected by the activities expected for the Proposed Action that would disturb soft bottom habitats.

Effects on Soft Bottom Habitat

This analysis covers the biological, geophysical, and geotechnical surveys associated with the Proposed Action that are expected to disrupt soft bottom seafloor habitats. The placement of met buoys is also considered.

Biological Sampling

Biological sampling methods expected to disrupt the seafloor include benthic grabs (e.g., Van Veen) and bottom trawls (e.g., otter and beam trawls, ventless traps). Benthic grab samplers used for assessing infauna assemblages remove on average about 0.1 m^2 of the upper 10 to 15 cm of seafloor sediment. The total area of seabed disturbed by individual sampling events (e.g., collection of a core or grab sample) is estimated to range from 1 to 10 m^2 for each lease area. A similar level of disturbance is to be expected from sampling within inshore transmission cable routes. These small volume samples may temporarily displace bottom feeding fishes and may remove or injure individual Atlantic sea scallops, Atlantic surfclams, or quahogs. These samples may also remove or injure demersal eggs, such as those deposited by winter flounder, or the egg cases deposited by various skate species. Infauna and epifauna that contribute to the prey base for demersal species such as hakes and skates may be affected by bottom sampling. While the biological sampling will result in some benthic disturbance and direct mortality of soft bottom assemblages, the dispersed nature and limited number of these surveys will impact only a small area of available soft bottom habitat in the region and are not expected to have adverse effects on EFH of managed species.

Bottom trawling, especially repeated trawling over fishing grounds, is well known to damage demersal environments (Collie et al. 1997; Mazor et al. 2021). Chains and heavy doors used by bottom trawls dig into the seafloor. Bottom trawl sampling expected for the proposed NY Bight WEA leasing is expected to follow the guidelines described by BOEM (2019b). For each of the 10 proposed leases areas, 20 project area and 10 control area otter trawl tows would be collected quarterly over a 2-year period, for a total of 8 surveys. The expected total would therefore be 240 otter trawl samples per lease (30 trawls × 8 surveys). Similarly, beam trawl surveys would occur quarterly over a 2-year period, for a total of

8 surveys. Each survey would collect 6 trawls, for a total of 48 beam trawl samples per lease. These individual tows would be short duration (<30 min), cover small areas of seafloor (<7,000 m^2), and be spread widely over the shelf (or inshore waters). Soft bottom assemblages disturbed by trawl sample would be expected to recover in short time frames (~100 days) (Collie et al. 2000).

Recovery of bottom grabs, otter trawls, beam trawls, or ventless traps lost during a survey may entail dragging grapnel lines, which could also disturb demersal habitats. Such recovery efforts are expected to occur infrequently and are not expected to have adverse effects on EFH of managed species or life stages.

Seafloor disturbance, as described above, may result from biological sampling in inshore waters (transmission cable routes) and may also affect EFH for managed species, especially juvenile stages. Potentially vulnerable HAPCs (**Figure E-2**) are also present in inshore are waters. These include summer flounder SAV (all areas); sand tiger shark (Delaware Bay) and sandbar shark (Delaware Bay and Great Bay) nursery areas; and juvenile cod habitat (coastal Rhode Island and Narragansett Bay).

HRG Surveys

HRG surveys acquire geophysical shallow hazards information. This information is used to determine whether shallow hazards will impact seabed support of the turbines, identify the presence or absence of archaeological resources, and conduct bathymetric charting. Side-scan sonars, sub-bottom profilers, magnetometers, and multibeam echosounders may be used during HRG surveys and could add noise to the underwater environment (**Table E-2**). These surveys may affect sand tiger, sandbar shark, and juvenile cod HAPCs illustrated in **Figure E-2**. Effects of HRG surveys on soft bottom species, EFH, or HAPCs are not expected to be significant and are considered in more detail below under Pelagic Habitat (**Section E.4.3**).

Geotechnical Surveys

Geotechnical surveys may involve vibracores, piston cores, deep borings, cone penetrometers, sediment profile imagers, and other forms of bottom-sampling gear (**Table E-3**). These methods would disturb soft bottom seafloor habitats by creating holes and pits. Epifauna and infauna resources important to bottom feeding fishes may be lost under and around areas where gear contacts the bottom. Average bottom coverage expected for vibracore, piston core, and deep boring samples is 1 m^2. A maximum of 2,548 samples may be collected for a total area of 2,548 m^2. Cone penetrometer and sediment profile imaging affect about 4 m^2 of seafloor for each sample for a combined total of 20,384 m^2. These sampling methods would generate noise up to 150 dB for deep borings (see **Table E-3**). This level is below the threshold considered detrimental to fish physiology and behavior (Popper et al. 2014). For most of these methods, survey vessels require anchoring for brief periods using small anchors; however, approximately 50% of deployments for this sampling work could involve a boat having dynamic positioning capability (BOEM 2014).

Meteorological Buoy Deployment

Met buoys are towed or carried aboard a vessel to the installation location and either lowered to the surface from the deck of the vessel or placed over the final location where the mooring anchor is dropped (BOEM 2014). Based on previous proposals, anchors for boat-shaped or discus-shaped buoys would each weigh about 2,721 to 4,536 kg and have a footprint of about 0.5 m^2 and an anchor sweep of about 34,398 m^2. The maximum number of buoys expected for the project is 20, resulting in a potential impact to soft bottom habitat from anchors of 10 m^2; impacts from anchor chain sweep would be 170 acres. The types of impacts likely to occur are similar to the ones previously described for seafloor disturbance from benthic sampling.

Summary

Soft bottom habitats disturbed by these activities (with the exception of the buoy anchors) are expected to recover physically and biologically over time. Physical recovery by infilling of sediment would proceed rapidly in areas with higher waves and stronger currents and less rapidly in low energy environments. Because the sedimentary regime is generally uniform, recolonization of surficial sediments likely would proceed rapidly through larval settlement and immigration of motile individuals from adjacent undisturbed areas (Newell et al. 1998). Because these actions affect small portions of the survey areas, an adequate supply of motile taxa would be available for rapid migration into impacted areas. Although community composition may differ for a period of time after the disturbance, the infaunal assemblage type that exists in affected areas is expected to be broadly similar, taxonomically and functionally, to naturally occurring assemblages in the study area over time. Based on previous observations of infaunal re-establishment in areas damaged by dredges, the infauna assemblage most likely would become reestablished within about 2 years, exhibiting levels of infauna abundance, diversity, and composition comparable to nearby non-impacted areas (Brooks et al. 2006).

Injury to relatively immobile Atlantic scallops, ocean quahogs, and surfclams would be limited due to the patchy nature of their distributions across the shelf (Stokesbury and Himmelman 1993). Bottom feeding fishes may be temporarily displaced from feeding areas. Other demersal species would actively avoid bottom-disturbing sampling activities.

Inshore EFH may be directly affected by site characterization activity. Much of the inshore habitat such as SAV, salt marshes, and soft bottom is important for supporting early life stages of bluefish, weakfish, striped bass, scup, black seabass, and summer flounder. HAPCs for summer flounder, sand tiger shark, sandbar shark, and juvenile cod cover much of the inshore waters of the project area. Surveying of inshore soft bottom habitats may potentially affect EFH or HAPCs, but due to wide spatial coverage (kms) and limited temporal exposure (days to weeks), adverse effects are not expected.

Therefore, the effects from bottom sampling, geophysical and geotechnical sampling, and met buoy deployment are not expected to significantly adversely affect the EFH of federally managed species or associated prey and HAPCs.

E.4.2 Hardbottom Benthic Habitat

Fish species such as black seabass (*Centropristis striatus*), scup (*Stenotomus chrysops*), cunner (*Tautogolabrus adspersus*), tautog (*Tautoga onitis*), sheepshead (*Archosargus probatocephalus*), Atlantic striped bass, Atlantic cod, and conger eel (*Conger oceanicus*) associate with artificial or natural hardbottom habitats. The juvenile cod HAPC consists of gravel pavement and rocky outcrops in nearshore water of Rhode Island (NEFMC 2017). Hardbottom habitats (e.g., rocky reef communities) may exist in small, isolated patches, and data collected during initial remote geophysical surveys would identify possible locations for these communities. Met buoys would only be installed in the proposed lease areas and BOEM would require the lessee to develop and implement avoidance measures near these resources before authorizing activities that would disturb hardbottom habitats. An example of hardbottom exclusion is the Cholera Bank in the Fairways South WEA (Guida et al. 2017).

Artificial reefs are man-made underwater structures that are developed intentionally or from remnants of objects built for other purposes, such as shipwrecks (Steimle and Zeitlin 2000). According to the Marine Cadastre Ocean Reports data portal, most of the artificial reefs in this region are close to shore and outside of the lease areas; however, the 2017 survey identified two shipwrecks in the region, but their exact locations were not reported due to archaeological site sensitivity.

Natural and artificial hardbottom habitats occur in inshore waters of the region and include rocky outcrops, oyster reefs, and blue mussel beds. Artificial hardbottom consists of construction -derived structures (breakwaters, pilings, piers, riprap shorelines, etc.) as well as planned artificial reefs (Steimle and Zeitlin 2000).

Effects on Managed and Associated Species

Managed species such as black seabass with affinities for structured habitats may be attracted to moored buoys and their anchors (Fabrizio et al. 2013). Although pelagic species, squids attach egg clusters to hard substrata ranging from clam shells to exposed rock (Jacobson 2005). With a maximum of 20 met buoys expected for the entire project, such an artificial reef effect is expected to be negligible.

Effects on Hardbottom Habitat

No significant effects on benthic hardbottom habitats are expected due to the relatively low occurrence of these habitats in each WEA. Hardbottom habitats may exist in small, isolated patches along the transmission cable routes to shore, but data collected during initial geophysical surveys could identify alternate locations to allow for avoidance of these habitats. Therefore, no impacts on hardbottom habitat or on managed or associated EFH species is expected.

Summary

Due to the scarcity of hardbottom habitat in the WEAs and surrounding area, and the avoidance measures that would be implemented, hardbottom habitats are unlikely to be affected by activities conducted the Proposed Action. Therefore, the effects from bottom sampling, geophysical and geotechnical sampling, and met buoy deployment are not expected to adversely affect the EFH of federally managed species, associated prey, or HAPCs. An artificial reef effect may occur for species that are affiliated with hardbottom habitats, such as black seabass and pelagic squids, but that effect is expected to be beneficial and negligible.

E.4.3 Pelagic Habitat

The offshore pelagic environment of the project area experiences large seasonal temperature changes at the surface and bottom. In winter months (October to April) water temperatures drop to just above

1°C. During this time, the water column is not thermally stratified. As waters warm (15 to 20°C) in mid to late April, the water column stratifies (Guida et al. 2017). Large scale circulation in NY Bight (and the Middle Atlantic Bight) involves a mass of cold bottom water (the Cold Pool) that moves from Georges Bank southward into the project area in the warm season. The Cold Pool holds nutrients over the shelf during the spring and summer which in turn promotes phytoplankton productivity and affects fish distributions and behavior (Lentz 2017; Nye et al. 2009). None of the activities described for the Proposed Action are expected to have any effect on the water column environment. Currents over the shelf tend to follow major isobaths and generally increase with increasing water depth (Guida et al. 2017).

Effects on Managed and Associated Species

The primary pelagic invertebrates with EFH in the WEA are longfin inshore squid and northern shortfin squids. Common pelagic fishes inhabiting the project area include Atlantic mackerel, bluefish, butterfish, bigeye tuna, yellowfin tuna, albacore tuna, skipjack tuna, weakfish, and striped bass. Sharks found in the water column include sandbar shark, dusky shark, blue shark, and spiny dogfish. Other pelagic species such as alewife (*Alosa psuedoharengus*), American shad (*Alosa sapidissima*), Atlantic herring, and Atlantic menhaden (*Brevoortia tyrannus*) also occur in the area. In addition, several demersal species have pelagic larvae whose EFH overlaps the WEAs (**Table E-7**). These species move mostly in response to seasonal water temperature changes. Movements may be across the shelf or north and south, depending on the species.

The potential impacts of renewable energy site characterization on pelagic resources and EFH have been analyzed in the previous NY Lease EA (BOEM 2016) and the G&G Final PEIS (BOEM 2014) and are incorporated herein by reference. Key impact-producing factors for the pelagic environment are sediment suspension (elevated turbidity) and noise generated by biological, geological, and geotechnical surveying. Elevated turbidity can cause avoidance and attraction movements, impair feeding, and lead to physiological changes in adult pelagic fishes. Gill cavities can be clogged by suspended sediment which can mechanically affect food gathering in planktivorous species. High levels of suspended sediment can clog gill cavities and erode gill lamellae (Wenger et al. 2017), preventing or interfering with normal gill respiration. Motile species such as squids, summer flounder, striped bass, Atlantic herring, Atlantic mackerel, bluefish, butterfish could avoid turbid areas and escape most of those impacts. In contrast, less motile organisms—including pelagic larvae of sea scallops, ocean quahogs, Atlantic surfclams, and many species of fishes—would temporarily experience impaired sensory abilities.

Medium and shallow sub-bottom profilers are the only HRG sound source expected to produce sounds within finfish and invertebrate hearing ranges. Fish are not expected to be exposed to sound pressure levels that could cause hearing damage. Sound exposure levels are expected to be below the hearing damage thresholds for fishes and invertebrates (Popper and Hawkins 2018). Fishes can also detect particle motion at frequencies produced during HRG surveys, but understanding of the potential effects of particle motion on fish and invertebrates is limited and suggests that impacts are similar to pressure waves unless animals are close to the sound source (Popper and Hawkins 2018; Weilgart 2018). Acoustic impacts would result in temporary and spatially limited changes in behavior and displacement, particularly to those species capable of hearing in the high-frequency range such as herrings, although these species are expected to avoid such sounds. Ichthyoplankton (eggs and larvae) and other organisms inhabiting the water column or near the water surface are unlikely to be affected by noise unless they are within a few meters of the activities (Popper et al. 2014). Therefore, only a small percentage of the ichthyoplankton and overall plankton assemblage populations would be affected.

Effects on Pelagic Habitat

Biological Sampling

Installation of clump anchors associated with met buoys, vibracoring, bottom sampling (trawling or bottom grabs), or deep borings may cause an increase in local suspended sediments. These impacts would be limited to the immediate area surrounding the anchors and of short duration. Suspended sediments could elevate ambient turbidity of the water column, which would be a localized, transient effect.

In general, biotic assemblages of the NY Bight inner shelf are regularly subjected to periodic reworking of surficial sediments caused by storm events, and are unlikely to experience adverse effects that are greater than those due to the normal dynamic environment. Effects from proposed activities would be limited to within hundreds of meters of anchoring and other bottom-disturbing activities and would persist for a matter of hours after the activity ceases. The sweep of anchor chains across the sedimentary seafloor is expected to elevate turbidity in small areas adjacent to the met buoys. Anchor sweep is expected to be a limited but continuous process. Biological, geological, and geotechnical sampling would temporarily elevate turbidity, but there would be no lasting adverse effect on the water column habitat from this disruption.

Biological sampling may include gillnets for assessment of water column nekton. According to BOEM survey guidelines (BOEM 2019b), gillnet samples would be taken over 4 days for 12 surveys in each of the 20 locations. Although mesh-size, total length and depth of the net, and the soak time for each set may vary among projects, the sets would be relatively sparse over space and time. As a consequence, the populations of federally managed species are not expected to be adversely affected. Increased turbidity within inshore waters may affect HAPCs identified for summer flounder (SAV habitat), sand tiger shark, sandbar shark, and juvenile cod (**Figure E-2**). Elevated turbidity may affect the light penetration and growth of SAV in shallow waters. Although the potential for suspended sediment can be higher in inshore waters with high proportions of fines, widely spaced activity expected during site assessment and characterization should not generate enough suspended sediment to affect growth of SAV in the study area.

HRG Surveys

HRG surveys acquire geophysical shallow hazards information, and their primary impact is likely to be increasing noise. Noise characteristics of equipment used during HRG surveys are provided in **Table E-2**. Increased vessel presence and traffic during HRG surveys could result in several impact-producing factors, including noise, routine vessel discharges, and lighting from vessels. Survey of inshore transmission cable routes could interact with HAPCs for summer flounder (SAV), sand tiger shark, sandbar shark, and juvenile cod (**Figure E-2**). None of these factors are expected to adversely affect managed species, EFH, or HAPCs as they would be short duration (weeks) and conducted from moving vessels.

Impacts from acoustic sound sources from HRG survey methods such as side-scan sonar, multibeam sonar, and sub-bottom profilers are not expected. Medium and shallow sub-bottom profilers (such as a boomer plate) are the only sound source expected to produce sounds within finfish and invertebrate hearing ranges. Fish are not expected to be exposed to sound pressure levels that could cause hearing damage (Popper et al. 2014). While fishes can also detect particle motion at frequencies produced during HRG surveys, there is currently limited understanding of the potential effects of particle motion on fish and invertebrates (Popper and Hawkins 2018). In general, particle motion is most relevant to frequencies below 1,000 Hz and within close ranges to the source (within tens of meters), although some information suggests that fish and invertebrates may perceive this at greater distances. At longer ranges from the source, it is expected that particle motion associated with impulsive noise sources (e.g., medium sub-bottom profilers) will have similar effects to pressure waves in fish and invertebrate species (Weilgart 2018). Additionally, because there are no accepted thresholds for particle motion from which the potential for impact may be assessed, particle motion impacts were not evaluated separately from sound pressure impacts. Sound exposure levels would also be below harmful thresholds for fishes and invertebrates. Impacts would result in temporary and spatially limited changes in behavior and displacement, particularly to those species capable of hearing in the high-frequency range such as herrings. Impulsive seismic sounds may affect squid behavior and physiology by damaging statoliths used for balance (André et al. 2011). Such effects may prevent squids from detecting predators, locating food, or finding mates. Other prey species sensitive to sounds (e.g., shads, menhaden, Atlantic herring, anchovies) may temporarily move from a project area during acoustic surveys, affecting some predators. General effects of acoustic survey devices on EFH for managed species in the area are also detailed in BOEM (2014).

Placement of moored metocean buoys is expected to only affect currents around the mooring lines of the structure, creating minor turbulence at that point. Based on the limited extent of water column effects, no adverse effects on pelagic biota or habitat associated with persistent remnant wintertime bottom water (Cold Pool; an important feature of the water column in the Middle Atlantic Bight) are expected. The hydrodynamic environment of the project area likely would not be adversely affected by placement of small water column footprint of met buoys.

Summary

Pelagic habitats disturbed by site characterization activities are expected to recover from elevated turbidity and altered noise regimes in short time (hours to days). Suspended sediments would dissipate within hours of being resuspended. Much of the sediment in offshore areas is sandy and expected to settle out rapidly. Fishes and squids can actively avoid clouds elevated turbidity created by bottom-sampling gear. Passively drifting larvae of managed species and their prey may experience reduced sensory capabilities and other physiological effects while entrained in suspended sediment plumes. Due to the patchy distribution of larvae at small scales and the small volumes of suspended sediment expected, effects on larval stages should be negligible. Because of relatively finer grained sediments found in nearshore waters, the extent of and duration of equipment-caused turbidity is expected to be higher for surveys of transmission cable routes than for the WEAs. However, because of relatively small footprints expected for these corridors, adverse effects to EFH of managed species life stages or prey are not expected.

Noise from HRG surveys is expected to be below the levels considered detrimental to fish physiology and behavior (Popper et al. 2014). Most of the managed fish species such as sharks, skates, tunas, Atlantic mackerel, and bluefish found in shelf waters or species occurring within nearshore transmission corridors would not be adversely affected by the expected sound levels produced by HRG surveys.

With respect to impacts on HAPCs, sand tiger and sandbar sharks respond to low frequency noise well below the thresholds expected for planned HRG surveys. Juvenile cod hear in a higher frequency range than sharks but would still be below the thresholds in Popper et al (2014).

Elevated turbidity and noise generated by bottom sampling, geophysical and geotechnical sampling, and met buoy deployment are not expected to noticeably adversely affect the EFH, associated prey, or HAPCs of federally managed pelagic species or their life stages. The same conclusion would apply to other NOAA Trust Resources, including weakfish, striped bass, Atlantic menhaden, and river herrings.

E.5 Standard Operating Conditions

Standard Operating Conditions for the Proposed Action are described in **Section 6** of the environmental assessment. BOEM's primary mitigation strategy has and will continue to be avoidance. For example, the exact location of met buoys would be adjusted to avoid adverse effects to biologically sensitive habitats, if present. Overall impacts to finfish and invertebrates from biological surveys are anticipated to be **negligible**, but BOEM recognizes that some fishery surveys could impact ESA-listed species. Thus, BOEM is proposing to prohibit fisheries surveys until all required ESA consultations are concluded.

E.6 Conclusions

Based on the analysis in the preceding sections, the Proposed Action is not expected to have lasting adverse effects on EFH, federally managed species, associated prey, or HAPCs at or around the WEAs. Impacts on the water column habitat would be localized and transient, with no significant adverse effect on EFH for any pelagic species. Minor disturbance of soft bottom areas may occur, but no noticeable adverse effects on soft bottom benthic habitats are expected due to the small area of seafloor disturbance relative to the available habitat, and any disturbed habitat would be expected to recover in short time frames (weeks to months). Hardbottom habitats would be avoided during met buoy placement; thus, no adverse effects are anticipated.

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Appendix G: Public Comments and BOEM's Responses

G.1 Overview

To initiate the public review and comment period of the Draft Environmental Assessment (EA), the Bureau of Ocean Energy Management (BOEM) took the following actions:

1. On August 10, 2021, BOEM published a Notice to Stakeholders (NTS) announcing the availability of the Draft EA that assesses the potential impacts of the issuance of commercial and research leases within the wind energy areas (WEAs) of the New York Bight (NY Bight), and granting of rights-of-way and rights-of-use and easement in the region. The availability of the Draft EA initiated a 30-day public comment period.
2. On September 8, 2021, BOEM published an NTS announcing an extension of the public comment period to September 23, 2021, in response to stakeholder requests for more time to review the Draft EA. Additionally, weather events in the region and technical issues with the BOEM website may have impacted some stakeholders' ability to review the document.
3. During the public comment period, BOEM hosted two virtual public meetings to provide the public with the opportunity to learn more about the Draft EA, ask questions, and provide oral testimony.

All comments received during the public comment period for the Draft EA were impartially assessed and considered by BOEM during preparation of this Final EA. In addition, BOEM considered public comments in determining whether to issue a Finding of No Significant Impact. Comments were received from state political members; Federal and state agencies; environmental and nongovernmental organizations (NGOs); business/labor interests including the renewable and non-renewable energy sectors; and individuals. **Table G-1** provides a list of the stakeholders who submitted substantive comments along with their affiliation and type of organization. All comment letters are available for viewing at www.regulations.gov under docket number BOEM-2021-0054.

Table G-1. List of commenters who provided substantive comments

Commenter Name	Type of Organization	Organization/Affiliation
Dan Mundy	NGO	Jamaica Bay Ecowatchers
S. Malhotra	Individual	N/A
Russell Wray	NGO	Citizens Opposing Active Sonar Threats
Kirby Aarsheim	Business/Labor Interest	Aarsheim Fishing Corp & Norport Inc.
Rav Freidel	Individual	N/A
Annie Hawkins, Fiona Hogan, Lane Johnston	Business/Labor Interest	Responsible Offshore Development Alliance
No name provided	NGO	World Shipping Council

Commenter Name	Type of Organization	Organization/Affiliation
Julia Livermore and Jim Boyd	State Agency Representative	State of Rhode Island Department of Environmental Management's Division of Marine Fisheries (RIDEM) and the Coastal Resources Management Council (CRMC)
Alena Walters*	Individual	N/A
Brian Vahey	Business/Labor Interest	The American Waterways Operators
Beth Lowell	NGO	Oceana
Thomas J. Fagan	Business/Labor Interest	Communications Workers of America, Local 1075
Willett Kempton	Individual	Professor in the College of Earth, Ocean, and Environment and the Department of Electrical and Computer Engineering
Adrienne Esposito*	NGO	Citizens Campaign for the Environment
Adriana Sola*	Business/Labor Interest	Petroleum Geo-Services (PGS)
Louis A. Chiarella	Federal Agency Representative	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
Cindy Claus	Business/Labor Interest	Jenkinson's Aquarium
Kathleen Valentino	Individual	N/A
Rand Pearsall	Individual	N/A
Lynn Schambach*	Individual	N/A
kavester@aol.com	Business/Labor Interest	Hudson River Fishermen's Association
No name provided	NGO	Long Island Traditions
Bryan Sanderson	Business/Labor Interest	Anbaric Development Partners
Paul M. Kanitra*	State Political Member	Mayor, Borough of Point Pleasant Beach
Thomas A. Nies	Federal Agency Representative	New England Fishery Management Council and Mid-Atlantic Fishery Management Council
Christen Wittman	Business/Labor Interest	EnBW North America, Inc.
David E. Frulla	Business/Labor Interest	Fisheries Survival Fund
Carl LoBue	NGO	The Nature Conservancy
Shyamala Rajan	NGO	Defenders of Wildlife
Brandon W. Burke	Business/Labor Interest	Business Network for Offshore Wind

Commenter Name	Type of Organization	Organization/Affiliation
Amber Hewett	NGO	National Wildlife Federation, NJ Audubon, NJ Resource Project, NJ League of Conservation Voters, Environment NJ, Sierra Club NJ Chapter, Regional Plan Association, Angles for Offshore Wind Power, Offshore Power LLC
Dorothy Reynolds	State Political Member	Borough Barnegat Light Councilwoman
Megan Brunatti	State Political Member	NJ Office of Permitting and Project Navigation
James Murphy; George Povall; Francine Kershaw, Ph.D.; Jillian Liner; Shilo K. Felton, Ph.D.; Susan Fisher; Lisa Curtis; Jennifer Wilson-Pines; Patrick Comins; Larry Federman; E. Heidi Ricci; William Rossiter; Alison Guinness; Michael Stocker; Dennis Riordan; Nicolas Entrup; Guy Jacob; Maryanne Adams; David S. Mizrahi, Ph.D.; Anne Swaim; Kevin R. Burgio, Ph.D.; Maureen Dunn; Brien Weiner; Colleen Weiler; Matt Gove; Howard Rosenbaum, Ph.D.	NGO	National Wildlife Federation, Natural Resources Defense Council, National Audubon Society, All Our Energy, Audubon New York, Bedford Audubon, Central Westchester Audubon Society, Connecticut Audubon, Mass Audubon, Mattabesseck Audubon Society, Menunkatuck Audubon Society, Nassau Hiking & Outdoor Club, New Jersey Audubon, New York City Audubon Society, North Shore Audubon Society, Northern Catskills Audubon Society, NY4WHALES, Ocean Conservation Research, OceanCare, Onondaga Audubon, Saw Mill River Audubon, Seatuck Environmental Association, South Shore Audubon Society, Surfrider Foundation, Whale and Dolphin Conservation, and Wildlife Conservation Society
Rhea Bozic	Individual	N/A
Anne Marie McShea	Business/Labor Interest	Ocean Winds North America, LLC
Cindy Zipf, Kari Martin	NGO	Clean Ocean Action (COA)
Michael D. Emerson	Federal Agency Representative	U.S. Coast Guard
Gene Grace, Molly Paquin, Aideen Chapman, Sarah Courbis	Business/Labor Interest	American Clean Power Association
Cindy	NGO	Clean Ocean Action (COA)
John Palmer	NGO	New Jersey Council of Diving Clubs
Kari Martin	Individual	N/A
Caroline	NGO	New York League of Conservation Voters
Carrie Martin	NGO	Clean Ocean Action (COA)
Paul Eidman	Business/Labor Interest	Anglers for Offshore Wind Power

* = Commenter made more than one submission; N/A = Not applicable; NJ = New Jersey.

G.1.1 Comment Review and Response Protocol

All comments were reviewed and systematically categorized in the same manner, and each individual comment document (submission) was entered into a comment database as a unique submission. A total of 63 unique comment submissions were received during the public comment period; no form letters were submitted. A total of one duplicate letter was received. Each unique comment submission was reviewed to determine if it contained general and similar concerns or if it contained substantive comments requiring detailed technical responses and/or changes to the Final EA. Fifty-one (51) unique comment letters were classified as substantive and were divided into categories based on the contents of the Draft EA. BOEM modified the Final EA, as necessary, and provided responses to public comments below.

G.2 SUMMARY OF COMMENTS

The following section provides an overview and summary of the comments presented in the comment letters and is not intended to be a reproduction of the exact wording of individual comments (unless otherwise noted). The summaries illustrate the varied issues, concerns, or requested changes to the EA. For some resources, the summary information is more detailed, as these resources received more detailed comments from submitters.

G.2.1 Purpose and Need for Action

Comment Summary

Commenters indicated that BOEM incorrectly characterized the Purpose and Need for Action by failure to frame it relative to climate change, and that the Purpose and Need for Action was not the EA, but the issuance of the lease and the rights-of-way and rights-of-use and easement.

BOEM Response to Comments

BOEM clarified the Purpose and Need statement to indicate more clearly the need for the Proposed Action.

G.2.2 Proposed Action

Comment Summary

BOEM received comments both in support of, and opposition to, the development of offshore wind. Some comments addressed the offshore wind industry as a whole, while others were specific to offshore wind development in the NY Bight WEAs. Commenters referenced climate change as the primary reason for supporting offshore wind energy. A commenter indicated that energy efficiency and use reduction should alternately be the course of action since there are too many unanswered questions relative to the impacts of offshore wind in the region. Other commenters indicated support for the offshore wind energy industry but indicated that fast-tracking was the wrong approach and recommended that activities be paused until a better understanding of impacts can be achieved when other leased areas achieve full buildout. Additionally, one commenter indicated that BOEM is misrepresenting the Proposed Action by only referencing NY and failing to call out NJ. Finally, a commenter recommended that two of the WEAs be removed from consideration in the Proposed Action.

BOEM Response to Comments

Comments in support of, and opposition to, the development of offshore wind are noted.

BOEM clarified that despite the name "NY Bight EA," the area considered in this analysis is offshore both the states of NY and NJ (**Section ES.1** and **Section 1**).

BOEM's renewable energy program occurs in four distinct phases: planning, leasing, site assessment, and construction and operations. The identification of WEAs for environmental analysis and leasing consideration does not constitute a final leasing decision. BOEM reserves the right under its regulations to issue leases in smaller, fewer, and/or different areas—or issue no leases. BOEM may decide to forgo leasing in certain WEAs or to issue fewer leases. If BOEM decides to decrease the number of leases or omit certain WEAs, potential impacts would be proportionally less based on the number of leases offered. Requests for removal of some areas within the WEAs is under BOEM's consideration.

G.2.3 Information Considered and Supporting National Environmental Policy Act Evaluations

Comment Summary

A few commenters indicated that literature utilized in the Draft EA was either missing or outdated, specifically related to baseline conditions and impacts of sound on organisms.

BOEM Response to Comments

BOEM reviewed the additional references suggested by commentors and incorporated the information where relevant and appropriate. Descriptions of baseline environmental conditions were revised and included in the discussion of potentially affected resources; BOEM also included a description of how the environmental baseline may change within the timeline of the Proposed Action (5 to 7 years). Additional analyses and references have been added to sections on sound and its impacts (**Sections 4.2.3, 4.2.4, and 4.2.6** and **Sections 4.3.3, 4.3.4, and 4.3.6**).

G.2.4 Foreseeable Activities and Impact-Producing Factors

Comment Summary

Several commenters expressed concern regarding the analysis of acoustic impacts on the marine environment relative to marine mammals. Some stakeholders believe that the impacts to marine mammals were understated in the Draft EA. A few commenters inquired about the use of specific equipment during the high-resolution geophysical survey data collection, while other commenters indicated that BOEM should consider a broader range of available technologies for site characterization. A commenter indicated that the foreseeable activities associated with the Proposed Action was missing fisheries studies. Another commenter indicated that the Draft EA consistently downplayed the potential for, and impact of, vessel strikes on sea turtles and large whales and that the Draft EA focuses too singularly on direct injury to hearing apparatus of different animals. Other comments indicated that certain impact-producing factors were not clearly or fully explained, were not quantified, or were missing from the Draft EA.

BOEM Response to Comments

BOEM added text to clarify the type of acoustic equipment included in the Proposed Action and to better describe the anticipated effects to marine mammals, turtles, and other resources. Additional analyses and references have been added to sections on sound and its impacts (**Sections 4.2.3, 4.2.4, 4.2.6, 4.3.3, 4.3.4, and 4.3.6**). The survey activities that are considered in this EA consist of high-resolution geophysical (HRG), geotechnical, and biological and fishery surveys. BOEM provided an extensive list of the typical types of equipment likely to be used for such surveys, described the typical survey timing and methodology, and analyzed the potential effects associated with such equipment and methods (**Tables 2-3 to 2-7**). While it is possible that other types of equipment could be used, it is most likely that the impact-producing factors (IPFs) and, thus, potential effects associated with such equipment would not be substantially different from that analyzed. Furthermore, the Final EA also includes additional information, references, and/or analyses in sections that address the affected environment (i.e., baseline conditions and anticipated changes to baseline) and the environmental consequences of the Proposed Action. Such additions provide greater clarity to sections addressing sea turtles, marine mammals, commercial and recreational fisheries, and others.

G.2.5 Resources Eliminated from Further Consideration

Comment Summary

Several commenters expressed concern regarding the analysis of resources that were eliminated from further consideration within the Draft EA, specifically indicating that pollution, health, mortality, and environmental justice impacts were not assessed relative to the No Action Alternative (Alternative A). Another commenter expressed concern for estuarine and inshore habitats such as subtidal and intertidal flats, submerged aquatic vegetation, shellfish reefs and beds, and tidal marshes, and indicated that BOEM should take a more comprehensive look at these areas. Other commenters articulated concern that birds; visual resources; and cultural, recreational, and historic resources were not fully evaluated within the Draft EA. One commenter stated that Indigenous fishing, cultural fishing, and subsistence fishing were not evaluated in the Draft EA.

BOEM Response to Comments

An EA is conducted to determine whether or not an action is a "major federal action significantly affecting the quality of the human environment"(42 United States Code (U.S.C.) 4332 2(C)). The EA is supposed to be brief but thorough and is not intended to be an exhaustive list of all human, environmental, or cultural resources that could be affected. To that end, this document employed measures to highlight and focus on those resources that had not been previously analyzed or could most likely be affected by the Proposed Action. Such measures included (1) incorporating by reference the analyses and conclusions from previous National Environmental Policy Act (NEPA) documents, where appropriate to do so (see **Table 2-1**); (2) eliminating certain resources from further analysis because the potential for impacts was well known, and the potential impacts in the NY Bight area are anticipated to be negligible (effects are summarized in **Section 2.3** for certain resources including bats; bathymetry, geology, and sediments; coastal habitats; coastal infrastructure; demographics and employment; environmental justice; physical oceanography; visual resources; and water quality); and (3) summarizing those resources analyzed in this EA that were determined to have negligible effects (see **Appendix B**).

The No Action Alternative is more clearly described in the Final EA and describes the baseline condition of each resource, analyzes the potential effects of ongoing and planned future activities (i.e., offshore wind and other types of activities; **Appendix D**) other than the Proposed Action, and provides a conclusion about the impacts from ongoing and future activities.

Regarding comments about specific resources that were not addressed or were inadequately addressed, the Final EA addresses “pollution” (potential effects to both air and water quality analyzed in **Appendix B**; potential effects of oil spills are addressed in **Section 2.2.5**); health, mortality, and environmental justice (addressed in **Section 2.3**); various estuarine and inshore habitat types (**Section 2.3 and 4.2.1**); birds (**Section 2.3**); visual resources (**Section 2.3**); and cultural, recreational and historic resources (**Appendix B**).

The effects analysis of the potential impacts of the Proposed Action is adequate and meets NEPA requirements.

G.2.6 Alternatives and Geographic Analysis Area

Comment Summary

Commenters suggested that BOEM failed to consider a full range of alternatives, indicating that the number of leases in the Proposed Action (Alternative B) should be reduced and that certain areas be removed from consideration, such as a scallop buffer zone along the eastern edge of the Hudson South WEA; that additional alternatives be added that consider alternate methods of combating climate change; that the No Action Alternative (Alternative A) was not accurately characterized in the Draft EA; and that a recommendation that the geographic analysis area be expanded in the Final EA. A commenter recommended that geophysical, geotechnical, and biological surveys should be coordinated across lease areas and individual wind energy projects so consistent baseline data are collected.

BOEM Response to Comments

On March 29, 2021, BOEM released the Area Identification, which provided the analyses and rationale used to select the five WEAs in the NY Bight. The alternatives for a NEPA analysis are largely shaped by the purpose and need for the Proposed Action. An alternative that does not meet the purpose and need does not need to be considered in a NEPA analysis; thus, alternate methods of combating climate change (i.e., improvements in energy efficiency and reducing energy use) are not evaluated in this EA. BOEM considered two alternatives—the No Action Alternative and the Proposed Action. The description of the No Action Alternative has been revised and clarified in the Final EA. The Proposed Action, Alternative B, is the issuance of up to 10 commercial and research wind energy leases in the five WEAs and is anticipated to have the greatest environmental consequences of the alternatives considered. This alternative presumes reasonably foreseeable scenarios for leasing, site characterization, and site assessment. BOEM has not identified any additional action alternatives that could result in meaningful differences in impacts to the various resources analyzed in this EA (e.g., the Proposed Action is the maximum number and size WEAs in the NY Bight; BOEM can elect to lease fewer and/or smaller areas).

BOEM considered including as a second action alternative a temporal removal of portions of the WEAs, and the National Marine Fisheries Service (NMFS) proposed a similar mitigation alternative in their scoping comment letter. After further evaluation, it became apparent that lease stipulations and Standard Operating Conditions (SOCs) would regulate the mitigative seasonal restrictions, and these alternatives were dismissed from further consideration. Other scoping comments did not suggest alternatives that met the purpose and need and/or would have resulted in different impacts.

BOEM may decide to forgo leasing in certain WEAs or to issue fewer leases. If BOEM decides to decrease the number of leases or omit certain WEAs, potential impacts would be proportionally less based on the number of leases offered. Requests for removal of some areas within the WEAs is under BOEM's consideration.

Regarding expanding the area of analysis, **Section 3.3** describes how the area of potential effects varies by resource. For example, benthic resources are stationary, and the area of effect is limited to the immediate area, whereas the area of effects for more mobile resources is more expansive, i.e., for certain resources, the area of effect includes the NY Bight area as well as some waters offshore Rhode Island, Massachusetts, and Delaware. Overall, the selection of alternatives and the geographic analysis area, and the description of the level of activity (scenario) are appropriate and meet NEPA requirements.

To address baseline data collection in different WEAs, BOEM has developed recommendations for acquiring information to ensure that data is collected in a consistent manner within the NY Bight WEA, as well as in other areas on the Atlantic Coast. These guidelines can be found at www.boem.gov/guidance under the renewable energy tab. BOEM has developed recommendations for conducting biological surveys for birds, benthic habitats, fisheries, marine mammals, and sea turtles.

G.2.7 Assessment Methodology

Comment Summary

Commenters stated that BOEM did not provide a thorough analysis of planned action (cumulative) impacts and that the cumulative effects analysis was flawed in its execution. Stakeholders noted that some impact analyses were based on flawed and unfounded assumptions or that not enough rationale was provided in support of impact determinations, that a "risk retirement" process was used, and that the alternatives were not adequately or properly compared to one another. Other commenters felt that the impact assessments resulted in impact determinations that were underestimated; another commenter indicated the impact determinations should be lowered. Commenters indicated that beneficial impacts were not evaluated in the Draft EA, while another commenter expressed concern that impacts of climate change are not addressed to any meaningful extent. Additional comments called for analysis of future environmental impacts of offshore wind development to be considered during the leasing phase. Comments indicated that a full environmental impact statement (EIS) should be conducted rather than an EA.

BOEM Response to Comments

Effects from installation, construction, and operation of a full-scale wind energy facility are outside the scope of the analysis for the Proposed Action (see **Section 2**) and, therefore, are not addressed in the

EA. Effects associated with site assessment and site characterization activities are the focus of this EA and include multiple actions that are intended to assess the distribution and population density of birds, benthic organisms, bats, and marine fauna and to aid a future NEPA analysis for a wind energy facility in the event a developer proposes one. The purpose of this NEPA analysis is to identify potential effects on resources, including wildlife species, from the Proposed Action and alternatives. This has been completed with use of an EA. To finalize an EA, BOEM must make a determination that no significant effects would occur and issue a Finding of No Significant Impact (FONSI) or a mitigated FONSI. The analysis contained in this EA indicates that the Proposed Action, including all of the alternatives and SOCs, would not result in significant effects on wildlife or their habitats, including North Atlantic right whale (NARW); therefore, an EIS is not necessary.

G.2.8 Benthic Resources

Comment Summary

BOEM received a number of substantive comments on the benthic resources sections in the Draft EA. Comments included a description of an overlap between the resources described in the benthic resources; commercial and recreational fishing; and finfish, invertebrates, and essential fish habitat (EFH) sections. For example, a commenter stated that bivalves are generally noted as benthic resources, but that some bivalve species support important commercial fisheries; the commenter recommended that BOEM acknowledge these overlaps and clarify what aspects of impacts are evaluated in each section.

Several commenters stated that scant justification is provided for cumulative impacts and recommended that additional discussion and rationale should be added, including the nature or magnitude of the impacts of various activities (fishing, offshore wind development, sand mining, navigational dredging) on benthic species. Commenters stated that it would be useful to characterize the expected relative magnitude of different activities (fishing, dredging, offshore wind development, etc.) so their relative effects on benthic resources could be compared. A commenter recommended that BOEM consider the New England Council's model of fishing gear effects that describes the spatial distribution and magnitude of fishing on the seafloor for multiple benthic gear types.

A number of comments were received regarding the impacts of noise, as quoted (in italics) below:

- *The Bureau fails to consider that sound can physically alter both the sea bottom and benthic organism physiology both directly and through effects of benthic organisms' behavioral response to sound. Such behavioral change reduced the capacity of the organism to mix the upper sediment profile, making it denser, affecting nutrient cycling [Solan et al., 2016].*
- *100-200 kHz sound elicited physiological stress response in echinoderm A. lixula, and increased the cytotoxicity of its coelemic fluid, confirming the vulnerability of this species to acoustic exposure (Vazzanaa et al, 2020).*
- *21% fewer noise-treated Sea Hare embryos successfully developed than controls. For the noise-treated embryos that did hatch, there was a 22% increase in their mortality relative to controls, which were exposed to ambient sounds (Nedelec et al. 2014).*
- *Sensitivity of the crab P. bernhardus is well within the ranges of vibrations measured in areas of anthropogenic operations. Animals can acclimate but research indicates acclimation has fitness*

cost in terms of survival; in the presence of noise and vibration another hermit crab species was shown to have allowed stimulated predators to approach more closely before attempting to hide.

- *Seismic Air Gun discharge was found not to affect survival or development of dungeoness crab larvae. However, such (lab) studies as Aaden et al. (2017) have no ability to detect effects on mortality caused by poor habitat selection (or by any other reason) from the hearing-loss effects of noise, because the control and treatment groups in the laboratory received the same food and environmental conditions.*
- *Very newly published research has demonstrated a detrimental effect of anthropogenic noise on seagrass, including on their energy storage structures [See Solé, Lenoir, Durfort, Fortuño, van der Schaar, SDe Vreese, André, 2021. Communications Biology volume 4, Article number: 743 (2021)] [Solé et al, 2021, Id.]*

Other commenters stated concern about impacts to marine species, as quoted (in italics) below:

- *Ctenophores (and a host of other invertebrates) locomote to regulate a variety of conditions such as temperature, pressure (depth), and salinity by changing the conditions to which they are subject. Damage to locomotive cilia in Ctenophores (and other invertebrates) from site characterization equipment may have substantial survival impacts. Ctenophore Leucothea multicornis has non-motile single-hair cilia that are sensitive to water movements and allow the animal to detect and catch small moving objects close by. [Horridge, 1966. Non-motile sensory cilia and neuromuscular junctions in a ctenophore independent effector organ. Proc. Roy Soc. B 162: 333-350].*
- *The Draft EA purports that sediment disturbance will be easy to recover from in a few years. However, studies show the haploop communities simply do not appear to be as resilient as that, and, due to the important habitat-forming role haploops serve, and consequential biodiversity and ecosystem-level effects, there is cause for concern.*

BOEM Response to Comments

Section 4.2.1 of the Final EA includes revised descriptions of the baseline condition of benthic organisms (i.e., within the No Action Alternative), and also more clearly describes and analyzes the potential effects of ongoing and planned future activities, including offshore wind, other types of activities, and climate change (**Appendix D**). **Section 4.3.1** (i.e., the Proposed Action) was also revised to describe more clearly impacts to benthic resources and to include an analysis of the incremental effect of the Proposed Action when added to the effects of ongoing and planned future activities. The Final EA continues to consider the main effects of the Proposed Action to be the physical smothering and crushing of benthic organisms. The effects of noise on invertebrates and benthic organisms are also analyzed, acknowledging that the severity of the impact is dependent on a variety of factors, including distance from the source and the bathymetry of the area. Mooring, geotechnical sampling, HRG surveys, and biological surveys may cause physical damage and death to zooplankton and benthic invertebrates, but the footprint of such activities is anticipated to be small, short-term, and localized. Recovery of many communities is expected to be rapid because many planktonic communities can recolonize from adjacent areas through water currents and have short lifecycles coupled with high reproductive potential; additionally, certain benthic organisms could also migrate to an adjacent disturbed location.

BOEM submits that this Final EA adequately analyzes the potential effects of the Proposed Action and that there is sufficient analysis upon which to base associated determination of effect.

G.2.9 Commercial and Recreational Fishing

Comment Summary

Several commenters stated that a cumulative assessment of potential changes to fishing activity in and around the proposed WEAs was lacking in the Draft EA, and the long-term cumulative impacts of leasing needs to be addressed.

Several commenters stated that the text in this section is very general and provides little detail on the nature or magnitude of the impacts of various activities (fishing, offshore wind development, sand mining, navigational dredging) on benthic species and suggested that BOEM characterize the expected relative magnitude of different activities (fishing, dredging, offshore wind development, etc.) so their relative effects on benthic resources can be compared.

BOEM received several specific comments regarding the impacts of noise as quoted (in italics):

- *Low frequency noise (at received level 135-150 dB) has been found to alter marine invertebrate behavior (Solan et al. 2016).*
- *Although there are many [bony fish] species that can hear above 100 kHz, and many with capabilities above 3 kHz, the majority of fishes are likely to be able to detect sounds from below 50 Hz up to at least 500-1500 Hz.*
- *While the impacts from noise generated by low-frequency sound on fish catch rates impacts may be temporary and negligible to minor when considered at the fishery-wide or fish population level, they can be much greater in magnitude on smaller scales.*
- *100–200 kHz sound elicited physiological stress response in echinoderm A. lixula, and increased the cytotoxicity of its coelemic fluid, confirming the vulnerability of this species to acoustic exposure.*
- *21% fewer noise-treated Sea Hare embryos successfully developed than controls. For the noise-treated embryos that did hatch, there was a 22% increase in their mortality relative to controls, which were exposed to ambient sounds (Nedelec et al. 2014).*
- *Sensitivity of the crab P. bernhardus is well within the ranges of vibrations measured in areas of anthropogenic operations. Animals can acclimate but research indicates acclimation has fitness cost in terms of survival; in the presence of noise and vibration another hermit crab species was shown to have allowed stimulated predators to approach more closely before attempting to hide.*
- *Seismic air gun discharge was found not to affect survival or development of dungeoness crab larvae. However, such (lab) studies as Aaden et al. (2017) have no ability to detect effects on mortality caused by poor habitat selection (or by any other reason) from the hearing-loss effects of noise, because the control and treatment groups in the laboratory received the same food and environmental conditions.*
- *Very newly published research has demonstrated a detrimental effect of anthropogenic noise on seagrass, including on their energy storage structures [See Solé, Lenoir, Durfort, Fortuño, van der*

Schaar, SDe Vreese, André, 2021. Communications Biology volume 4, Article number: 743 (2021)] [Solé et al, 2021, Id.].

- *Seismic survey activities proposed in the draft EA could have significant detrimental impacts on scallops, and especially scallop larvae, in these areas. Scallop larvae exposed to playbacks of seismic pulses for extended periods showed significant developmental delays and 46% developed body abnormalities…exposed scallops were discovered to have significantly increased mortality rates…the size of the airgun had no effect, but repeated exposure intensified responses. A 2017 peer-reviewed study examining the impacts of seismic surveys on scallops found that both short- and long-term exposure to air guns results in behavioral and physiological changes. Scallops in this study also demonstrated increased "recessing reflexes" in response to seismic activity, which is when the animal uses jets of water to create depressions in sediment to avoid predators.*
- *Noise consisting of a linear sweep from 100 to 1000 Hz can induce Atlantic cod in a transient, mild cortisol elevation with a clear noise intensity dose response which returns baseline levels post sound exposures. Atlantic cod exposure to noise also adversely effects juvenile growth rates and mortality by predation.*

Other commenters stated concern about impacts to marine species, as quoted (in italics) below:

- *The Draft EA purports that sediment disturbance will be easy to recover from in a few years. However, studies show the haploop communities simply to no appear to be as resilient as that, and, due to the important habitat-forming role haploops serve, and consequential biodiversity and ecosystem-level effects, there is cause for concern.*

Commenters provided the following summarized suggestions:

- Revise language to refer to management at the Federal and state level, rather than at the Federal and regional level and to note that National Oceanic and Atmospheric Administration (NOAA) Fisheries has management authority for certain tunas, sharks, swordfish, and billfish.
- The list of managed species included in **Section 4.2.2** is far from comprehensive; revise language to clarify that this list includes examples of prominent fisheries in the NY Bight, rather than all managed fisheries in the region.
- Use multi-year averages to assess fisheries conditions and impacts as landings, value, and other socioeconomic characteristics can vary year to year.
- Using only ex-vessel value to define the most affected fisheries can exclude fisheries that may have socioeconomic importance for other reasons.
- Use the longest time series data available that also includes the most recent and complete fishing year when analyzing fisheries data, which for Northeast Multispecies is May 1, 2019, through April 30, 2020; recommend its use in the Final EA.
- Add a separate heat map similar to Figure 5[1] but displaying only squid and other cephalopod annual with the area of impact caused by site characterization activity overlayed to estimate the expected impacts on these commercial fisheries.
- Regarding references to NOAA's Fish and Shellfish Climate Vulnerability Assessment (Hare et al. 2016), incorporate into all relevant EA and EIS documents for offshore wind energy development in this region the forthcoming Habitat Climate Vulnerability Assessment, which

[1] **Figure 4-2** in the Final EA.

draws similar conclusions by habitat type. NOAA Headquarters habitat staff are the primary point of contact for this work.

- There is overlap between the resources described in the benthic resources; commercial and recreational fishing; and finfish, invertebrates, and EFH sections. For example, bivalves are generally noted as benthic resources; however, some bivalve species support important commercial fisheries. Assuming BOEM intends to retain the resource groupings as-is, acknowledge these overlaps and clarify which aspects of impacts are evaluated in each section.

BOEM Response to Comments

An EA is done to determine whether or not an action is a "major federal action significantly affecting the quality of the human environment" (42 U.S.C. 4332 2(C)). The EA is supposed to be brief but thorough and is not intended to be an exhaustive listing of resources that could be affected by an action, but rather it is intended to highlight and focus on those resources that could most likely be affected by the Proposed Action. This Final EA analyzes potential effects on prominent fisheries in the NY Bight but is not intended to be a comprehensive list of all managed fisheries in the region. With that said, **Section 4.2.2**; **Figures 4-1 to 4-4**; and **Tables 4-2 and 4-3** of the Final EA include revised descriptions of the commercial and recreational fishery resources (i.e., within the No Action Alternative). Other sections address related resources (i.e., benthic resources, EFH, etc.). The Final EA also more clearly describes and analyzes the potential effects of ongoing and planned future activities that could overlap in time and space with the Proposed Action. Such activities include offshore wind, other types of activities, and climate change (**Appendix D**).

Section 4.3.2 (i.e., the Proposed Action) was also revised to describe more clearly impacts to commercial and recreational fishery resources and to include an analysis of the incremental effect of the Proposed Action when added to the effects of anticipated future activities. The Final EA considers the main effects of the Proposed Action to be vessel traffic (although at a low level) associated with site characterization and site assessment activities; installation of up to 20 met buoys installed over a large geographical area; and noise that is expected to occur over a small spatial area and for a limited duration. The Final EA identifies that communication and coordination between a lessee and fishermen could reduce potential for conflict during vessel movement and met buoy installation activities. BOEM submits that this Final EA adequately analyzes the potential effects of the Proposed Action and that there is sufficient analysis upon which to base associated determination of effect.

G.2.10 Finfish, Invertebrates, and Essential Fish Habitat

Comment Summary

Stakeholders indicated that information on and impacts to Atlantic sturgeon was lacking in the Draft EA. Commenters indicated that description of and potential effects of biological surveys (such as fisheries surveys) was limited and inadequate. Additionally, commenters indicated that a robust and comprehensive evaluation of the potential impacts of proposed activities on longfin squid and longfin squid spawning habitat is absent from the Draft EA. Stakeholders requested additional rationale be provided in support of some statements made in the Draft EA regarding the Mid-Atlantic Bight Cold Pool and comments were made indicating that the scope of the cumulative impact assessment needs to be broadened. A commenter indicated that acoustic impacts to certain fish and invertebrate species is lacking within the Draft EA and provided literature for review and potential inclusion in the Final EA.

BOEM Response to Comments

Section 4.2.3 of the Final EA includes descriptions of baseline conditions of finfish, invertebrate, and EFH resources (i.e., within the No Action Alternative). Related information can also be found in **Section 4.2.1** (Benthic Resources) and **Section 4.2.2** (Commercial and Recreational Fishing). The Final EA also more clearly describes and analyzes the potential effects of ongoing and planned future activities that could overlap in time and space with the Proposed Action. Such activities include offshore wind; other types of activities, including biological surveys; and climate change (**Appendix D**).

Section 4.3.3 (i.e., the Proposed Action) was also revised to describe more clearly and analyze potential impacts to finfish, invertebrates, and EFH. The Final EA also includes an analysis of the incremental effect of the Proposed Action when added to the effects of ongoing and planned future activities (i.e., cumulative effects). Specific revisions in these sections include additional analysis of potential effects to the Endangered Species Act- (ESA-) listed Atlantic sturgeon. This section and **Section 4.2.3** also include additional information and analyses relative to the features like the cold pool. And finally, relative to the EFH assessment, on August 10, 2021, BOEM submitted an assessment to NMFS that identified potential adverse effects to designated EFH from activities described in the Proposed Action. BOEM determined that the Proposed Action would not significantly affect the quality and quantity of EFH. NMFS suggested conservation measures to minimize impacts from site assessment and characterization activities on EFH and sensitive habitats. The EA was revised to address the comments from NMFS, and the consultation concluded on October 28, 2021.

G.2.11 Marine Mammals

Comment Summary

Comments regarding marine mammals are summarized and paraphrased below, organized by topic.

Comments were submitted about the organization of the EA:

- The marine mammal section of the Draft EA should be revised and better organized. Many of the paragraphs include statements that are not linked to the Proposed Action. **Table ES-2** concludes that impacts to marine mammal species that are not listed under the ESA are minor to moderate, while all other species will experience negligible to minor impacts.
- In the "No Action Alternative" section of the Draft EA, there are impact determinations about the impacts from reasonably foreseeable wind project construction, which is not appropriate without proper analysis or reference to documents that have conducted such an analysis.

Some commenters suggested additional alternative actions and addressed mitigation measures:

- Hydrographic site characterization surveys should not be permitted on the eastern lobe of Hudson South, owing to its proximity to the Hudson valley, nor in proximity to the Outer Continental Shelf (OCS).

- No matter what mitigation measures are put in place to avoid impacts to marine mammals, these measures are never 100% effective when they depend on visual and acoustic detection of these animals. For these reasons, it is not possible to know for sure whether or not marine mammals are in a certain ocean areas.

Reviewers also recommended additional or updated information be added to the EA or additional research be done to collect marine mammal information prior to leasing.

- NMFS recommended the use of Pace (2021) for NARW abundance information. For all marine mammals, the 2020 stock assessment reports (SARs) are finalized; therefore, all references to "draft" SARs should be removed.
- The Draft EA (page 56) indicates that impacts from vessel strikes are expected to be negligible because of the low probability of such an event. BOEM should include the required mitigation measures (e.g., use of observers, implementation of separation distances, requirement to put vessels into neutral if whales are within certain proximities, etc.) to support this determination. BOEM should also review the NMFS Vessel Speed Rule Assessment (NMFS 2020).
- Further environmental inquiry should be made prior to authorization of site characterization surveys in the southeast portions of Hudson North and Central Bight proposed lease areas.

Commenters expressed concern regarding the NARW:

- Given the dire forecasts for NARWs, it is difficult to understand how BOEM assumes that all affected NARWs would recover completely from impacts resulting from the numerous activities that will be occurring should the Proposed Action proceed.
- Vessel strike is already a leading cause of death for NARWs. If the Proposed Action is implemented, it will lead to a significant increase in noise and risk that sea turtles and marine mammals, including the critically endangered NARW, will be struck by vessels.
- The Draft EA shows that models of sparkers and seismic air guns (so-called "bubble" guns) emit sounds of the same frequencies as the calls of the NARW; thus, these instruments have the potential to mask communication, especially between mothers and young.

Commenters addressed the impacts of noise (see also **Section G.2.9 and G.2.13**):

- Noise exposure has adverse effects on marine mammals:
  - Inadequate consideration was given in the Draft EA to possible effects of active sonar. Sonar emissions are concerning because sound travel tens and hundreds or even thousands of kilometers with only modest attenuation; sound travels quickly underwater and cannot be escaped or outrun; and site characterization surveys involve sonar pulses being delivered continuously for prolonged periods.
  - The Draft EA focused mainly on effects of intense noise exposure, focusing on permanent threshold shifts (PTS). Sound levels that do not lead to stranding or cause immediate bodily harm can still have impacts affecting fitness (survival or reproduction) by, for example, affecting behaviors important to fitness like feeding or mating.
  - BOEM cannot assume marine mammals can swim away from sonar noise unharmed. Gas embolisms may be caused when whales dive rapidly to escape or from gas bubbles being vibrated in the tissues.

- Displacement should not be assumed to be inconsequential and may constitute real reductions in fitness. A 10-days reduction in foraging due to disturbance could lead to loss of a pregnancy or a calf in gray whales. This species is not expected to be found in the NY Bight, but it demonstrates the energetic demands of gestation.
- There are difficulties in determining the presence of animals under water. Cuvier's beaked whales and other non-beaked whale species are present in the NY Bight, and stranding events have been linked to mid-frequency active sonar exercises. Therefore, mortality might be grossly underestimated.

- BOEM's assessment of effects of noise was inappropriate or insufficient:
  - The Draft EA refers to the Atlantic geophysical and geotechnical (G&G) EIS for discussion on sound, which is not appropriate because that document included large airgun seismic surveys, which have greater impacts than the HRG sources in the Proposed Action.
  - BOEM confounds absence of demonstrated harm with demonstrated absence of harm.
  - Propagation models used in establishing marine mammal harassment thresholds were made under assumptions about a propagation environment (most models assume spherical dissipation without any reflection) that does not at all match the actual environment, particularly in the undersea Hudson River valley and canyon.
  - It was helpful that the maximum distances for PTS was calculated for each category of HRG equipment (Table 14 of the Draft EA). However, immediate damage to hearing is not the only Level A harm that occurs from active sonar. The Draft EA should also establish maximum distances for Level B harm.
  - The Bureau should estimate of the number of marine mammals affected so that the public can judge whether a FONSI is reasonable.

- Thresholds for identifying impacts from noise are inaccurate or inadequate:
  - The Draft EA focuses nearly exclusively on PTS (Level A harassment), overlooking physiological and behavioral mechanisms of harm. In some studies, effects were triggered by sound pressures lower than established thresholds, which will cause the Bureau to miss significant adverse impacts to marine mammals.
  - Classification of Level A and Level B harm using PTS and temporary threshold shift (TTS) does not indicate the potential for harm to the stock and does not adequately capture behavior-mediated harm vs direct harm to tissues.
  - The sound exposure levels expected from site characterization activities (Table 6 of the Draft EA) are higher than impulsive noise Level B threshold (e.g., 160 dB) and are greatly higher than the continuous noise Level B thresholds (e.g., 120 dB).
  - The 160 dB Level B harassment threshold was intended to characterize harassment from one or a few single pulses or from intermittent exposure to short duration impulsive noise. It is not adequate to identify effects from sonar pings occurring 1 to 20 times every second over track lines covering tens of thousands of acres, which may be month of continuous sound. BOEM should use the 120-dB Level B threshold for sound occurring over longer time lapses.
  - Recovery after TTS has been assumed to indicate reversal of damage to delicate structures of the inner ear. However, damage can be progressive, and animals may still

be unable to hear normally. Thresholds that constitute physical harm should be lowered to the point at which actual physical tissue damage occurs.

- Some comments addressed cumulative effects to marine mammals from noise exposure:
    - Site characterization activities can be expected to take place in multiple lease areas contemporaneously, which can be expected to result in repeated exposures. Numerous repeated stress responses can still have impacts affecting fitness (survival or reproduction) that must be addressed.
    - Multiple vessels in each of multiple lease areas and cable routes may be operating simultaneously, which could cause harassment in substantial portions of the NY Bight on an ongoing basis. The Draft EA fails to identify, quantify, or limit this, instead relying on the assumption that affected individuals can move away from the noise and quickly recover.
    - There was no estimate in the Draft EA of harm to cetaceans and/or pinnipeds that would result from the project if all the areas proposed for lease sale are surveyed.

BOEM received statements about the NEPA determinations:

- The justification for the conclusion that impacts to marine mammals from reasonably foreseeable planned actions will result in only moderate adverse impacts to marine mammals is based on unfounded assumptions and is not well explained in the Draft EA.
- The Draft EA conclusion that effects to marine mammals other than ESA-listed species will be minor to negligible is not reconcilable with the planned activities and known effects to whales. An environmental impact review must take into consideration multiple proposed areas and activities conducted simultaneously.
- The impact determinations for ESA-listed marine mammals are inconsistent with the findings in the recent ESA programmatic consultation on certain marine site assessment and characterization surveys referenced in the EA, which concludes that surveys that follow a set of project design criteria and best management practices (which appear to be required as conditions of any lease contemplated in the EA) are not likely to adversely affect any ESA-listed species. Further, the impact determination conclusions on page 57 (negligible to minor) are inconsistent with this summary table.
- The Bureau is reviewing its own application (i.e., it is both the NEPA reviewing agency and the applicant for review).

BOEM Response to Comments

Organization:

- BOEM revised the marine mammal sections to improve organization and clarity. In the Draft EA, the effects of the Proposed Action were considered together with the effects of ongoing and planned activities. The new organization differs from what many readers are accustomed to and led to confusion about the conclusions reached in **Section 4** versus those shown in the Executive Summary. In the Final EA, the general structure of the document was retained, but changes were made to better explain the document's organization and content.
- BOEM reviewed the EA to better link the analyses in the Marine Mammals sections to the Proposed Action and to address missing and outdated references.

- The Draft EA provided a separate NEPA determination for ESA-listed marine mammals and other marine mammals. For clarity, the Final EA considers the effects to both listed and non-listed species together.

Alternative actions and mitigation measures:

- Similar to the request for a scallop buffer zone along the eastern edge of Hudson South WEA, the requests for area exclusions are being considered.
- The required marine mammal mitigation measures were developed collaboratively by NMFS, BOEM, and others to avoid impacts to the greatest degree practical and to provide protections against the most severe types of impacts. Effectiveness of mitigation is a main point of consideration when evaluating the overall effects of the Proposed Action. Additional measures are being developed and reviewed. BOEM evaluates survey plans on a case-by-case basis and may apply additional mitigation to ensure that environmental effects are minimized.

Additional information and research:

- Updated information on the abundance of NARW and marine mammal stock assessments has been added to the Final EA.
- Additional details concerning the required mitigation measures for vessel strike avoidance have been added to **Section 5** (SOCs).
- BOEM advocates for, funds, and uses scientific research for analysis of effects of development on the OCS. Additional research would improve the precision of the predicted effects of site assessment and characterization. However, the NEPA process allows for decision making given imperfect data. Changes were made to provide additional references and to improve the connections between the data and the determinations.

NARWs:

- BOEM received comments that indicate that the effects from the full-scale wind energy development in the Atlantic could have significant effects on NARW. Effects of full-scale wind projects, including construction, operation, and decommissioning of commercial-scale wind energy facilities, are outside the scope of the analysis for the Proposed Action. Additional text has been added for clarity. The purpose of this NEPA analysis is to identify potential effects on resources, including wildlife species, from the site assessment and site characterization activities in NY Bight and from the No Action Alternative. This goal has been completed with use of an EA. To finalize an EA, BOEM must determine that no significant effects would occur and issue a FONSI or a mitigated FONSI. The analysis contained in this EA indicates that the Proposed Action, including the alternatives and mitigation measures, such as SOCs, would not result in significant effects on wildlife or their habitats, including NARWs. This determination is based on the best available data regarding the likelihood, numbers, and degree (intensity and duration) of exposures of NARW to the Proposed Action, the NARW physiological and behavioral response to exposure, and the effects of the response on survival and reproduction. It incorporates life history data, mitigation measures, and considers the effects of the action in the context of ongoing and reasonably foreseeable planned activities in the region, including climate change. The NARW faces multiple challenges to survival. The issuance of a FONSI would not indicate that the Proposed Action is benign, but rather, that this action (when conducted with the SOCs and in compliance with all required authorizations) is not expected have a significant effect, i.e., it is not expected to reduce the likelihood of survival or reproduction of any NARW nor cause or contribute to a decline of the species.

- The risk of vessel strikes from the Proposed Action is limited to the scenarios described in **Appendix A** and was determined to be negligible for NARW. The amount of vessel traffic attributable to the Proposed Action would be only a very small fraction of the existing and expected vessel traffic in NY Bight. The Proposed Action includes SOCs for reducing the likelihood of collisions (see **Section 5**). When considered together with ongoing and foreseeable planned activities in the region, vessels strike contributes to a determination of moderate impacts. Various efforts to reduce overall risk of vessel strike are in place (www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-vessel-strikes-north-atlantic-right-whales).
- Prolonged, disruptive masking of communications between NARWs by acoustic surveying equipment is unlikely for the types of equipment specified in the Proposed Action. These sources generate relatively low sound levels and narrow beam patterns, which reduces the likelihood of a NARW occurring within the area where masking could occur. Seismic air guns are not part of the Proposed Action.

Adverse effects from noise:

- Several commenters suggested the review of effects of mid- and low-frequency active sonar and deep penetrating seismic (e.g., with high-volume airguns) was insufficient. These activities are not normally used for shallow hazard site assessment surveys such as those included in the Proposed Action and will not be authorized in a lessee's SAP where BOEM-recommended techniques will suffice (see BOEM (2020)). These activities, if proposed in the Construction and Operations Plan (COP), will be fully evaluated prior to any authorization for use during future development and construction work. Changes to the text of the Final EA have been made to more clearly identify the types of equipment that are included in the Proposed Action.
- **Section 4.3.4** of the Final EA has been revised to improve discussion of behavioral effects of HRG surveys on marine mammals. **Section 5** has been expanded to better describe the SOCs. Lessees will be required to adopt these SOCs along with the best management practices and project design criteria in Anderson (2021). These measures have been determined by NMFS to reduce the effects of site assessment and site characterizations surveys to a level that is not likely to adversely affect ESA-listed marine mammal. Behavioral affects can be considered "adverse effects" if they will disrupt any biologically significant behaviors such as breeding, feeding, migrating, etc. The mechanisms by which sound affects ESA-listed and non-listed marine mammals are the same, so the measures that protect listed species are also expected to protect non-listed marine mammals.
- BOEM recognizes that marine mammals can experience harmful physical and behavioral effects from exposure to high levels of underwater noise, and these impacts may go undetected. The text of **Section 4.2.4** has been revised to expand the discussion of these effects. BOEM has evaluated the potential for marine mammals to experience these impacts due to the Proposed Action. These effects are not anticipated from the types of HRG equipment that will be used in the site assessment and characterization surveys in NY Bight (see **Section 4.3.4**).
- BOEM understands that measures to avoid exposing marine mammals to underwater sound during site assessment and characterization surveys are not 100% effective. Protected species

observers may not detect every marine mammal, and animals may respond in unpredictable ways. However, these measures have been developed collaboratively with NMFS, and they are expected to reduce the amount or degree of exposure. Uncertainties about the amount of impact reduction are included in the analyses and the NEPA determinations.

BOEM's analysis of noise:

- References to the Atlantic G&G EIS were qualified to apply only where that document described and analyzed effects from equipment listed in the NY Bight EA. Information about seismic airgun surveys does not apply; no seismic airguns will be used as part of the Proposed Action. Clarifying text was added to **Sections 4.3.3 and 4.3.4**.
- BOEM reviewed the text of the Draft EA to ensure accuracy in the way scientific data was conveyed and to avoid confounding absence of demonstrated harm with demonstrated absence of harm.
- Sound attenuation modelling can incorporate the reflection and refraction of sound in the ocean environment if sufficient site-specific data is available; however, the accuracy gained by adding these parameters does not outweigh the uncertainty presented by unknown animal movement patterns. The modelling approach taken in this analysis seeks to balance accuracy with conservative estimates of impacts to account for uncertainty.
- The maximum distances to the Level B noise threshold are given in **Table 4-5** in **Section 4.3.4**.
- The total number of marine mammals that could experience the presence of vessels or HRG survey activities depends on the time of year and location of each survey. The total was not estimated because with the application of the required SOCs, these animals are not expected to experience any type of harm. Text was added to **Section 4.3.4**.

Thresholds:

- BOEM has adopted the threshold levels of noise identified by NMFS as the best available scientific information regarding the amount and level of noise a marine mammal can experience before harassment or injury occurs. These thresholds have been carefully developed using an abundance of theoretical and field data and have been through multiple rounds of public and peer review. The state of the science continues to evolve, and BOEM may make changes and updates as new information becomes available.

Cumulative effects:

- **Section 4.2.4** and **Appendix D** of the Final EA have been updated to include an expanded planned action analysis. BOEM revisited the list of reasonably foreseeable future offshore wind projects based on project progress since publication of the Draft EA. The effects of the ongoing and reasonably foreseeable planned actions together with the Proposed Action are described in **Section 4.3.4**. Effects determinations were made with consideration for the existing and expected monitoring and mitigation requirements that apply to both the HRG surveys and the ongoing and planned activities in the region, including construction, operation, and full-scale production from wind energy facilities. Mitigation measures would reduce the aggregate effects of multiple stressors in the region, while monitoring would provide information for improved mitigation in the future. According to the Council on Environmental Quality (CEQ), monitoring is "fundamental for ensuring the implementation and effectiveness of mitigation commitments, meeting legal and permitting requirements, and identifying trends and possible means for improvement" (CEQ 2011). Because monitoring efforts are specifically intended to identify trends and possible means for improvements through refinement, monitoring is a critical element of mitigation to help ensure the accumulated effects to marine mammals remain low.

NEPA determinations:

- The Draft and Final EAs provided separate determinations of effects for each major IPF. In the Draft EA, separate summary determinations were provided for ESA-listed and non-listed marine mammals. The Final EA combined the determinations for listed and non-listed species into one determination for improved clarity. The most severe effects, which were attributed to vessel strikes involving ESA-listed species, are not listed separately. This may lead to the appearance of a downgrading of determinations. However, the determinations regarding effects from each IPF for each species group (listed and non-listed) did not change. The Final EA discusses the potential effects of vessel collisions, especially for the NARW, which could suffer significant effects from vessel strikes, but it lists only the summary determination regarding overall effects of vessel strikes on all marine mammal species including those listed under the ESA.
- In response to concerns that the determinations that commenters asserted were not well supported, BOEM revised the marine mammal sections (**Sections 4.2.4 and 4.3.4**) to add additional supporting information and references. Many of the technical details, especially about the effects of exposure to underwater, can be found in the appendices and have been incorporated by reference. This important content is not featured in the main text of the EA to meet regulatory requirements for brevity, but all the supporting information is accessible to the reader.
- Regarding concerns that the Draft EA did not consider effects of multiple activities, **Section 4.2** describes the No Action Alternative, which includes ongoing and reasonably foreseeable planned activities in the geographic analysis area. This section concludes that multiple planned activities may have moderate effects on marine mammals.
- Inconsistencies between findings of the ESA programmatic consultation on site assessment and characterization activities (Anderson 2021) were recognized and corrected.
- Apparent inconsistencies between the text of **Sections 4.2.4 and 4.3.4** and **Table ES-2** result from differences in the activities summarized in these sections. Text sections address the effects of the No Action Alternative together with the ongoing and planned activities (**Section 4.2.4**) and the effects of the Proposed Action together with the ongoing and planned activities (**Section 4.3.4**), while the summary table summarizes findings of the Proposed Action alone. Text has been added to better explain the organization of the Final EA.
- NEPA requires Federal agencies to disclose the effects of their actions to the public. BOEM is meeting these requirements by providing the NY Bight Final EA for review. BOEM strives for full and responsible compliance with all statutes and regulations for environmental protection.

G.2.12 Military Use and Navigation/Vessel Traffic

Comment Summary

Comments articulated concern with respect to safety fairways for towing vessel traffic relative to the WEAs and disagreed that proposed mitigation will adequately minimize conflicts.

BOEM Response to Comments

BOEM maintains continuous lines of communication with the U.S. Coast Guard and is following their recent Port Access Route Study processes as the U.S. Coast Guard works to designate shipping safety fairways along the Atlantic.

G.2.13 Sea Turtles

Comment Summary

Commenters expressed concern that the EA is not based on current data/best available science, does not consider the impacts in cumulation of other offshore wind and non-offshore wind activities in the region and along the Atlantic Coast, does not include foreseeable dire consequences of climate change, and is dismissive of all impacts as being negligible or minor. A commenter stated that the EA points to 8-year-old data on increases in nesting trends of the ESA-listed leatherback sea turtle species as signs of species recovery and population stability/increase.

Commenters stated that there is no foundation, nor a prior reason to believe that "turbine structures may also displace sea turtles from the area reducing exposure to the hazards of commercial and recreational fishing activity" as was claimed in the Draft EA page 45. A commenter expressed the following: sea turtles have a nomadic lifestyle; speculation about sea turtles aggregating at the foundations of structures is incorrect; and the suggestion that sea turtle populations will benefit from "fish" aggregation at the base of turbines, or that such benefit will balance out the increased entanglement and other risks presented by the proposed activities, also is not founded.

A commenter stated that except for leatherbacks, sea turtles swim very slowly, and in a 3-minute ramp-up warning of site characterization activity about to begin, they would be unable to clear the area before use of the damaging sonic equipment starts.

A commenter pointed out that each sea turtle species utilized differing foraging methods and foraged on different prey, indicating that, to minimize effects on sea turtles, BOEM should ensure ensonification from site characterization, pile driving, and operations to avoid adverse impacts on their prey or forage foods.

Comments regarding the impacts of noise are quoted (in italics):

- *The Draft EA states, "Construction from reasonably foreseeable wind energy development in the geographic analysis area, most notably from pile driving, would create airborne and underwater noise. Sea turtles close to impact pile driving could potentially experience a temporary or permanent loss of hearing sensitivity, acknowledging that sea turtle hearing is poorly understood (citing Finneran et al. 2017 and Popper et al. 2014)." But then says, "Based on current and anticipated future impact avoidance and minimization requirements, impacts to sea turtles from construction-related noise would likely be limited to minimal or moderate short-term effects on a small number of individuals and would not be significant at the population level." The Draft EA is full of contradictions with respect to Turtles. It is unclear how entanglements (also cited by the Draft EA) and permanent loss of hearing could be considered a short-term effect.*
- *"The duration and frequency of any exposure of sea turtles to the other noise [including site characterization surveys] would be variable but anticipated to only result in behavioral*

disturbance impacts. However, accumulated stress and energetic costs of avoiding repeated exposure to noise sources over a season or a life stage could have long-term effects on survival and fitness." This is a grossly self-contradictory statement. Survival and fitness costs associated with accumulated stress and energetic costs of avoiding repeated exposure to noise source over a season (both of which the Draft EA acknowledges) is inconsistent with "only disturbance effects", and with the Bureau's statement "some individuals will likely experience disturbances, but the affected individuals would be expected to recover completely." Reduced survival is not something one recovers from. Does the Draft EA mean that the individual would recover from an entire season of repeated exposure to noise after the season is over, then go on to experience an increase in mortality from reduced condition? If so, this is irreconcilable with the conclusion that there is only potential for "minimal or moderate short-term effects" and that affected individuals would be expected to "recover completely".

BOEM Response to Comments

Revisions were made to the Final EA to clarify impact determinations for the No Action and the Proposed Action Alternatives. The No Action Alternative would have no impact on sea turtles attributable to the Proposed Action. However, the impact determination in **Section 4.2.6** more clearly indicates that the No Action Alternative also includes an assessment of potential effects attributable to a change in baseline conditions (i.e., due to climate change as well as ongoing and planned future activities that are anticipated within the next 5 to 7 years).

BOEM's Data Collection Biological Assessment (Baker and Howson 2021) was submitted to NMFS for their review and concurrence. The assessment considered the effects of HRG surveys, geotechnical surveys, deployment and retrieval of met buoys, and vessel traffic on NMFS-managed ESA species, including the five species of sea turtles listed as threatened or endangered that may occur in the area (green turtle, North Atlantic distinct population segment (DPS) and South Atlantic DPS; hawksbill turtle; Kemp's ridley turtle; leatherback turtle; and loggerhead sea turtle, Northwest Atlantic DPS). Baker and Howson (2021) also considered the whether the Proposed Action would adversely modify the critical habitat of the Northwest Atlantic DPS of the loggerhead sea turtle. NMFS concurred with BOEM's determination that the Proposed Action is not likely to adversely affect any listed species, including sea turtles, nor is it likely to adversely affect critical habitat of the loggerhead sea turtle (Anderson 2021).

NMFS' conclusion (Anderson 2021) is consistent with previous analyses of effects on sea turtles related to lease issuance and site characterization (including meteorological buoys) as described in the NMFS G&G Biological Opinion (NMFS 2013). The analysis in the NMFS G&G Biological Opinion determined that G&G activities—including acoustic sound sources, vessel and equipment noise, vessel traffic, trash and debris release, and accidental fuel spills that may occur as a result of G&G activities—were not likely to result in reductions in the reproduction, numbers, or distribution of sea turtle populations or appreciably reduce the likelihood of green, hawksbill, Kemp's ridley, leatherback, or Northwest Atlantic DPS loggerhead sea turtles surviving and recovering in the wild (NMFS 2013).

Additionally, utilizing the best available science and in consultation with NMFS, BOEM developed a suite of SOCs to minimize the effects of site characterization and site assessment activities on listed species, including sea turtles (**Appendix H**). The Proposed Action includes implementation of the SOCs to avoid and minimize effects to specific species. For example, the SOCs include monitoring of shutdown zones during geophysical surveys and following ramp-up and shutdown procedures for all ESA-listed species. If leases or grants are issued, BOEM will require lessees to comply with the SOCs through lease stipulations and/or as conditions of SAP approval. BOEM submits that this Final EA adequately analyzes the potential effects of the Proposed Action and that there is sufficient analysis upon which to base associated determination of effect.

G.2.14 Standard Operating Conditions

Comment Summary

A range of mitigation measures were suggested via comment submissions relative to navigation concerns, marine mammals and sea turtles, sensitive benthic habitats, decommissioning, and fisheries. Changes to measures were suggested and some comments asserted that existing measures were insufficient in protecting the affected resources. Comments were made urging the implementation of conflict avoidance agreements, especially between industry and fisheries. Commenters articulated the importance of BOEM working with various stakeholders to develop and implement mitigation measures specific to these leases.

BOEM Response to Comments

In developing this EA and in consideration of past EAs and EISs, BOEM identified several ways that potential impacts could be reduced. BOEM also considered all relevant and reasonable measures identified in the public comments on the EA. These potential mitigation measures are identified in the Final EA and described in detail in **Appendix H** (SOCs).

G.2.15 Public Involvement

Comment Summary

Stakeholders commented that offshore wind was moving too quickly, and the public was being flooded by comment periods, making meaningful engagement too difficult. A commenter stated specific concerns that BOEM was not being transparent and departed from the established legal process regarding announcement of the Draft EA and associated comment period. Another commenter indicated that BOEM should continue to work with industry on wind farm layouts that are fishable or avoid areas of important fishing grounds. Several commenters indicated the desire for additional public meeting and an extension to the comment period for the Draft EA and expressed concern that the online comment platform did not work as intended. Some stakeholders articulated that comments made during the scoping phase were not reflected in the Draft EA. Stakeholders indicated that the Intergovernmental Renewable Energy Task Force on the NY Bight was limited in membership and the number of meetings and that many members were unaware of the Task Force and their membership in it.

BOEM Response to Comments

BOEM is committed to robust stakeholder outreach and appreciates feedback and suggestions for improvement. BOEM extended the comment period from September 8, 2021, to September 23, 2021, in response to several requests for extension due to weather events in the region and technical issues with the BOEM website that may have impacted some stakeholders' ability to review the Draft EA. BOEM held two virtual public meetings that were attended by approximately 175 stakeholders in total, and hosted a virtual meeting room with information on the project and how to provide comments at www.boem.gov/new-york-bight-draft-environmental-assessment-virtual-public for those who were unable to attend the virtual public meetings. BOEM considered all comments, including those received during the scoping phase, in preparation of the EA. Additional opportunities for public input will occur at later stages of the renewable energy development process; for example, if a lessee submits a COP, BOEM would initiate the preparation of a project-specific NEPA analysis. This analysis would most likely take the form of an EIS and would provide additional opportunities for public involvement, pursuant to NEPA. As with an SAP, BOEM may approve, approve with modification, or disapprove a lessee's COP.

G.2.16 Consultations

Comment Summary

Several comments expressed concern regarding the ability of offshore wind to comply with NEPA, ESA, the Marine Mammal Protection Act (MMPA), and the Magnuson Stevens Act (MSA). Additional comments requested clarification on the consultation process, and recommendations were made for early and frequent coordination with consulting agencies.

BOEM Response to Comments

In accordance with BOEM's renewable energy regulations, the submission (and BOEM's potential subsequent approval) of a COP, which is a detailed plan for construction and operation of a wind energy facility on a lease, allows the lessee to construct and operate wind turbine generators and associated facilities for a specified term. If a COP is submitted, BOEM will prepare a project-specific NEPA analysis. This analysis would most likely take the form of an EIS and would provide additional opportunities for public involvement, pursuant to NEPA. As with an SAP, BOEM may approve, approve with modification, or disapprove a lessee's COP. Concurrent with the project-specific NEPA analysis, BOEM would initiate consultations, which would include Section 7 consultations under the ESA and Section 106 consultations under the National Historic Preservation Act, among other consultations.

G.2.17 Assessment of Resources with Negligible Impacts

Comment Summary

A commenter requested that BOEM revise the analysis of air quality and greenhouse gas (GHG) emissions to be consistent across alternatives.

BOEM Response to Comments

Revisions have been made in the air quality and GHG emissions section (**Appendix B**, **Sections B.2.1 and B.3.1**) to address the combined impacts of Alternative A and B.

G.2.18 Air Emissions Calculations

Comment Summary

A commenter requested that air emission calculations be expanded to include planned actions (cumulative) assessment in order to improve understanding of overall emissions and net environmental tradeoffs. The commenter also indicted that emissions calculations must also account for carbon released by the offshore wind supply chain activities, including fabrication of concrete and steel that will be needed to install the turbines permanently into the seabed.

BOEM Response to Comments

BOEM's current analyses take into account existing attainment and non-attainment classifications that are a result of cumulative emissions throughout the region. The No Action Alternative includes an assessment of how the environment may shift over the next 5 to 7 years (the timeframe of the Proposed Action) solely from ongoing and planned activities. For air quality, BOEM determined these impacts may result in minor adverse impacts due to criteria pollutant emissions. The Proposed Action itself does not include procurement, installation, or operation of wind turbines. In the event that a lessee submits a COP for a full-scale wind energy facility, BOEM would conduct a site-specific environmental analysis, which would most likely take the form of an EIS. That environmental document would include an analysis of GHG emissions that would result from the construction, operation, and decommissioning of an offshore wind energy facility.

In regard to the request to provide air emission calculations for the fabrication of the wind turbine structure itself, these emissions are not a part of emissions attributable to the Proposed Action. Facilities that are in the supply chain that manufacture materials such as concrete, steel, etc. are subject to regulatory requirements specific to the location where the manufacturing occurs. In the U.S., emissions from such facilities are already accounted for and regulated by the EPA.

G.2.19 Proposed Sale Notice and Construction

Comment Summary

Several commenters articulated the desire to pause the leasing process or expressed opposition to the WEAs in the NY Bight being leased. Other commenters requested modifications to specific areas or removal of specific areas from consideration of leasing. Additional commenters expressed support for BOEM moving forward with the leasing process. Many commenters expressed concerns regarding activities and impacts related to full buildout of the lease areas (installation, operation, and maintenance of turbines and cables) to various resources.

BOEM Response to Comments

In response to the comment period on the Draft EA, BOEM received several comment letters that were specifically on the NY Bight Proposed Sale Notice but are considered out of scope for the NY Bight Draft EA. BOEM has not identified any additional action alternatives that could result in meaningful differences in impacts to the various resources analyzed in this Final EA (e.g., the Proposed Action is the maximum number and size WEAs in the NY Bight; BOEM can elect to lease fewer and/or smaller areas).

BOEM considered including as a second action alternative a temporal removal of portions of the WEAs, and NMFS proposed a similar mitigation alternative in their scoping comment letter. After further evaluation, it became apparent that lease stipulations and SOCs would regulate the mitigative seasonal restrictions, and these alternatives were dismissed from further consideration. Other scoping comments did not suggest alternatives that met the purpose and need and/or would have resulted in different impacts.

BOEM values stakeholder input and will consider these comments during its development of the Final Sale Notice. In addition, if there is information pertinent to impacts associated with surveys and meteorological buoys, then that information was considered in the preparation of the Final EA.

Effects from installation, construction, and operation of a full-scale wind energy facility are outside the scope of the analysis for the Proposed Action and, therefore, are not addressed in the EA, except to the extent they are relevant to the effects identified in the present (ongoing) and planned actions (formerly referred to as cumulative) considered as part of Alternative A. Effects associated with site assessment and site characterization activities are the focus of this EA and include multiple actions that are intended to assess the distribution and population density of birds, benthic organisms, bats, and marine fauna and to aid a future NEPA analysis for a wind energy facility in the event a developer proposes one. The purpose of this NEPA analysis is to identify potential effects on resources, including wildlife species, from the Proposed Action and alternatives.

G.3 References

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BOEM. 2020. Guidelines for providing geophysical, geotechnical, and geohazard information pursuant to 30 CFR Part 585. Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management. 32 p.

CEQ. 2011. Appropriate use of mitigation and monitoring and clarifying the appropriate use of mitigated findings of no signifiant impact; memorandum for heads of Federal departments and agencies. Washington (DC): Council on Environmental Quality. 20 p.

Hare J, Morrison W, Nelson M, Satachura M, Teeters E, Griffis R, Alexander M, Scott J, Alade L, Bell R, et al. 2016. A vulnerability assessment of fish and invertebrates to climate change on the northeast U.S. continental shelf. PLoS ONE. 11(2):e0146756.

NMFS. 2013. Endangered Species Act Section 7 Consultation Biological Opinion for commercial wind lease issuance and site assessment activities on the Atlantic Outer Continental Shelf in Massachusetts, Rhode Island, New York and New Jersey Wind Energy Areas. Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management, U.S. Army Corps of Engineers New England District. 255 p. Report No.: NER-2012-9211, GARFO-2012-00011.

NMFS. 2020. North Atlantic right whale (*Eubalaena glacialis*) vessel speed rule assessment. Silver Spring (MD): National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Protected Resources. 217 p.

Pace R. 2021. Revisions and further evaluations of the right whale abundance model: improvements for hypothesis testing. Woods Hole (MA): U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center. 54 p. Report No.: NOAA Technical Memorandum NMFS-NE-269.

Appendix H: Standard Operating Conditions

This section lists the Standard Operating Conditions (SOCs) that are part of the Proposed Action (Alternative B). The SOCs to minimize or eliminate potential impacts to protected species, including Endangered Species Act (ESA)-listed species of marine mammals and sea turtles, were developed by the Bureau of Ocean Energy Management (BOEM) and refined during consultations with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) under Section 7 of the ESA.

1 General Requirements

1.1 Prior to the start of operations, the Lessee must hold a briefing to establish responsibilities of each involved party, define the chains of command, discuss communication procedures, provide an overview of monitoring procedures, and review operational procedures. This briefing must include all relevant personnel, crew members and PSOs. New personnel must be briefed as they join the work in progress.

1.2 The Lessee must ensure that all vessel operators and crew members, including PSOs, are familiar with, and understand, the requirements specified in Addendum C of the lease.

1.3 The Lessee must ensure that a copy of Addendum C of the lease and the Project Design Criteria and Best Management Practices listed in Appendix B of the NMFS Letter of Concurrence issued by the National Marine Fisheries Service (NMFS) on June 29, 2021 is made available on every project-related vessel. The 2021 Biological Assessment and letter of concurrence may be found at https://www.boem.gov/environmental-consultations.

1.4 Endangered Species Act (ESA) Consultation for Biological Surveys: The Lessee must consult with BOEM, the National Marine Fisheries Service, and the Fish and Wildlife Service prior to designing and conducting biological surveys intended to support offshore renewable energy plans that could interact with ESA-listed species. Please see the 2021 Biological Assessment and letter of concurrence at https://www.boem.gov/renewable-energy/nmfs-esa-consultations for data collection activities that have been previously consulted upon.

2 Protected Species

2.1 Protected Species. Unless otherwise authorized by BOEM, Lessee's OCS activities must comply with the standards in the Project Design Criteria and Best Management Practices of the February 2021 Biological Assessment (BA) and corresponding NMFS Letter of Concurrence issued by the National Marine Fisheries Service (NMFS) Appendix B on June 29, 2021. The 2021 BA and letter of concurrence may be found here at https://www.boem.gov/renewable-energy/nmfs-esa-consultations. At the Lessee's option, the Lessee, its operators, personnel, and contractors may satisfy this requirement by complying with the NMFS-approved measures to safeguard protected species that are most current at the time an activity is undertaken under this lease, including but not limited to new or updated versions of the 2021 BA or 2021 NMFS Letter of Concurrence, or through new or activity-specific consultations.

3 Archaeological Survey Requirements

3.1 Archaeological Survey Required. The Lessee must provide the results of an archaeological survey with its plans.

3.2 Qualified Marine Archaeologist. The Lessee must ensure that the analysis of archaeological survey data collected in support of plan (e.g., SAP and/or COP) submittal and the preparation of archaeological reports in support of plan submittal are conducted by a Qualified Marine Archaeologist.

3.3 Tribal Pre-Survey Meeting. The Lessee must coordinate a tribal pre-survey meeting by sending a letter through certified mail, and following up with email or phone calls as necessary, to the following Tribes:

- Absentee-Shawnee Tribe of Indians of Oklahoma;
- Delaware Tribe of Indians;
- Eastern Shawnee Tribe of Oklahoma;
- Mashantucket Pequot Tribal Nation;
- Mashpee Wampanoag Tribe;
- Mohegan Tribe of Connecticut;
- Shawnee Tribe;
- Stockbridge-Munsee Community Band of Mohican Indians;
- The Delaware Nation;
- The Narragansett Indian Tribe;
- The Shinnecock Indian Nation; and
- Wampanoag Tribe of Gay Head (Aquinnah).

The purpose of this meeting will be for the Lessee and the Lessee's Qualified Marine Archaeologist to discuss the Lessee's Survey Plan and consider requests to monitor portions of the archaeological survey and the geotechnical exploration activities, including the visual logging and analysis of geotechnical samples (e.g., cores, etc.). Notification of the tribal pre-survey meeting must be sent at least 15 calendar days prior to the date of the proposed tribal pre-survey meeting. The meeting must be scheduled for a date at least 30 calendar days prior to commencement of survey activities performed in support of plan submittal and at a location and time that affords the participants a reasonable opportunity to participate. The anticipated date for the meeting must be identified in the timeline of activities described in the applicable survey plan (see 2.1 of the lease). The Lessee must provide the Lessor with documentation of compliance with this stipulation prior to commencement of surveys.

3.4 Geotechnical Exploration. The Lessee may only conduct geotechnical exploration activities performed in support of plan (i.e., SAP and/or COP) submittal in locations where an analysis of the results of geophysical surveys has been completed. This analysis must include a determination by a Qualified Marine Archaeologist as to whether any potential archaeological resources are present in the area. Except as allowed by the Lessor under 4.2.6, the geotechnical exploration activities must avoid potential archaeological resources by a minimum of 50 m (164 ft), and the avoidance distance must be calculated from the maximum discernible extent of the archaeological resource. A Qualified Marine Archaeologist must certify, in the Lessee’s archaeological reports, that geotechnical exploration activities did not impact potential historic properties identified as a result of the HRG surveys performed in support of plan submittal, except as follows: in the event that the geotechnical exploration activities did impact potential historic properties identified in the archaeological surveys without the Lessor's prior approval, the Lessee and the Qualified Marine Archaeologist who prepared the report must instead provide a statement documenting the extent of these impacts.

3.5 Monitoring and Avoidance. The Lessee must inform the Qualified Marine Archaeologist that he or she may elect to be present during HRG surveys and bottom-disturbing activities performed in support of plan (i.e., SAP and/or COP) submittal to ensure avoidance of potential archaeological resources, as determined by the Qualified Marine Archaeologist (including bathymetric, seismic, and magnetic anomalies; side scan sonar contacts; and other seafloor or sub-surface features that exhibit potential to represent or contain potential archaeological sites or other historic properties). In the event that the Qualified Marine Archaeologist indicates that he or she wishes to be present, the Lessee must reasonably facilitate the Qualified Marine Archaeologist's presence, as requested by the Qualified Marine Archaeologist, and provide the Qualified Marine Archaeologist the opportunity to inspect data quality.

3.6 No Impact without Approval. In no case may the Lessee knowingly impact a potential archaeological resource without the Lessor's prior approval.

3.7 Post-Review Discovery Clauses. If the Lessee, while conducting geotechnical exploration or any other bottom-disturbing site characterization activities in support of plan (i.e., SAP and COP) submittal and after review of the location by a Qualified Marine Archaeologist under 4.2.4 of the lease, discovers an unanticipated potential archaeological resource, such as the presence of a shipwreck (e.g., a sonar image or visual confirmation of an iron, steel, or wooden hull, wooden timbers, anchors, concentrations of historic objects, piles of ballast rock) or evidence of a pre-contact archaeological site (e.g. stone tools, pottery or other pre-contact artifacts) within the project area, the Lessee must:

3.7.1 Immediately halt seafloor/bottom-disturbing activities within the area of discovery;

3.7.2 Notify the Lessor within 24 hours of discovery;

3.7.3 Notify the Lessor in writing via report to the Lessor within 72 hours of its discovery;

3.7.4 Keep the location of the discovery confidential and take no action that may adversely impact the archaeological resource until the Lessor has made an evaluation and instructs the applicant on how to proceed; and

3.7.5 If (1) the site has been impacted by the Lessee's project activities; or (2) impacts to the site or to the area of potential effect cannot be avoided, conduct additional investigations, as directed by the Lessor, to determine if the resource is eligible for listing in the National Register of Historic Places (30 CFR 585.802(b)). If investigations indicate that the resource is potentially eligible for listing in the National Register of Historic Places, the Lessor will inform the Lessee how to protect the resource or how to mitigate adverse effects to the site. If the Lessor incurs costs in protecting the resource, then, under Section 110(g) of the National Historic Preservation Act, the Lessor may charge the Lessee reasonable costs for carrying out preservation responsibilities under the OCS Lands Act (30 CFR 585.802(c-d)).

4 Avian and Bat Survey and Reporting Requirements

4.1 Lighting: Any lights used to aid marine navigation by the Lessee during construction, operations, and decommissioning of a meteorological buoy must meet USCG requirements for private aids to navigation [https://www.navcen.uscg.gov/pdf/AIS/CG_2554_Paton.pdf] and BOEM's Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development [https://www.boem.gov/2021-lighting-and-marking-guidelines]. For any additional lighting, the Lessee must use such lighting only when necessary, and the lighting must be hooded downward and directed when possible, to reduce upward illumination and illumination of adjacent waters.

4.2 Motus Wildlife Tracking System: To help address information gaps on offshore movements of birds and bats, including ESA-listed species, the Lessee must install Motus stations on meteorological or environmental data buoys in coordination with U.S. Fish and Wildlife Service's Offshore Motus network.

4.3 Bird Deterrents: To minimize the attraction of birds, the Lessee must install bird deterrent devices (e.g., anti-perching), where appropriate.

4.4 Avian Annual Reporting: The Lessee must provide an annual report to the Lessor and U.S. Fish and Wildlife Service (USFWS) using the contact information provided as an Enclosure to this lease, or updated contact information as provided by the Lessor. This report must document any dead or injured birds or bats found during activities conducted in support of plan submittal. The first report must be submitted within 6 months of the start of the first survey conducted in support of plan submittal, and subsequent reports must be submitted annually thereafter until all surveys in support of plan submittal have concluded and all such birds and bats have been reported. If surveys are not conducted in a given year, the annual report may consist of a simple statement to that effect. An annual report must be provided to BOEM 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.usgs.gov/centers/eesc/science/bird-banding-laboratory.

4.5 Survey Results and Data: The Lessee must provide the results of avian surveys and data to BOEM and USFWS with its plans.

U.S. Department of the Interior

The Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

BOEM
Bureau of Ocean Energy Management

Bureau of Ocean Energy Management

The mission of the Bureau of Ocean Energy Management is to manage development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way. The bureau promotes energy independence, environmental protection, and economic development through responsible management of these offshore resources based on the best available science.