Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf of the Gulf of Maine

Draft Environmental Assessment June 2024

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Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Maine

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Executive Summary

ES.1 Purpose and Need for Action

On March 15, 2024, the Bureau of Ocean Energy Management (BOEM) released the Announcement of the Area Identification (Area ID) memorandum (BOEM 2024ba). The Area ID memorandum documents the analysis and rationale used to develop the Wind Energy Area (WEA) in the Gulf of Maine (Figure ES-1). The Gulf of Maine is an area offshore the states of Maine, New Hampshire, and Massachusetts. In partnership with the National Centers for Coastal Ocean Science (NCCOS), BOEM compiled best available data and developed spatial models to identify suitable areas for offshore wind energy in the region (Randall et al. 2024). BOEM identified one WEA in the Gulf of Maine.

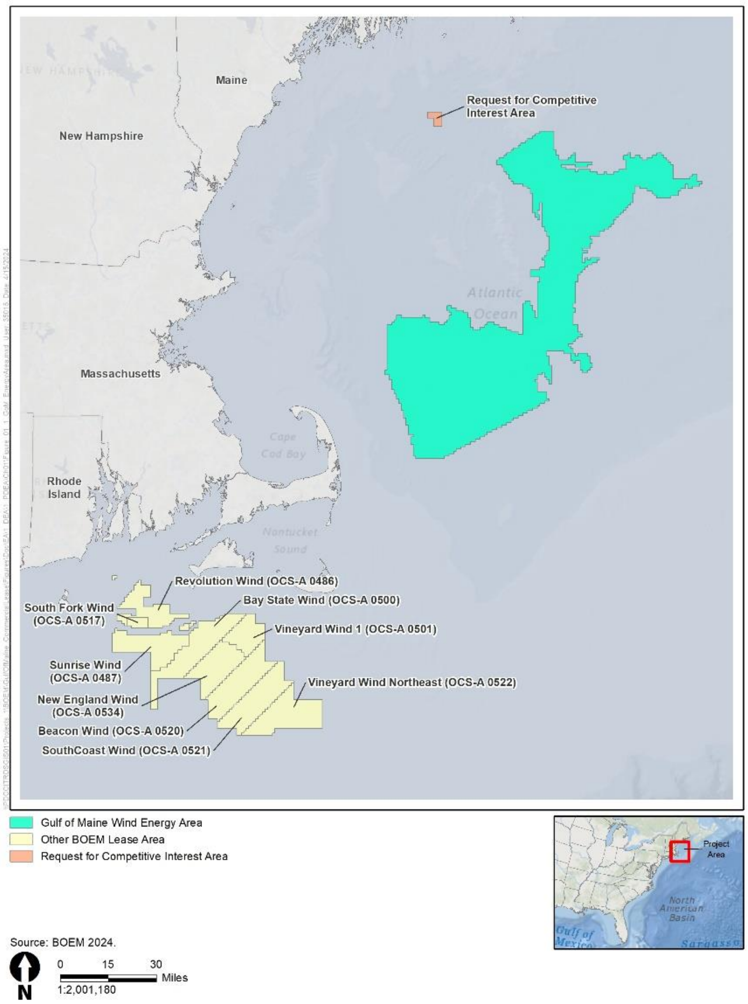

Figure ES-1. Gulf of Maine Wind Energy Areas

The purpose of the Proposed Action is to issue commercial leases within the WEA and to grant rights-of-way (ROWs) and rights-of-use and easement (RUEs) in the region of the Outer Continental Shelf (OCS) of the Gulf of Maine. The Gulf of Maine Final WEA, depicted in **Figure ES-1,** is considered in this environmental assessment (EA). BOEM may decide to issue leases within all of, a portion of, or none of the WEA analyzed in the EA, and it communicates this decision through issuance of a Proposed Sale Notice (PSN) and Final Sale Notice (FSN). On May 1, 2024, BOEM published a PSN in the *Federal Register* (89 *Federal Register* [FR] 35222), proposing eight lease areas for leasing: OCS-A 0562, OCS-A 0563, OCS-A 5064, OCS-A0565, OCS-A 0566, OCS-A 0567, OCS-A 0568, and OCS-0569. The EA and associated consultations will inform development of the FSN.

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 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 one or more plans to conduct this activity.

ES.2 Proposed Action and Alternatives

The Proposed Action for this EA is the issuance of commercial wind energy leases within the WEA that BOEM has designated on the OCS in the Gulf of Maine, and the granting of ROWs and RUEs in support of wind energy development. Issuance of leases and 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 wind energy leases. This EA analyzes BOEM's issuance of up to 15 leases (across two phases of leasing) that may cover the entirety of the WEA, 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 Gulf of Maine and may include corridors that extend from the WEA 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. The EA analyses include site assessment and site characterization activities for potential corridors. 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. The Proposed Action includes site characterization activities within the WEA and between the WEA and shore along the potential transmission cable corridors.

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 Gulf of Maine at this time. Although some site characterization surveys (e.g., biological surveys) and site assessment activities 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. Alternative A includes other ongoing activities and reasonably foreseeable future (planned) actions (**Appendix D**) occurring in the same geographic area and timeframe (within 10 years after first lease issuance).

Alternative	Description
Alternative B (Preferred Alternative) – Offer some or all the WEA for lease and adjacent areas for grants	Under Alternative B, lease issuance, site characterization, and site assessment activities could occur in the WEA for which leases are offered, and between the WEA and shore along the potential transmission cable corridors.

BOEM = Bureau of Ocean Energy Management; 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 WEA. 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 Code of Federal Regulations (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 events, 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 Gulf of Maine WEA, 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 incremental 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 (**Chapter 3**). Cumulative impacts resulting from Alternative B and other ongoing or future planned action is described in **Section 3.5.2**.

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
Water Quality	Negligible	Negligible	Negligible
Benthic Resources	Negligible to Minor	Negligible to Minor	Negligible
Finfish, Invertebrates, and Essential Fish Habitat	Negligible	Negligible	Negligible
Marine Mammals	Negligible to Minor	Minor to Minor	Negligible
Sea Turtles	Negligible to Minor	Negligible to Minor	Negligible
Military Use	Negligible	Negligible	Negligible
Navigation and Vessel Traffic	Negligible to Minor	Negligible to Minor	Negligible to Minor
Commercial and Recreational Fishing	Negligible to Minor	Negligible to Minor	Negligible to Minor
Recreation and Tourism	Negligible	Negligible	Negligible
Cultural, Historical, and Archaeological Resources	Negligible	Negligible	Negligible

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

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List of Abbreviations and Acronyms

ACHP	Advisory Council on Historic Preservation
ADCPs	Acoustic Doppler Current Profilers
ADIOS	Automated Data Inquiry for Oil Spills
AIS	Automated Identification System
Area ID	Area Identification
ATON	aids to navigation
BIA	biologically important area
BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement's
Call	Gulf of Maine call for Information and Nominations
CD	Consistency Determination
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CHIRP	Compressed High-Intensity Radiated Pulse
COP	Construction and Operations Plan
CPT	cone penetration test
dB	decibel
DoD	U.S. Department of Defense
EA	Environmental Assessment
EBM	ecosystem-based management
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FR	Federal Register
FSN	Final Sale Notice
G&G	geological and geophysical
GAAs	geographic analysis areas
GPs	general permits
HRG	High-resolution geophysical
Hz	hertz
IMO	International Maritime Organization
IPFs	impact-producing factors
kHz	kilohertz
LNM	Local Notice to Mariner
LoC	Letter of Confirmation
MA GP	Massachusetts General Permit
ME GP	Maine General Permit
MEC	munitions and explosives of concern
met	meteorological
MMPA	Marine Mammal Protection
MNM PARS	Approaches to Maine, New Hampshire, and Massachusetts Port Access Route Study
NARW	North Atlantic Right Whale

NCCOS	National Centers for Coastal Ocean Science
NEPA	National Environmental Policy Act
NGOs	non-governmental organizations
NH GP	New Hampshire General Permit
nm	nautical miles
NMFS	National Marine Fisheries Service
NMSA	National Marine Sanctuaries Act
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
ONMS	Office of National Marine Sanctuaries
PATON	private aid to navigation
PBFs	physical and biological features
PEIS	Programmatic Environmental Impact Statement
PK	zero-to-peak sound pressure level
PSN	Proposed Sale Notice
PSO	protected species observer
PTS	permanent threshold shift
re 1 μPa	referenced to 1 micropascal
RFI	Request for Interest
RHA	Rivers and Harbos Act
ROW	right-of-way
RUE	right-of-use and easement
SAP	site assessment plan
SBNMS	Stellwagen Bank National Marine Sanctuary
SBP	sub-bottom profiler
SEL	sound exposure level
SHPO	State Historic Preservation Office
SOCs	Standard Operating Conditions
SPL	sound pressure level
Task Force	Central Atlantic Intergovernmental Renewable Energy Task Force
TSS	traffic separation scheme
UME	Unusual Mortality Event
USACE	U.S. Army Corps of Engineers
USBL	Ultra-short baseline
USC	United States Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
UXO	unexploded ordnance
VMS	Vessel Monitoring System
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 within the Wind Energy Area (WEA) in the Gulf of Maine would lead to reasonably foreseeable significant impacts on the environment and, thus, whether an environmental impact statement should be prepared before any leases are issued.

On March 15, 2024, BOEM released the Announcement of the Area Identification (Area ID) memorandum (BOEM 2024b). The Area ID memorandum documents the analysis and rationale used to develop the WEA in the Gulf of Maine (**Figure 1-1**). The Gulf of Maine is an area offshore the states of Maine, New Hampshire, and Massachusetts. In partnership with the National Centers for Coastal Ocean Science (NCCOS), BOEM compiled best available data and developed spatial models to identify suitable areas for offshore wind energy in the region (Randall et al. 2024). BOEM identified one WEA in the Gulf of Maine. The purpose of the Proposed Action is to issue commercial leases within the WEA and to grant rights-of-way (ROWs) and rights-of-use and easement (RUEs) in the region of the Outer Continental Shelf (OCS) of the Gulf of Maine. 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 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 one or more plans to conduct this activity.

Based on the process described in the Area ID memorandum (BOEM 2024b), the WEA considered in this EA is described in **Table 1-1** and depicted in **Figure 1-1**. For the purposes of impact assessment, BOEM is assuming lease areas of approximately 80,000 acres each, with up to 15 lease areas across two phases of leasing within the WEA. BOEM may decide to issue leases within all of, a portion of, or no part of the WEA analyzed in the EA, and communicates this decision through issuance of a Proposed Sale Notice (PSN) and Final Sale Notice (FSN). On May 1, 2024, BOEM published a PSN,[1] proposing a first phase of lease areas within the WEA. The EA and associated consultations will inform development of the FSN.

[1] https://www.federalregister.gov/documents/2024/05/01/2024-09390/atlantic-wind-lease-sale-11-atlw-11-for-commercial-leasing-for-wind-power-development-on-the-us-gulf

Table 1-1. Gulf of Maine Wind Energy Area descriptive statistics

Parameter	WEA
Acres	2,001,902
Maximum depth (m)	277
Minimum depth (m)	120
Closest distance to Maine (nm)	58
Closest distance to Massachusetts (nm)	20
Closest distance to New Hampshire (nm)	57

m = meter; N/A = not applicable; nm = nautical mile.

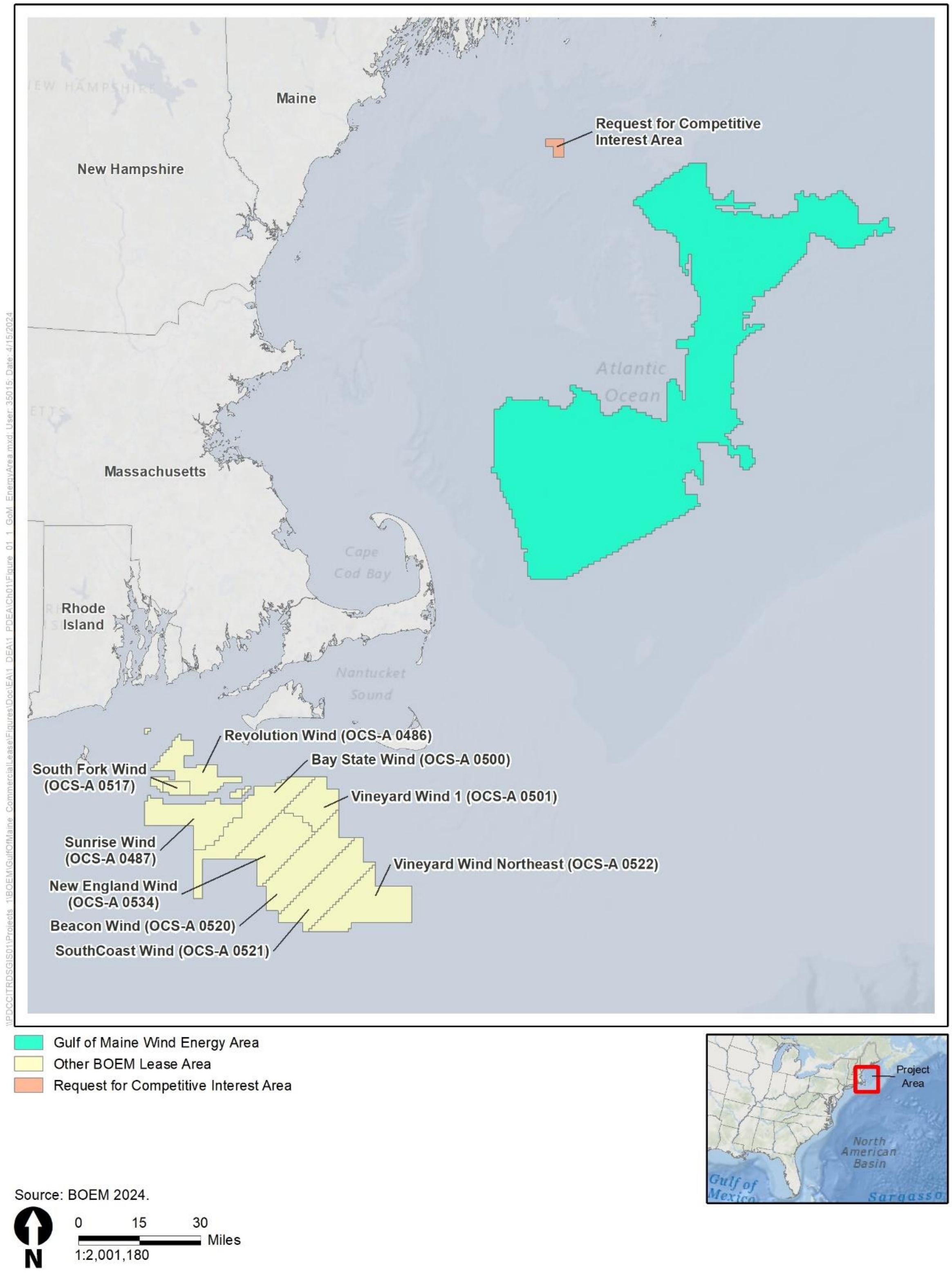

Figure 1-1. Gulf of Maine Wind Energy Area

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2 The Proposed Action and Alternatives

The Proposed Action is to offer for lease all or some of the WEA described in **Chapter 1** (**Table 1-1**; **Figure 1-1**) for commercial wind energy development and to grant ROWs and RUEs in support of wind energy development. Under the Proposed Action, BOEM would potentially issue leases that may cover the entirety of the WEA, easements associated with each lease, and grants for subsea cable corridors and associated offshore collector/converter platforms. The ROWs, RUEs, and potential easements would all be located within the OCS offshore Maine, Massachusetts, and New Hampshire and may include corridors that extend from the WEA to the onshore energy grid.

This Draft 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 within the Proposed Action would most likely include the temporary placement of meteorological (met) buoys and oceanographic devices. Activities do not include the installation of met towers, as met buoys have become the preferred metocean data collection platform for developers. Site characterization activities would most likely include geophysical, geotechnical, and biological surveys.

To measure the speed and direction of ocean currents, Acoustic Doppler Current Profilers (ADCPs) would likely be installed on met buoys or the ocean floor. The ADCP is a remote sensing technology that transmits sound waves at a constant frequency and measures the ricochet of the sound wave off fine particles or zooplankton suspended in the water column. The ADCPs may be mounted independently on the seafloor or attached to a buoy. A seafloor-mounted ADCP would likely be located near the met buoy (within approximately 500 feet) and connected by a wire that is buried into the ocean bottom. A typical ADCP has 3 to 4 acoustic transducers that emit and receive acoustical pulses from different directions, with frequencies ranging from 300 to 600 kilohertz (kHz) and a sampling rate of 1 to 60 minutes. A typical ADCP is about 1 to 2 feet tall and 1 to 2 feet wide. Its mooring, base, or cage (surrounding frame) would be several feet wider.

A met buoy could also accommodate environmental monitoring equipment such as avian and bat monitoring equipment (e.g., thermal imaging cameras, Motus receivers, acoustic detectors), acoustic monitoring for marine mammals, data logging computers, visibility sensors, water measurements (e.g., temperature, conductivity salinity), and communications equipment.

This analysis does not consider construction and operation of any commercial wind power facilities, which would be evaluated if a lessee were to submit 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 one or more plans proposing development of the leasehold; the lease does not by itself convey rights to proceed with development of a wind energy facility. After lease issuance, a lessee would conduct surveys and, if authorized to do so, install meteorological measurement devices (e.g., met buoys) 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 it is found to be suitable, 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 Tribal, state, federal, and local entities; solicit input from the public and the Gulf of Maine Intergovernmental Renewable Energy Task Force (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 Code of Federal Regulations (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 conditions, 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 (OCSLA).

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. 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 site assessment activities and by potential advances in technology during the extensive time period between lease issuance and COP approval. Each design parameter, or a 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 activities. It is assumed that lessees would begin survey activities as soon as possible after receiving a lease and preparing plans for submission to BOEM, and when sea states and weather conditions allow for site characterization and site assessment activities. The most suitable sea states and weather conditions typically occur between April and August. Lessees have up to 5 years to perform site characterization activities before they must submit a COP (30 CFR § 585.235(a)).[1] Lease sales in the Gulf of Maine are anticipated to occur in two phases.

- Leasing Phase 1: Under the reasonably foreseeable site characterization scenario, the sale date for up to ten leases is planned for October 2024, and the FSN is to be published 45 days prior. BOEM could issue leases as early as late 2024 and continue through mid-2025. For leases issued

[1] BOEM regulations currently require lessees to submit a site assessment plan (SAP), which must include data from site characterization surveys (30 CFR § 585.605). BOEM and Bureau of Safety and Environmental Enforcement's (BSEE's) proposed Renewable Energy Modernization Rule, published on January 30, 2023 (88 FR 5968) would eliminate the SAP requirement for met buoys because the SAP process is duplicative with U.S. Army Corps of Engineers' (USACE's) permitting process under Section 404(e) of the Clean Water Act (33 United States Code [U.S.C.] 1344(e)) and Section 10 of the Rivers and Harbors Act of 1899 (33 USC 401 *et seq.*) for the installation of met buoys, which are categorized by the USACE as scientific measurement devices. (The proposed rule can be found at https://www.federalregister.gov/documents/2023/01/30/2023-00668/renewable-energy-modernization-rule.)

in October through December 2024, the earliest surveys would likely begin no sooner than April 2025. Lessee's surveys for leases issued in October through December 2024 could continue through August 2029 prior to submitting their COPs.

- Leasing Phase 2: Under the reasonably foreseeable site characterization scenario, a second lease sale would be held in 2028. BOEM could issue leases as early as early 2028 and continue through late 2028. For leases issued after July 2028, the earliest surveys would likely begin no sooner than April 2029. Lessee's surveys for leases issued in 2028 could continue through 2033 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 site assessment activities in the identified WEA in the Gulf of Maine and along offshore export cable corridors to shore. The two alternatives were analyzed by BOEM, in full, in this EA. The alternatives are described in **Section 2.1**.

2.1 Alternatives Considered

This section describes the No Action Alternative and one action alternative for lease and grant issuance, site characterization, and site assessment activities within the WEA and along the potential transmission cable corridors of the Gulf of Maine. The alternatives are described in the following sections.

2.1.1 Alternative A—No Action

Under the No Action Alternative, no wind energy leases would be issued, and site assessment activities undertaken by lessees would not occur within the identified WEA in the Gulf of Maine. Although some site characterization surveys (e.g., geological, geophysical, biological, and archaeological surveys conducted on unleased or ungranted areas of the OCS) and site assessment activities 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 of this EA 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 reasonably foreseeable future (planned) actions (**Section 3.3**, **Section B.3**, and **Appendix D**). The other ongoing and planned actions that contribute to the No Action baseline will be addressed, as will impacts on 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 (10 years after first lease issuance, including both phases of leasing). 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 (Alternative B, the Proposed Action) is evaluated.

2.1.2 Alternative B—Proposed Action/Preferred Alternative

Alternative B was developed through extensive coordination with the Task Force;[2] relevant consultations with federal, state, and local agencies; and extensive input from the public and potentially

[2] Task Force meeting information and content is available on BOEM's website: https://www.boem.gov/renewable-energy/state-activities/maine/gulf-maine. Meetings were held on December 12, 2019; May 19, 2022; and May 10–11, 2023.

affected stakeholders as described in the Area ID memorandum (BOEM 2024b). BOEM partnered with NCCOS to compile the best available data and develop spatial models to identify suitable areas for offshore wind energy in the region (Randall et al. 2024).

Alternative B (the Proposed Action/Preferred Alternative) is the issuance of commercial wind energy leases and site characterization and site assessment activities within the WEA as identified in **Figure 1-1**, and the granting of ROWs and RUEs in support of wind energy development in the WEA. The WEA totals approximately 2.0 million acres and is located between 20 and 76 nautical miles (nm) from shore. For the purposes of impact assessment, BOEM is assuming lease areas of approximately 80,000 acres each, with a maximum of 15 lease areas (for a total of up to 1,200,000 acres across all leases). The impact analyses under Alternative B in this EA include potential impacts of lessee site assessment and site characterization activities for lease issuance for all potential lease areas.

Alternative B assumes that each lessee would undertake the largest expected number of site characterization surveys (i.e., shallow hazards, geological, geotechnical, and archaeological, and biological surveys) in the WEA for which leases are offered. 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 (for a total of 30 met buoys across all leases). BOEM anticipates that each lease could have up to two transmission cable routes (for connecting future wind turbines to an onshore power substation).

Impacts 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. Potential direct and indirect impacts of activities associated with Alternative B are determined separately from cumulative impacts (impacts resulting from Alternative B in combination with other ongoing and planned offshore wind and non-offshore wind activities) (**Section 3.4**, **Section B.4**, and **Appendix D**).

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 Standard Operating Conditions (SOCs) (**Appendix H**) and would be implemented through lease stipulations. The impacts of Alternative B on environmental and socioeconomic resources are described in detail in **Section 3.4** and **Section B.4**.

Impacts from installation, construction, and operation of a full-scale wind energy facility in the WEA are outside the scope of the analysis for the Proposed Action and, therefore, are not analyzed in the EA. Effects associated with site assessment and site characterization activities are the focus of this EA, including multiple actions 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.

2.2 Alternatives Considered but Dismissed

Through the Area ID process, the WEA underwent significant winnowing to avoid and minimize adverse impacts to wildlife, fisheries, natural resources, and other ocean users. The process to identify the Gulf of Maine WEA included analysis of existing resources, including visual and historic properties, marine protected species, existing cables, recreational and commercial fishing, and vessel navigation and 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.

On March 15, 2024, BOEM released the Area ID memorandum (BOEM 2024b), which documents the analysis and rationale used to develop recommendations for the WEA in the Gulf of Maine.[3] 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 on the various resources analyzed in this EA.

2.3 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 25, 2023, Call for Information and Nominations (Call) associated with wind energy planning in the Gulf of Maine
- Public response to the October 19, 2023, Notice for Comment of Draft Wind Energy Area on the Gulf of Maine, associated with the analysis and rationale used to develop the Draft WEA
- Public response to the March 18, 2024, Notice of Intent (NOI) to prepare this EA
- Ongoing consultation and coordination with the members of BOEM's Task Force
- Ongoing or completed consultations with other federal agencies, including the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Department of Defense (DoD), and U.S. Coast Guard (USCG)
- Research and review of current relevant NEPA documents that assess similar activities, as well as relevant scientific and socioeconomic literature (**Table 2-1**)

[3] BOEM and the NOAA National Centers for Coastal Ocean Science developed a spatial model to combine data on human resources (e.g., vessel traffic, including fisheries) and natural resources (e.g., fisheries and endangered species habitats). The final WEA and siting analysis are available at https://www.boem.gov/renewable-energy/state-activities/maine/gulf-maine.

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 and Site Assessment Activities Environmental Assessments	
BOEM. 2024c. Final Environmental Assessment for Wind Energy Research Lease on the Atlantic Outer Continental Shelf Offshore Maine. OCS EIS/EA BOEM 2023-045. May 29, 2024.	https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/GoME-RL_Final%20EA.pdf
Siting Analyses	
Alyssa L. Randal, Jonathan A. Jossart, Lucas B. Feinberg, Brandon M. Jensen, Zachary E. Jylkka, Seth J. Theuerkauf, and James A. Morris Jr. 2024. A Wind Energy Area Siting Analysis for the Gulf of Maine Call Area. Sterling, Virginia.	https://www.boem.gov/sites/default/files/documents/renewable-energy/GOME_Final_WEA_Report_NCCOS_20240314_508c.pdf
Other Relevant Wind Energy Documents	
Avanti Corporation, Industrial Economics Inc. 2019. National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Continental Shelf. Sterling, VA: U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-036.	https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/IPFs-in-the-Offshore-Wind-Cumulative-Impacts-Scenario-on-the-N-OCS.pdf
BOEM. 2022. Gulf of Maine Request for Competitive Interest (RFCI). Decision memorandum. Washington, DC: U.S. Department of the Interior, Bureau of Ocean Energy Management.	https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/GoME%20RFCI%20Decision%20Memo.pdf
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Other Relevant Affected Environment Documents	
BOEM. 2024a. Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR Part 585. December 28, 2023; published January 2, 2024. Washington, DC: U.S. Department of the Interior, Bureau of Ocean Energy Management.	https://www.boem.gov/sites/default/files/documents/about-boem/Updated%20Renewable%20Energy%20Geohazard%20Guidelines%202023_508c.pdf

2.4 Assumptions for the Proposed Action

BOEM's assumptions for the Proposed Action (Alternative B) scenario in this EA are summarized in **Table 2-2** and **Table 2-3**; 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 2.3**), 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 15 leases within the WEA of around 80,000 acres each (up to 1,200,000 acres total).
A lessee would install up to two met buoys per lease (up to 30 met buoys total).
There would be up to two offshore export cable route corridors per lease (up to 30 offshore export cable route corridors total). Site characterization activities would include the WEA and potential offshore cable route corridors.
Surveying and Sampling Assumptions
Reconnaissance site characterization surveys would likely begin within 1 year following execution of the lease, along with any additional surveys that may be required prior to installing a met buoy. Site characterization surveys would then continue in a phased approach for up to 5 years leading up to the preparation and submittal of the COP. Additional geophysical surveying may be performed after COP approval to support a facility design report and a fabrication and installation report. Under the current BOEM regulations, the lessee must receive BOEM approval of a SAP before installing one or more met buoys. BOEM has proposed eliminating the SAP requirement for met buoys in an ongoing rulemaking.[a]
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 offshore export cables). The surveys are typically completed in phases, starting with reconnaissance surveys.
Seabed sampling (CPTs, vibracores, grab samples, SPI) of the WEA would require a seabed investigation at every potential wind turbine location to provide sufficient geotechnical data to support facility design (which would only occur in the portion of the WEA where structural placement is allowed) and one investigation per kilometer of offshore export cable corridor. Investigations would also be conducted at locations where offshore collector or converter platforms are proposed. The amount of effort and the number of vessel trips required to perform the geotechnical investigations vary greatly by the type of technology used to retrieve the sample. Benthic sampling could also include nearshore, estuarine, and SAV habitats along the offshore export cable routes.
Lessees would be required to comply with SOCs developed to avoid and minimize adverse effects on resources (**Appendix H**). 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.
Installation, Decommissioning, and Operations and Maintenance Assumptions
Met buoy installation and decommissioning would likely take approximately 1 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.
Assumptions for Port Usage
Vessel traffic associated with the Proposed Action would be split between ports in Maine, Massachusetts, and New Hampshire. Vessels could use the following general port locations: Searsport, Maine; Portland, Maine; Portsmouth, New Hampshire; Boston, Massachusetts; Salem, Massachusetts; and New Bedford, Massachusetts. No expansion of these ports is expected in support of the Proposed Action.

BOEM = Bureau of Ocean Energy Management; BSEE = Bureau of Safety and Environmental Enforcement; CFR = Code of Federal Regulations; COP = Construction and Operations Plan; CPT = cone penetration test; FR = *Federal Register*; HRG = high-resolution geophysical; met = meteorological; NOPR = Notice of Proposed Rulemaking; SAP = Site Assessment Plan; SAV = submerged aquatic vegetation; SOC = Standard Operating Condition; SPI = sediment profile imaging; USACE = U.S. Army Corps of Engineers; WEA = Wind Energy Area.

[a] BOEM regulations currently require lessees to submit a SAP, which must include data from site characterization surveys (30 CFR § 585.605). BOEM and BSEE's proposed Renewable Energy Modernization Rule, published on January 30, 2023 (88 FR 5968) would eliminate the SAP requirement for met buoys because the SAP process is duplicative with USACE's long-standing permitting process under Section 404(e) of the Clean Water Act (33 U.S.C. 1344(e)) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 401 *et seq.*) for the installation of met buoys, which are categorized by the USACE as scientific measurement devices. (The proposed rule can be found at https://www.federalregister.gov/documents/2023/01/30/2023-00668/renewable-energy-modernization-rule).

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

Survey Type	Survey Equipment or Method	Resource Surveyed or Information Used to Inform
High-resolution geophysical surveys	Sub-bottom profiler, side-scan sonar, multibeam echosounder, magnetometer, or gradiometer—towed from vessel or mounted on an AUV within the water column	Shallow hazards,[a] archaeological,[b] bathymetric charting, benthic habitat
Geotechnical/ seafloor investigation[c]	Vibracores, deep borings, cone penetration tests	Geological and geotechnical[c]
Biological[d]	Grab sampling, benthic sled, underwater imagery/sediment profile imaging	Benthic habitat
Biological[d]	Aerial digital imaging, visual observation from boat, airplane, or remote-operated flying drone	Avian
Biological[d]	Ultrasonic detectors installed on survey vessels used for other surveys	Bat
Biological[d]	Visual observation from boat, airplane, or remote-operated drone; passive acoustic monitors mounted on AUVs, drones, or vessels	Marine fauna (marine mammals and sea turtles)
Biological[d]	Direct sampling of fish and invertebrates, including traps on the seabed and water column and line fishing	Fish

AUV = autonomous underwater vehicle.
[a]30 CFR § 585.610(b)(2), 30 CFR § 585.626(a)(1), and 30 CFR § 585.645(a)(2).
[b]30 CFR § 585.626(a), 30 CFR § 585.610–585.611, and 30 CFR § 585.645(a)(3).
[c]30 CFR § 585.610(b)(1,4), 30 CFR § 585.626(a)(2,4), and 30 CFR § 585.645(a)(1,4).
[d]30 CFR § 585.610(b)(5) and 30 CFR § 585.626(a)(3), and 30 CFR § 585.645(a)(5).

2.4.1 High-Resolution Geophysical Surveys

High-resolution geophysical (HRG) survey data provides information on seafloor and subsurface conditions as they pertain to project siting and design, including shallow geologic and anthropogenic hazards like the presence or absence of archaeological resources. To acquire data, a controlled sound source that is set at a specific duty cycle, frequency, and source level introduces pulses of sound into the water; then a receiver, which is either mounted on the ship or in the same instrument package as the transmitter, receives the reflected signal. The types of equipment that may be used during these surveys are described in **Tables 2-4** and **2-5**; however, alternative equipment and new technologies may be used. A carefully controlled laboratory study (Crocker and Fratantonio 2016) provides the best reference for source levels and other characteristics of commonly used geophysical sources, which are shown in **Table 2-5**. A follow-up field study examined the propagation characteristics of commonly used HRG sources (specifically the sources covered in Crocker and Fratantonio 2016 and some additional hull-mounted, sonar systems), and the results found consistency between the predicted source characteristics and those observed in the shallow water field measurements (Halvorsen and Heaney 2018). This information is based on the highest reported power settings and source levels, but the actual equipment and settings used could have source levels that 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. Further detail regarding the use of these sound sources, their technical specifications, and their expected impacts on marine life can be found in Ruppel et al. 2022, Crocker and Fratantonio (2016), and BOEM's Sound Source List (BOEM 2023a).

BOEM's Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR Part 585 (BOEM 2024a) recommends high-frequency sub-bottom profiler (SBP) data and medium-penetration seismic surveys. Medium-penetration seismic systems, such as a boomer, bubble pulser, or other low-frequency system, can be used to provide information on sedimentary structure that exceeds the depth limitations of Compressed High-Intensity Radiated Pulse (CHIRP) systems. BOEM guidance also recommends collection of sedimentary structure data 10 meters beyond the depth of disturbance, which may be conducted using SBP systems. As noted in the BOEM guidelines, NMFS has technical guidance for understanding how some types of survey equipment may impact marine mammals. The lessee should be aware of how the choice of equipment may impact marine mammals and may require a permit from the NMFS.

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

Equipment Type	Data Collection 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. Echo sounders work by emitting a short pulse of sound into the water column and then receiving, processing, and returning sound pulses reflected from the seafloor and objects in the water column. Typically, multibeam echosounders emit sounds in a fan shape, which is narrow along the track of the vessel and wide on the orthogonal track. The system would 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, typically operated > 180 kHz (see Table 2-5).
Magnetometer or gradiometer	Collection of geophysical data for shallow hazards and archaeological resources assessments	Magnetometer or gradiometer surveys would be used to detect and aid in the identification of ferrous or other objects having a distinct magnetic signature. The magnetometer gradiometer sensor is typically towed as near as possible to the seafloor, usually no more than approximately 6 meters above the seafloor.	For the collection of geophysical data for shallow hazards assessments using equipment such as magnetometers, side-scan sonar, and SBP systems, BOEM recommends survey at a 150 m line spacing. For the collection of geophysical data for archaeological resources assessments using equipment such as magnetometers, gradiometers, side-scan sonar, and all SBP systems, BOEM recommends survey at a 30-m line spacing. BOEM requires perpendicular tie-
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 2007a). 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. Similar to multibeams, the sound is emitted in a narrow beam in the along-track direction and a wide beam orthogonal to the ship's track. A side-scan sonar system can be mounted on an AUV or towed behind a vessel. BOEM assumes that the lessee would use a digital dual-frequency side-scan sonar system with frequency ranges of 300 to 500 kHz or greater to record continuous planimetric images of the seafloor.	

Equipment Type	Data Collection or Survey Types	Description of the Equipment	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	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. SBPs are complete systems that include both the source and receiver and may be attached to the ship's hull or towed behind the ship (at the surface or closer to the bottom). Typically, a high-resolution CHIRP system SBP 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. CHIRPs emit a user-defined signal that sweeps along a range of frequencies; because of this range of frequencies, they are not considered to be an impulsive sound source. Another type of SBP that may be employed is a medium-penetration system, such as a boomer, bubble pulser, or impulse type system. These systems operate at lower frequencies and are considered to be impulsive sounds. They may be operated at a range of power levels (and thus a range of source levels) depending on the survey need and water depth. SBPs are capable of penetrating sediment depth ranges of 3 m to greater than 100 m, depending on frequency and bottom composition.	line spacing for archaeological identification surveys every 500 m (with a minimum of at least three equidistant tie-lines). Distance at which data is collected from the sea floor depends on the exact line spacing, individual instrument range, and water depth at the location of the same.

Source: BOEM 2020, 2024a.
AUV = autonomous underwater vehicle; BOEM = Bureau of Ocean Energy Management; CHIRP = compressed high-intensity radiated pulse; EA = environmental assessment; kHz = kilohertz; m = meter; SBP = sub-bottom profiler; WEA = Wind Energy Area.

Table 2-5. Examples of typical high-resolution geophysical survey equipment used for site assessment, and their acoustic characteristics

HRG Equipment Categories	Lpk Source Level (dB re 1 µPa·m)	SPL Source Level (dB re 1 µPa·m)	SEL Source Level (dB re 1µPa² s·m²)	Approximate Frequency Range (kHz)	Pulse Duration (ms)	Beamwidth (degrees)
Medium-penetration SBP						
Boomer: Applied Acoustics AA200 (single plate, 0.8-ms pulse operated at 250 J)	209	200	169	0-4.3	0.8	47
Sparker: Applied Acoustics Dura Sparker at 2,000 J, 400 tips (5.0 J/tip) (2.4-ms pulse)	224	214	188	0-2.8	1.5	Omni
Bubble pulsar: Falmouth Scientific Inc. HMS-620XL LF; 120 in³	220	-	-	0-1.7	-	-
Shallow-penetration, non-parametric SBP (CHIRPs)						
SBP EdgeTech 512i; 100% power	182	178	151	4-7.7	5	~1.8
SBP Knudsen 3202; single transducer, power setting: 4	212	208	177	0-8.7	0.8	
Parametric SBP						
Innomar, SES-2000 Medium-100	-	240	-	85-115	0.07-1.5	5
Reson Seabat 7111 multibeam echosounder	228	224	185	100	0.15	160
Kongsberg EM122 multibeam echosounder	210	-	-	> 200	2-15	150
Echotrac CV100 single-beam echosounder; power setting 12	196	193	163156	> 200	0.181	7
Side-scan sonar						
Klein 3900 side-scan sonar	227	223	182	445	0.088	1.2
USBL positioning						
Sonardyne Compatt 6 8300-3111	187-196	-	-	19-34	-	omni

Source: Highest reported source levels (estimated at a distance of 1 m from the source) reported in Crocker and Fratantonio (2016), Ruppel et al. (2022), BOEM Sound Source List (BOEM 2023a) 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. Note that sources are rarely operated at their highest power levels, especially in shallower waters, so they are likely to have lower source levels than what is reported here.
µPa = micropascal; CHIRP = Compressed High-Intensity Radiated Pulse; dB = decibels; HRG = high-resolution geophysical; m = meter; 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 offshore export 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 offshore export cable route to shore would likely occur over a 1,000-meter-wide corridor, centered on the potential offshore export cable location, to allow for anticipated physical disturbances and movement of the proposed cable, if necessary. Because it is not yet possible to predict precisely where an onshore electrical substation may ultimately be installed or to know the route that any potential future export cable would take across the seafloor from the WEA to shore, this Draft EA used direct routes from the far side of the WEA to hypothetical potential interconnection points onshore in Maine, Massachusetts, and New Hampshire. The hypothetical points were selected based on proximity from onshore points of interconnection to the WEA to conservatively approximate the level of surveys that may be conducted and the number of samples that would be collected to characterize an offshore export cable route. The hypothetical points of interconnection used to approximate the level of surveys for the WEA in no way represents proposed export cable routes.

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

2.4.2 Geotechnical Surveys

Geotechnical surveys are performed to assess the suitability of substrate to support a structure foundation (i.e., gather information to determine whether the seabed can support foundation structures) or offshore export 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 a combination of boring and in situ methods 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 and benthic sampling of the WEA would require three samples at every potential wind turbine location, representing the likely scenario of three anchor legs each with one line, which would only occur in the portion of the WEA where structural placement of floating turbine anchors is allowed. Geotechnical and benthic sampling of the WEA would also require one sample per kilometer of offshore export cable corridor. The amount of effort and number of vessel trips required to collect the geotechnical samples vary 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 square meter to 10 square meters (BOEM 2014; 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 2014). There are residual risks of encountering munitions and explosives of concern (MEC)/unexploded ordnance (UXO) during surveying, and in the event that a MEC/UXO is encountered, lessees should follow the National Guidance for Industry on Responding to Munitions and Explosives of Concern in U.S. Federal Waters.[4]

[4] The proposed National Guidance for Industry on Responding to Munitions and Explosives of Concern in U.S. Federal Waters was published by the U.S. Committee on the Marine Transportation System on August 25, 2023

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. In general, noise from geotechnical sampling is non-impulsive, low-frequency, and nearly continuous while the activity is occurring. There are very few acoustic measurements from geotechnical activities, but some information regarding recorded sound levels can be found in BOEM's Sound Source List (BOEM 2023a). 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 2007a). 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 previously described sampling methods do not use high-energy sound sources (Continental Shelf Associates Inc. 2004; MMS 2007b).
Vibracores	Obtaining samples of unconsolidated sediment; in some cases, may also be used to gather information to inform the archaeological interpretation of features identified through the HRG survey (BOEM 2020)	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 2007b; USACE 1987).
Deep borings	Sampling and characterizing geotechnical properties to provide relevant data for facility design, to a minimum depth of 10 m below the maximum depth of seafloor disturbance, or depth of cable or structure (BOEM 2024a)	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 to 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 2024a)	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.

cm = centimeter; CPT = cone penetration test; dB = decibels; HRG = high-resolution geophysical; m = meter; NMFS = National Marine Fisheries Service.

(https://www.federalregister.gov/documents/2023/08/25/2023-18381/proposed-national-guidance-for-industry-on-responding-to-munitions-and-explosives-of-concern-in-us).

2.4.3 Biological Surveys

Biological surveys are necessary to characterize the biological resources that could be affected by site assessment and site characterization activities in the Proposed Action. 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 SOCs (**Chapter 4** and **Appendix H**). NMFS may require additional measures from the lessee to comply with the Marine Mammal Protection Act (MMPA) 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.

BOEM acknowledges that while an individual Gulf of Maine lessee may opt to carry out biological surveys, including fisheries surveys, to characterize resources in its lease area to inform its COP development, there is not an affirmative requirement to carry out any biological surveys nor fisheries survey plans yet developed; thus any such surveys are not reasonably certain to occur, and effects at this time are unknowable. Therefore, entanglement risk associated with fisheries surveys is not considered in this EA. A condition of the proposed lease would require appropriate consultation prior to carrying out any such fisheries surveys. However, BOEM has used potential biological survey types and frequency to estimate vessel traffic associated with future surveys in order to estimate impacts associated with vessel traffic (e.g., air emissions, impacts to navigation).

Table 2-7. Biological survey types and methods

Biological Survey Type	Survey Guidelines	Survey Method	Timing
Benthic habitat	BOEM. 2019. 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 in **Section 2.4.2**)	Concurrent with geotechnical/benthic sampling
Avian	BOEM. 2020. Guidelines for Providing Avian Survey Information for Renewable Energy Development on the 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 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. 2019. 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. 2019. 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 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
General guidelines	BOEM. 2019. Survey Guidelines for Renewable Energy Development. https://www.boem.gov/renewable-energy/survey-guidelines-renewable-energy-development	---	---

Biological Survey Type	Survey Guidelines	Survey Method	Timing
	BOEM. 2016. Mid-Atlantic Regional Ocean Action Plan. https://www.boem.gov/sites/default/files/environmental-stewardship/Mid-Atlantic-Regional-Planning-Body/Mid-Atlantic-Regional-Ocean-Action-Plan.pdf BOEM. 2024a. Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information Pursuant to 30 CFR Part 585. December 28, 2023; published January 2, 2024. https://www.boem.gov/sites/default/files/documents/about-boem/Updated%20Renewable%20Energy%20Geohazard%20Guidelines%202023_508c.pdf		

2.4.4 Meteorological Buoys—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 in each of the 15 leases within the WEA; therefore, installation, operation, and decommissioning of a total of 30 buoys are included in the analysis.

The type of buoy chosen 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 to sustain several 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. These 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 kilograms to 4,536 kilograms, with a footprint of about 0.5 square meter and an anchor chain sweep of about 34,398 square meters (BOEM 2014; 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 square meters of seafloor between its clump anchor and mooring chain (BOEM 2014).

For met buoys, on-site inspections and preventive maintenance (i.e., marine fouling, wear, or lens cleaning) are expected to occur on a monthly or quarterly basis. 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 (or vessels) 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 or 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.

Decommissioning and site clearance activities are also a part of decommissioning obligations and requirements pursuant to 30 CFR 285 Subpart I—Decommissioning. 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, high-resolution side-scan survey, or sector-scanning sonar survey.

IPFs associated with met buoy installation operation and maintenance and with met buoy decommissioning (including site clearance) may include vessel traffic, noise, 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 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.

2.4.5 Non-Routine Events

Reasonably foreseeable non-routine events, 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 vessels or marine life; (3) spills from collisions or fuel spills resulting from generator refueling; and (4) recovery of lost survey equipment.

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. Nor'easters are common between October and April, and the Atlantic Ocean hurricane season runs from June 1 to November 30.

Storms could increase the 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 before 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 (e.g., 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 or the vessel, as well as loss of life and spillage of petroleum product. Although such an event is 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 may be reduced through compliance with USCG Navigation Rules and Regulations, use of navigational aids (e.g., aids to navigation [ATON], bridge equipment, charts, and informational notices and publications), safety fairways, and traffic separation schemes (TSSs) for vessels transiting to and from ports primarily in Maine, Massachusetts, and New Hampshire. BOEM anticipates that aerial surveys, if deemed necessary, would not be conducted during periods of storm activity because the reduced visibility conditions would not meet visibility requirements for conducting the surveys and because 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 because vessel traffic is controlled by multiple routing measures, such as safety fairways, TSSs, and anchorages. Areas with higher traffic were excluded from the WEA. BOEM requires the lessee to submit a private aid to navigation (PATON) application with the USCG for the met buoy. Risk of allisions with met buoys would be further reduced by USCG-approved marking and lighting on the met buoys. The lessee will be responsible for the establishment, operation, maintenance, and discontinuance of the PATON.

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 or crew, or natural events (e.g., strong waves or storms). From 2011 to 2021, the average spill size for vessels other than tank ships and tank barges was 95 gallons (USCG 2022); should a spill from a vessel associated with the Proposed Action occur, BOEM anticipates that the volume would be similar to that average.

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 2007b). An oil weathering model from the National Oceanic and Atmospheric Administration (NOAA), the Automated Data Inquiry for Oil Spills (ADIOS), 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 modeling 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 the average amount of 95 gallons would reach similar concentrations much faster and limit the environmental impact of such a spill. Based on the size of the spill, it would be expected to dissipate very rapidly and then evaporate and biodegrade within 1 or 2 days (at most), limiting the potential impacts to a localized area for a short duration.

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 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.

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 of lost survey equipment is a newly identified non-routine event not found in previous EAs (**Table 2-1**) and therefore is carried forward for analysis in this EA.

Recovery operations may be performed in a variety of ways depending on the type of equipment lost. A commonly used method for retrieval of lost equipment on the seafloor is 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 because it may require multiple passes in a given area. Additional disturbance could come after the line catches the lost equipment, when it drags all the components along the seafloor until recovery.

Marine debris, such as lost survey equipment, that cannot be retrieved because either it is small or buoyant enough to be carried away by currents or it is completely or partially embedded in the seafloor could create a potential hazard for bottom-tending fishing gear or cause additional bottom disturbance. For instance, a broken vibracore rod that cannot be retrieved may need to be cut and capped 1 to 2 meters below the seafloor. For the recovery of marine debris, BOEM or BSEE 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, lighting, air emissions, and routine vessel discharges from a single vessel. Recovery operations may also cause bottom disturbance and habitat degradation.

2.5 Impact-Producing Factors

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

An IPF is the outcome or result of any proposed activities with the potential to positively or negatively affect physical, biological, cultural, or socioeconomic resources. BOEM 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). 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/anchoring
- Entanglement

The timing of lease issuance, weather, and sea conditions would be the primary factors influencing the timing of site characterization surveys and site assessment activities. BOEM could begin issuing leases in late 2024 and continue through 2025 (Phase 1) or through 2028 (Phase 2). Lessees have a preliminary term of up to 1 year to begin site characterization surveys and submit a SAP.

Pursuant to 30 CFR Section 585.605, the lessee must provide the data from the physical characterization and baseline environmental surveys supporting the SAP, which are then reviewed by BOEM to identify the presence of anthropogenic hazards such as MEC/UXO, archaeological resources, and biologically sensitive habitats. Prior to any bottom-disturbing surveys (e.g., geotechnical surveys), geophysical surveys are conducted and the results reviewed. Depending on the site characterization information, the SAP approval may include conditions to avoid or mitigate potential impacts to identified resources and hazards.

BOEM must approve the SAP before lessees can proceed with approved activities (e.g., met buoy deployment). Lessees then have up to 5 years after SAP approval to perform additional site characterization and site assessment activities before they must submit a COP (30 CFR § 585.235(a)(1-2)).[5]

[5] BOEM and BSEE's proposed Renewable Energy Modernization Rule would eliminate the requirement for lessees to submit a SAP that includes the installation and operations of met buoys to BOEM for approval.

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3 Environmental Consequences

Each resource section of this chapter includes a summary description of the affected resource and an analysis of the potential environmental consequences of site assessment and site characterization activities under each alternative. The impacts of Alternative A, which includes ongoing and reasonably foreseeable planned activities, are used to determine the incremental impact of Alternative B on the resource. Cumulative impacts include the incremental impact of Alternative B when added to the past, present, and reasonably foreseeable activities.

Appendix D includes a list of the ongoing and reasonably foreseeable planned activities and IPFs that BOEM has identified as potentially contributing to cumulative impacts when combined with impacts from the Proposed Action over the geography and time scale described in **Section 3.3**. Ongoing and reasonably foreseeable planned activities 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) commercial fisheries; (3) military use; (4) marine transportation; (5) undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); (6) marine minerals use and ocean-dredged material disposal; (7) surveys and monitoring activities; and (8) global climate change.

As indicated in **Chapter 2**, issuance of a lease only grants the lessee the exclusive right to submit to BOEM a SAP and COP proposing development of the leasehold; the lease does not, by itself, authorize any activity within the lease area. Therefore, the analysis in this EA does not consider development of the Gulf of Maine WEA. However, the No Action Alternative does consider current approved, proposed, and potential wind energy projects across existing leases.[1]

3.1 Geographic Analysis Area

BOEM delineated two geographic analysis areas (GAAs) as depicted in (**Appendix D, Figure D-1**).

- 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 WEA (e.g., water quality). This GAA includes the WEA; other survey areas between the WEA and shoreline and areas where vessels and aircraft conducting Proposed Action activities may transit to and from; and an 800-m buffer around the WEA to account for line turns, anchoring, or other activities that may occur beyond the WEA boundary.
- The geographic boundaries for the analysis for marine mammals, sea turtles, fish/fishing, and birds include the entire Gulf of Maine given their highly mobile and, in some cases, migratory nature. It encompasses three Ecological Production Units (Georges Bank, Western-Central Gulf of Maine [or Gulf of Maine], and Scotian Shelf-Eastern Gulf of Maine) and extends to the

[1] Approved projects are those projects for which BOEM has issued a COP approval. Proposed projects are those projects for which a COP has been submitted to BOEM. Potential projects are leases or portions of leases for which a COP has not been submitted to BOEM.

shoreline of the Atlantic coast of the United States. Ecosystem Production Units are defined by NMFS in partnership with the Northeast Fisheries Science Center and represent major areas within bioregions that contain a reasonably well-defined food web/production system.

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 an 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.

3.2 Impact Level Determinations

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 (**Table 3-1**). Definitions of impacts are presented in two separate groups: (1) biological and physical resources, and (2) socioeconomic resources.

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

Table 3-1. 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 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 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.

Impact Determination	Definition for Biological and Physical Resources	Definition for Socioeconomic Resources
Moderate	Impacts on the affected resource are unavoidable. 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 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. 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 remedial action is taken.
Major	Impacts on the affected resource are unavoidable. 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 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. 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.

To comply with the page limits of 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 based on comments received during the public scoping period and the potential for greater than negligible incremental impacts from the Proposed Action and has moved to **Appendix B** the analysis of other resources. **Appendix B** includes resources eliminated from detailed consideration in this EA (i.e., bats; birds; coastal habitats; coastal infrastructure; demographics and employment; environmental justice; visual resources).

3.3 Alternative A – No Action Alternative and Affected Environment

The No Action Alternative 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).

3.3.1 Regional Overview

The Gulf of Maine is a semi-enclosed sea in the Atlantic Ocean, bordered by the coastlines of Massachusetts, New Hampshire, Maine, New Brunswick, and Nova Scotia. It is an ecologically diverse region with unique benthic features and oceanographic circulation patterns that contribute to flourishing and productive marine resources, which, in turn, support culturally significant fisheries and recreational activities. The complex geomorphology made up of deep basins and shallow banks, oceanographic circulation influenced by the Labrador Current and the Gulf Stream, and a diverse benthic habitat make the Gulf of Maine one of the most productive and ecologically important marine environments in the North Atlantic.

Due to the interconnected nature of the geomorphological, biological, and social aspects of the Gulf of Maine, BOEM is planning on adopting an ecosystem-based management (EBM) approach that considers the ecosystem as a whole in the cumulative impacts analysis, as further described in **Section 3.5.1**. The resource areas are described and analyzed individually in **Section 3.3** and **Section 3.4** (and **Section B.3** and **Section B.3**) to provide a full evaluation of the resource prior to evaluation at the ecosystem level in the cumulative impacts analysis. The individual resource area sections below begin with a description of the physical environment of air quality and water quality, followed by a description of the biological environment from the benthic communities to the apex predators. The human dimension is then discussed including marine uses such as military use areas and marine transportation, commercial and recreational fishing, recreation and tourism, and culturally important areas.

3.3.2 Benthic Resources

The Gulf of Maine is among the most diverse and productive temperate marine environments in the world, and is partitioned into several regions, distinguished by depth, geologic features, and oceanographic patterns (Greene et al. 2010). The Bay of Fundy in the northern region is known to have the highest tidal flux worldwide, ranging up to a maximum mean height of 52 feet (16 meters) in the inner reaches (Thompson 2010; East Coast Aquatics 2011). The southern region, including Georges Bank, has high fish diversity and is one of the most productive fishing areas in the northwest Atlantic Ocean (Incze et al. 2010). The water column dynamics are greatly influenced by the geomorphology of the seafloor, for example, upwelling areas with high primary productivity are created by the mixing of the nutrient-rich bottom waters. The Gulf of Maine is relatively wide and is geologically complex with ocean basins, banks, and channels (Thompson 2010). Basins range from 200 to 656 feet (60 to 200 meters) and contain stagnant deeply stratified water, with little light penetration. These basin habitats tend to have sediment composed of very fine-grained silt and mud which support diverse benthic communities (Thompson 2010).

Three major basins comprise the Gulf of Maine, Wilkinson in the southwest, Jordan in the northeast, and Georges in the southeast. Other named geomorphic features include Cashes Ledge, Jefferys Bank, and Georges Bank (Randall et al. 2024). These deep-channel habitats include the deeper Northeast and the shallower Great South Channels at 755 feet (230 meters) and 230 feet (70 meters), respectively (Brooks 1992). The inflow of water from deep offshore waters runs through the Northeast Channel, and the outflow through the Great South Channel between Georges Bank and Nantucket Shoals (south of Cape Cod, Massachusetts). These currents combine to create a large counter-clockwise gyre, referred to as the Gulf of Maine Gyre (Brooks 1992; Thompson 2010; Burgess 2022) that converges with clockwise gyre over Georges Bank and creates some of the most highly variable water temperatures in the North Atlantic Ocean year to year (East Coast Aquatics 2011). The geomorphic features enable the flow of colder waters from the north and promote strong stratification patterns. During the spring and summer, the mid-depth water layer, known as Maine Intermediate Water becomes sealed off. The three-layer water stratification in the central and western gulf is comprised of a thin surface layer of relatively warm and less saline water, a middle layer of colder and saltier Maine Intermediate Water, and a bottom layer of warmer and saltier water (Brooks 1992). Du et al. (2021) documented this unique temperature stratification in the Jordan Basin and found that the bottom water in Jordan Basin was warmer in the winter than the summer. According to the 2023 State of the Ecosystem report, seasonal sea surface temperatures in 2022 were above average throughout the year, with some seasons exceeding the record warm temperatures observed in 2012 (NOAA Fisheries 2023b). This instability in the Gulf Stream may lead to alterations of biological cycles and seasonal movement patterns (Thompson 2010; NOAA Fisheries 2023b).

Stellwagen Bank National Marine Sanctuary (SBNMS) is located from the mouth of Cape Cod Bay north to Cape Ann. SBNMS covers 842 square miles (2,180 square kilometers), including Stellwagen Bank, the steep sides of the plateau, the Stellwagen Basin, and the southern portion of Jeffreys Ledge. The upwelling of cold, nutrient-rich waters with the sand and gravel substrate create ideal habitat for sand lance (*Ammodytes* spp.), a crucial infaunal fish that serves as prey for numerous fish and whale species, including the critically endangered North Atlantic right whale (NARW).

The WEA partially overlaps the Wilkinson Basin with a maximum depth of 902 feet (275 meters) (Brooks 1992). Wilkinson Basin is partly sheltered by the shoals of Jeffreys Bank off Penobscot Bay and has a comparatively weak or nonexistent closed circulation that allows for the export of water from the inner gulf out through the Great South Channel. The basin borders Georges Bank and is north of the boundary for the Great South Channel restricted area.

The geographic analysis area as depicted in (**Appendix D, Figure D-1**) includes the WEA as well as potential benthic survey areas in nearshore and estuarine waters along the coast between the WEA and the Maine and Massachusetts shorelines. The WEA is approximately 2,001,902 acres (810,140 hectares). Cape Cod is the nearest shoreline to the WEA boundary at 20 nm (37 km). Water depths within the WEA range from 170 to 1,115 feet (52 to 340 meters) (Randall et al. 2024).

Generalized mapping conducted by the Maine Coastal Mapping Initiative of the inner continental shelf shows a variation of benthic substrates along the Maine coastline (Maine Geological Survey 2023). The habitats along the coastline may be impacted by the transmission cable corridors or potential landing sites. These corridors will be further studied once transmission cables are sited. From tidal areas to roughly 9 nautical miles (16.7 kilometers) at water depths of approximately 295 feet (90 meters), the substrate is patchy, with high-relief features observed beyond 9 nautical miles (16.7 kilometers) (Burgess 2022). Patches of gravel are found along the northeast coasts of Penobscot Bay and Machias. Nearshore estuaries and bays are mostly soft-bottom sediments but also include shellfish beds and submerged aquatic vegetation. Mud flats cover most of the intertidal habitats of the coastline of Maine and Massachusetts where the water is calm and sheltered from wave action. Often depositional, these mudflats lead to high and low salt marshes, all of which provide habitat and shelter for numerous coastal invertebrates, many of which are filter and deposit feeders that burrow in the muddy substrate. The sediments of mud habitats are nutrient-rich compared to those in sandy habitats (Thompson 2010).

Coastal sandy habitats tend to have relatively low biological productivity but are functionally important. Sandy environments support filter and deposit feeders while the ridges, waves, and ripples offer refuge for fish. Sand lance (*Ammodytes* spp.) is a prime example of an important forage fish species that reside in sandy habitats and play an integral role at the base of the ocean food web (Staudinger et al. 2020). Sand lance heavily rely on copepods and other zooplankton and serve as a key prey source for Atlantic sturgeon, cod, herring, mackerel, whales, and seabirds (Staudinger et al. 2020). Dependency on sandy substrates leads to high densities of NWA in regions such as the northwest and southwest corners of Stellwagen Bank in the Gulf of Maine.

The Gulf of Maine is known for its rocky intertidal habitats, as it has more than any other area along the Atlantic coast. Coastlines and exposed bedrock are most prevalent on the northern shores, and offer habitats for filter-feeding, sessile, and invertebrate species. Primary productivity of rocky habitats can be up to ten times higher if they are dominated by seaweed.

Areas of natural gas have been identified along the coast north of Casco Bay (Maine Geological Survey 2023). A systematic mapping initiative of more than 270 nautical miles (500 kilometers) of the western region identified more than 70 biogenic natural gas deposits, covering a total area just over 74,132 acres (300 square kilometers) in nearshore muddy bays (Rogers et al. 2006). The gas is produced by bacteria after consuming organic matter beneath the seafloor. Occasionally the gas is released into the water column, where a depression, known as a pockmark, can be left behind (Maine Geological Society 2005). In some cases, these pockmarks create pockmark fields, as is most notable in Belfast Bay (located in the upper reaches of Penobscot Bay) where pockmarks cover the seafloor. The species diversity around pockmarks is increased (Dubois et al. 2015).

Biogenic habitats in the Gulf of Maine include cold-water corals and sponges, seagrasses, and mussel beds. The habitats within the WEA may support cold-water corals and sponges. Unlike shallow-water corals, which require sunlight, these cold-water corals and sponges are suspension feeders that rely on planktonic and organic matter to obtain their energy. Octocorals, including sea pens, are common in colder and deeper waters. In 2014, octocoral garden communities were discovered in the northern Gulf of Maine in water depths of 656 to 820 feet (200 to 250 meters) (Auster et al. 2013; Auster et al. 2015; NOAA Fisheries 2018). Dense aggregations of one or more species of cold-water octocorals are referred to as coral gardens (Fountain et al. 2019). Many coral species function as ecosystem engineers and provide habitat for many other species, including juvenile fish. Recent surveys indicate coral presence within the Gulf of Maine may be higher than expected, despite benthic disturbance from nearby fishing activities such as bottom trawling and dragging (Fountain et al. 2019).

NOAA's Deep-Sea Coral Research and Technology Program compiles a national database of the known locations of cold-water corals and sponges in U.S. waters (Deep Sea Coral Research and Technology Program 2016; Hourigan et al. 2015). According to the coral map portal, the Gorgonian corals, demosponges, and unspecified sponges are known to be landward of the WEA, while sea pens seem to be most common within the WEA (Hourigan et al. 2015). However, there is currently no detailed information available on the presence or absence of these features within the WEA. NOAA habitat suitability models show the most suitable areas for soft and stony corals seaward of the WEA, north of George's Bank, and along the offshore canyons. Mount Desert Rock and Outer Schoodic Ridge Coral Protection Areas are located outside of the WEA, and no other Coral Protection Areas are within the WEA. Jordan Basin Dedicated Habitat Research Area is designated for research on corals and fishing gear impacts on the area and is located outside the WEA.

Eelgrass (*Zostera marina*), the most common species of seagrass in the Gulf of Maine, takes root in a range of substrates. Most frequently found in mud to coarse sand, eelgrass can even thrive in cobble and boulder habitats as long as there are ample light conditions, and is typically found in water depths from 3.3 to 26.3 feet (1 to 8 meters) (Stevenson et al. 2014). Widgeon grass (*Ruppia maritima*) is limited to low-salinity waters (Thompson 2010).

In the Gulf of Maine, 271 species of marine algae have been identified (Thompson 2010). Macroalgae serve an important role to the regional marine ecosystem. Hard-bottom macroalgal habitats composed of smaller brown algae (e.g., *Fucus* spp. and *Ascophyllum nodosum*), red algae (e.g., *Phyllophora* spp.) in the intertidal and sub-tidal zones, and kelp beds composed of brown algae (e.g., *Laminaria saccharina*, *Alaria esculenta*, and *Agarum clathratum*) are present in the Gulf of Maine (Stevenson et al. 2014). The most common kelp species in the Gulf of Maine include sugar kelp (*Laminaria saccharina*), oarweed (*Laminaria digitata*), and shotgun kelp (*Agarum clathratum*) (Thompson 2010). Notably, the kelp aggregations resemble forest canopies and in doing so provide shelter, spawning, and feeding grounds for many invertebrates including lobsters (*Homarus americanus*) and fish (Thompson 2010).

Mussel beds are found in the upper sub-tidal to intertidal coastal zones along the Maine coastline. Beginning from an attachment to a patch of hard substrate, seagrass, or macroalgae, the conspecific aggregations begin to grow as they attach to each other, forming a reef. Oysters (*Crassostrea virginica*) also attach to hard substrates but are not common in the Gulf of Maine (Stevenson et al. 2014). Atlantic sea scallop (*Placopecten magellanicus*), a highly profitable commercial bivalve species, is generally found in deeper waters (Fitzgerald 2021), and unlike mussels and oysters, are motile.

The variety of nearshore habitats provide food and shelter for high trophic species and boost local biodiversity while also serving as nursery grounds for local fish and invertebrate species (Kritzer et al. 2016; Stevenson et al. 2014). Stevenson et al. (2014) evaluated the importance of these nearshore habitats for 16 of the most common commercially important species and their prey showing that sand and gravel/cobble habitats are used by the majority of species and life stages, followed by mud, eelgrass, macroalgae, boulder, salt marsh channels, and shell (mussel) beds. Shallow water habitats in the Gulf of Maine provide valuable ecological services for a variety of species.

There are approximately 2,645 invertebrate species in the Gulf of Maine (Incze et al. 2010), including managed invertebrate species such as American lobster, northern shortfin and longfin squid (*Illex illecebrosus/Loligo pealeii*), and Atlantic sea scallop. These marine invertebrates serve an essential trophic role in the marine ecosystems as prey items that support populations of demersal fish species such as Atlantic cod (*Gadus morhua*), black sea bass (*Centropristis striata*), and summer and winter flounder (*Paralichthys dentatus/Pseudopleuronectes americanus*) (Greene et al. 2010). Mud, gravel/cobble, and vegetated habitats are particularly important as juvenile nursery grounds for species such as Atlantic cod, American lobster, winter flounder, soft-shell clams (*Mya arenaria*), and blue mussels (*Mytilus edulis*) (Stevenson et al. 2014). The lobster fishery, dominant in value, license, and impact of Maine coastal communities, generally targets areas of high seafloor complexity and transition habitats or edge environments (Burgess 2022). Juvenile lobsters are common in shallow waters while adults can be found in habitats as deep as 2,297 feet (700 meters), where they are not as dependent on sheltering from predators (Stevenson et al. 2014).

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), aquaculture, development, extraction, and transfer of liquified natural gas, and sediment dredging for navigation. Land-based activities such as wastewater discharge also contribute additional stressors to the marine environment. These routine activities are expected to continue for the foreseeable future and will continue to affect benthic habitats and the community composition.

3.3.3 Marine Mammals

There are 30 species of marine mammals that may occur in the Gulf of Maine, consisting of 6 mysticete (baleen whales), 20 odontocete (toothed whales, dolphins, and porpoises), and 4 pinniped (seals) species. Of these species, 14 are considered common, regular, and uncommon in the Proposed Action activity area, which is the area where impacts from the Proposed Action would occur (i.e., waters in and directly around the WEA; survey areas between the WEA and shoreline, and areas where all Proposed Action-related vessels and aircraft may transit to and from). The remaining 16 species are considered rare (**Table 3-2**). The highest levels of marine mammal biodiversity (i.e., greatest species richness) off the Northeast U.S. occurs in the vicinity of Georges Bank, especially in proximity to the OCS shelf edge and the Northeast Canyons and Seamounts Marine National Monument (Hodge et al. 2022*).* The majority of marine mammal species that are identified as “rare” in the vicinity of the Proposed Action activity area are more likely to use this shelf break region without predictable occurrences within interior portions of the Gulf of Maine.

All 30 species are protected by the MMPA and five marine mammal species are also protected under the ESA. These species are listed as endangered and include the blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), NARW (*Eubalaena glacialis*), sei whale (*Balaenoptera borealis*), and sperm whale (*Physeter macrocephalus*). Abundance estimates for all NMFS management stocks can be found in annual NMFS marine mammal stock assessment reports (Hayes et al. 2019, 2020, 2021, 2022, 2023; NMFS 2024a; Waring et al. 2015). For these reports, data collection, analysis, and interpretation are conducted through marine mammal research programs at NOAA Fisheries Science Centers and by other researchers. Additional population information for the NARW is reported in the North Atlantic Right Whale Consortium’s Annual Report Card (Pettis and Hamilton 2024) and Pace’s 2021 population modeling report (Pace 2021).

There are additional sources of data that were used to inform marine mammal occurrence and distribution within the Gulf of Maine. The Atlantic Marine Assessment Program for Protected Species coordinates data collection and analysis to assess the abundance, distribution, ecology, and behavior of marine mammals in the U.S. Atlantic. These include ship and aerial surveys conducted from 2010 and currently ongoing. Atlantic Marine Assessment Program for Protected Species survey efforts cover a broad area, which encompasses the Gulf of Maine (Palka et al. 2021; Palka et al. 2017). A habitat-based cetacean density model for the U.S. Exclusive Economic Zone of the East Coast (eastern U.S.) and Gulf of Mexico was also developed by the Duke University Marine Geospatial Ecology Lab in 2016 (Roberts et al.

2016). These models have been subsequently updated to include more recently available data in 2017, 2018, 2019, 2020, 2022, and 2023 (Curtice et al. 2019; MGEL 2022; Roberts et al. 2017; Roberts et al. 2018; Roberts et al. 2020, 2023). Collectively, these estimates are considered the best information currently available for marine mammal densities in the U.S. Atlantic. Abundance and density data maps for individual species are accessible from Duke University's Marine Geospatial Ecology Lab online mapper (MGEL 2022). Other regional data, scientific literature, and technical reports were also used to assess marine mammal distribution patterns in the region.

Table 3-2. Marine mammals that may occur in the Gulf of Maine and in the vicinity of the Proposed Action activity area[1]

Common Name	Scientific Name	ESA/MMPA Status[2]	Relative Occurrence in the Proposed Action Activity Area[1,3]	Seasonal Occurrence in the Proposed Action Activity Area[1,4]	Critical Habitat in Area of Direct Effects	Stock (NMFS)	Population (Abundance) Estimate[5]	Population Trend[6]	Total Annual Observed Human- Caused Mortality/ Serious Injury (M/SI)[7]	Reference
Mysticetes										
Blue whale	*Balaenoptera musculus*	E/D	Rare	Rare	N/A	Western North Atlantic	402[8]	Unknown	Unknown	Hayes et al. (2020)
Fin whale	*Balaenoptera physalus*	E/D	Common	Year-round (highest abundances mid-spring through mid-fall)	N/A	Western North Atlantic	6,802	Unknown	2.05	NMFS (2024a)
Humpback whale	*Megaptera novaeangliae*	None/N	Common	Year-round (highest abundances mid-spring through fall)	N/A	Gulf of Maine	1,396	+2.8% per year (2000 through 2016)	12.15	Hayes et al. (2020)
Minke whale	*Balaenoptera acutorostrata*	None/N	Common	Year-round (highest abundances mid-spring through mid-fall)	N/A	Canadian East Coast	21,968	Unknown	9.4	NMFS (2024a)
North Atlantic right whale	*Eubalaena glacialis*	E/D	Common	Year-round (highest abundances late fall through spring)	Yes[9]	Western North Atlantic	340	–29.3% overall (2011 through 2021)	7.1[10]	NMFS (2024a)
Sei whale	*Balaenoptera borealis*	E/D	Regular	Year-round (highest abundances late spring and mid-fall)	N/A	Nova Scotia	6,292	Unknown	0.6	NMFS (2024a)
Odontocetes										
Atlantic spotted dolphin	*Stenella frontalis*	None/N	Rare	Rare	N/A	Western North Atlantic	31,506	Decreasing	Presumed 0	NMFS (2024a)
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	None/N	Common	Year-round	N/A	Western North Atlantic	93,233	Unknown	0.19	NMFS (2024a)
Blainville's beaked whale	*Mesoplodon densirostris*	None/N	Rare	Rare	N/A	Western North Atlantic	2,936[11]	Unknown	0.2	NMFS (2024a)
Common bottlenose dolphin (offshore)	*Tursiops truncatus*	None/N	Uncommon	Summer	N/A	Western North Atlantic, Offshore	64,587	Unknown	28	NMFS (2024a)
Common dolphin	*Delphinius delphis*	None/N	Common	Summer through winter (highest abundances fall)	N/A	Western North Atlantic	93,100	Unknown	414	NMFS (2024a)
Cuvier's beaked whale	*Ziphius cavirostris*	None/N	Rare	Rare	N/A	Western North Atlantic	5,744	Unknown	0.2	NMFS (2024a)
Dwarf sperm whale	*Kogia sima*	None/N	Rare	Rare	N/A	Western North Atlantic	9,474[12]	Unknown	0.8	NMFS (2024a)
Gervais' beaked whale	*Mesoplodon europaeus*	None/N	Rare	Rare	N/A	Western North Atlantic	2,936[11]	Unknown	0	NMFS (2024a)

Common Name	Scientific Name	ESA/MMPA Status[2]	Relative Occurrence in the Proposed Action Activity Area[1,3]	Seasonal Occurrence in the Proposed Action Activity Area[1,4]	Critical Habitat in Area of Direct Effects	Stock (NMFS)	Population (Abundance) Estimate[5]	Population Trend[6]	Total Annual Observed Human- Caused Mortality/ Serious Injury (M/SI)[7]	Reference
Harbor porpoise	*Phocoena phocoena*	None/N	Common	Year-round	N/A	Gulf of Maine, Bay of Fundy	85,765	Unknown	145	NMFS (2024a)
Killer whale	*Orcinus orca*	None/N	Rare	Rare	N/A	Western North Atlantic	Unknown	Unknown	Unknown	Waring et al. (2015)
Long-finned pilot whale	*Globicephala melas*	None/N	Regular	Late spring through fall	N/A	Western North Atlantic	39,215	Unknown	5.5	NMFS (2024a)
Northern bottlenose whale	*Hyperodon ampullatus*	None/N	Rare	Rare	N/A	Western North Atlantic	Unknown	Unknown	Presumed 0	Waring et al. (2015)
Pygmy sperm whale	*Kogia breviceps*	None/N	Rare	Rare	N/A	Western North Atlantic	9,474[12]	Unknown	Presumed 0	Hayes et al. (2020)
Risso's dolphin	*Grampus griseus*	None/N	Rare	Late fall through early winter	N/A	Western North Atlantic	35,215	Unknown	34	Hayes et al. (2022)
Short-finned pilot whale	*Globicephala macrorhynchus*	None/N	Rare	Rare	N/A	Western North Atlantic	18,726	Unknown	218	NMFS (2024a)
Sowerby's beaked whale	*Mesoplodon bidens*	None/N	Rare	Rare	N/A	Western North Atlantic	492[11]	Unknown	0	NMFS (2024a)
Sperm whale	*Physeter macrocephalus*	E/D	Uncommon	Year-round (highest abundances summer through early fall)	N/A	North Atlantic	5,895	Unknown	0	NMFS (2024a)
Striped dolphin	*Stenella coeruleoalba*	None/N	Rare	Rare	N/A	Western North Atlantic	48,274	Unknown	0	NMFS (2024a)
True's beaked whale	*Mesoplodon mirus*	None/N	Rare	Rare	N/A	Western North Atlantic	4,480[11]	Unknown	0	NMFS (2024a)
White-beaked dolphin	*Lagenorhynchus albirostris*	None/N	Rare	Rare	N/A	Western North Atlantic	536,016	Unknown	0	Hayes et al. (2020)
Pinnipeds										
Gray seal	*Halichoerus grypus*	None/N	Common	Year-round (highest abundances summer through mid-fall)	N/A	Western North Atlantic	27,911	Increasing	4,570	NMFS (2024a)
Harbor seal	*Phoca vitulina*	None/N	Common	Year-round (highest abundances summer through mid-fall)	N/A	Western North Atlantic	61,336	Unknown	339	Hayes et al. (2022)
Harp seal	*Pagophilus groenlandicus*	None/N	Uncommon	Late winter, early spring	N/A	Western North Atlantic	Unknown[13]	Increasing	178,573	Hayes et al. (2022)
Hooded seal	*Cystophora cristata*	None/N	Rare	Rare	N/A	Western North Atlantic	593,500	Increasing	1,680	Hayes et al. (2019)

D = depleted (strategic); E = endangered; MMPA = Marine Mammal Protection Act; N = non-strategic; N/A = not applicable; T = threatened

[1] The Proposed Action activity area is considered the area where impacts from the Proposed Action would occur (i.e., waters in and directly around the WEA; survey areas between the WEA and shoreline, and areas where all Proposed Action-related vessels and aircraft may transit to and from).

[2] This denotes the highest federal regulatory classification (16 U.S.C. 1531 *et seq*. and 16 U.S.C. 1361 *et seq*.). A strategic stock is defined as any marine mammal stock:

a. for which the level of direct human-caused mortality exceeds the potential biological removal level;

b. that is declining and likely to be listed as threatened under the ESA; or

c. that is listed as threatened or endangered under the ESA or as depleted under the MMPA.

[3] Relative occurrence in the Proposed Action activity area is defined as:

Common: occurring consistently in moderate to large numbers

Regular: occurring in low to moderate numbers on a regular basis or seasonally

Uncommon: occurring in low numbers or on an irregular basis

Rare: limited records exist for some years

[4] Seasonal occurrence, when available, was derived from abundance estimates using density models (MGEL 2022; Roberts et al. 2016, 2023) and/or NMFS Stock Assessment Reports (Hayes et al. 2019, 2020, 2021, 2022, 2023; NMFS 2024a; Waring et al. 2015). Seasons are depicted as follows: spring (March–May); summer (June–August); fall (September–November); winter (December–February).

[5] Unless otherwise noted, best available abundance estimates (Nbest) are from NMFS stock assessment reports (Hayes et al. 2019, 2020, 2021, 2022, 2023; NMFS 2024a; Waring et al. 2015).

[6] Increasing = beneficial trend, not quantified; Decreasing = adverse trend, not quantified; Unknown = there are insufficient data to determine a statistically significant population trend (Hayes et al. 2019, 2020, 2023, 2021, 2022; Waring et al. 2015).

[7] The total annual estimated average human-caused mortality and serious injury (M/SI), if known, is the sum of detected mortalities/serious injuries resulting from incidental fisheries interactions and vessel collisions within the U.S. Exclusive Economic Zone. The value (number of individuals per year) represents a minimum estimate of human-caused mortality/serious injury only (Hayes et al. 2019, 2020, 2021, 2022, 2023; NMFS 2024f; Waring et al. 2015).

[8] No best population estimate exists for the blue whale; the minimum population estimate is presented in this table (Hayes et al. 2020).

[9] Critical habitat for the NARW is established for its foraging area (Unit 1) in the Gulf of Maine and calving area (Unit 2) off the Southeast U.S. (81 *Federal Register* 4837). Only the Unit 1 foraging area critical habitat is in the area of direct effects.

[10] Modeling data indicate the estimated rate of total NARW non-calf mortality is 27.2 animals (non-calves) per year, or 136 animals total, for the period 2016–2020 (Pace 2021). This estimated total mortality accounts for detected mortality and serious injury (injuries likely to lead to death), as well as undetected (cryptic) mortality within the population (NMFS 2024f).

[11] The 2021 survey implemented improvements in field protocols for visual observers and passive acoustic monitoring of *Mesoplodon* spp., enabling species differentiation during encounters. This advancement facilitated the calculation of abundance estimates for each species individually, departing from previous practices of grouping them at the genus level in past stock assessment reports.

[12] Estimated abundance is for *Kogia* spp. (dwarf and pygmy sperm whales) (NMFS 2024f)

[13] Hayes et al. (2022) report insufficient data to estimate the population size of harp seals in U.S. waters; the best estimate for the whole population (range-wide) is 7.6 million.

Fin whales are common and widespread throughout the Gulf of Maine year-round, with highest abundances in the Proposed Action activity area from mid-spring through mid-fall (MGEL 2022). NARWs are also common in the Gulf of Maine and visual and acoustic surveys indicate that NARWs may be present year-round in the Gulf of Maine, with the highest abundances occur from late-fall through spring (Davis et al. 2017; MGEL 2022). Humpback whales are observed in the Gulf of Maine year-round, with peak abundances occurring from mid-spring through fall (MGEL 2022). Similarly, minke whales are present year-round in the Gulf of Maine, with highest abundances recorded in mid-spring through mid-fall (MGEL 2022). Sei whales typically express irregular movement patterns that appear to be associated with oceanic fronts, sea surface temperatures, and specific bathymetric features (Hayes et al. 2022; Olsen et al. 2009); the species is considered regular in the Gulf of Maine, with higher, though variable, densities from late spring through mid-fall (MGEL 2022). Sperm whales are primarily found in deeper offshore waters near the OCS edge beyond Georges Bank and in proximity to the prominent bathymetric features such as the Northeast Channel (Hayes et al. 2020). This species is considered uncommon within the Gulf of Maine, with seasonal occurrences in the Proposed Action activity area during the summer to early fall months (MGEL 2022). Blue whales in the North Atlantic appear to target high-latitude feeding areas and may also utilize deep-ocean features at or beyond the shelf break outside the feeding season (Lesage et al. 2017; Lesage et al. 2018; Pike et al. 2009). Given their reported occurrence and habitat preferences, their presence in the Gulf of Maine is considered rare.

A wide variety of odontocete whale and dolphin species are expected to occur within the Gulf of Maine and Proposed Action activity area seasonally and year-round. These include the Atlantic white-sided dolphin (*Lagenorhynchus acutus*; year-round common occurrence), common bottlenose dolphin—offshore stock (*Tursiops truncates*; summer uncommon occurrence), common dolphin (*Delphinus delphis*; summer through winter common occurrence), long-finned pilot whale (*Globicephala melas*; regular late-spring through fall occurrence), and harbor porpoise (*Phocoena phocoena*; common year-round occurrence).

Pinniped species expected to commonly occur in the Proposed Action activity area are harbor seals (*Phoca vitulina*) and gray seals (*Halichoerus grypus*), both of which occur year-round in the Gulf of Maine, with highest occurrences from summer through mid-fall in nearshore and coastal waters (MGEL 2022). Harp seals (*Pagophilus groenlandicus*) also occur in the Gulf of Maine during the late winter to early spring, but are considered uncommon given their low seasonal occurrence (Hayes et al. 2022).

The most recent *U.S. Atlantic and Gulf of Mexico Marine Mammal Draft Stock Assessment Report* (NMFS 2024f) indicates that there is insufficient data to determine population trends for most marine mammal species that utilize the Gulf of Maine. Humpback whale, gray seal, and harp seal population sizes are reportedly increasing, whereas the NARW population is decreasing (Hayes et al. 2020, 2022; NMFS 2024f). The humpback whale was previously federally listed as endangered. However, based on the revised listing completed by NOAA in 2016, the DPS of humpback whales that occurs along the East Coast of the United States (West Indies DPS) is no longer considered endangered or threatened (Hayes et al. 2020). This stock continues to experience a positive trend in abundance (Hayes et al. 2020). However, an Unusual Mortality Event (UME)[1] was declared for this species in January 2016, and since then, 51 humpback whales have stranded in Maine, New Hampshire, and Massachusetts, with 218 total along the Atlantic coast from Maine to Florida (NMFS 2024a). A potential leading cause of the ongoing

[1] UME data presented in this section current as of April 8, 2024.

UME is vessel strikes (NMFS 2024a). In addition, a UME was declared for the minke whale in January 2017 (NMFS 2024b). A total of 166 individuals stranded from Maine to South Carolina, with 99 occurring in Maine, New Hampshire, and Massachusetts (NMFS 2024b). Preliminary results of necropsy examinations indicate evidence of human interactions or infectious disease; however, these results are not conclusive (NMFS 2024b). Both humpback and minke whale UMEs currently remain active and ongoing.

Between July 2018 and March 2020, increased numbers of gray seal and harbor seal mortalities have been recorded across Maine, New Hampshire, and Massachusetts, with strandings as far south as Virginia (NMFS 2022a). This event was declared a UME by NMFS and encompasses 3,152 seal strandings, with 3,039 reported in Maine, New Hampshire, and Massachusetts (NMFS 2022a). The pathogen phocine distemper virus was found in most deceased seals and based on this finding, was identified as the cause of the UME. This UME is no longer active and pending closure by NMFS (NMFS 2022a). In addition, between June 20 and July 20, 2022, elevated gray seal and harbor seal mortalities were recorded along coastal Maine (NMFS 2024d). This event was closed in January 2024, with a total of 181 seals stranded along the coast of Maine—including 143 harbor seals, 28 gray seals and 10 seals of unidentified species (NMFS 2024d). Seals tested positive for the highly pathogenic avian influenza (NMFS 2024e).

The NARW is considered to be one of the most biologically sensitive species within the geographic analysis area. Between 2011 and 2021, overall population abundance declined 29.3 percent, further evidenced by the decreased abundance estimate from 451 individuals in 2018 to the current 2023 estimate of 340 individuals (NMFS 2024f). This decline in abundance follows a previously positive population trend from 1990 to 2011 of a 2.8 percent increase per year from an initial abundance estimate of 270 individuals in 1998 (NMFS 2024f). Over time, there have been periodic swings of per capita birth rates (NMFS 2024f), although current birth rates continue to remain below expectations (Pettis and Hamilton 2024), with an approximately 40 percent decline in reproductive output for the species since 2010 (Kraus et al. 2016). Twelve new calves were born during the 2023 calving season, down from 15 in 2022 and 20 in 2021; so far, 17 calves have been identified during the 2024 calving season (NMFS 2024g). Although the increasing birth rate is positive, it is still significantly below what is expected, and the rate of mortality is higher than what is sustainable (Pettis and Hamilton 2024; NMFS 2024f).

There have been elevated numbers of NARW mortalities and injuries reported since 2017, which prompted NMFS to designate a UME for NARWs (NMFS 2024c). These elevated mortalities and injuries have continued into 2024, with a total of 125 individuals reported dead or to have sustained serious or sublethal injuries or illness in U.S. and Canadian waters to date (NMFS 2024c). This includes 40 confirmed mortalities, 34 live free-swimming whales with serious injuries, and 51 individuals observed with sublethal injuries or illness documented as of April 8, 2024 (NMFS 2024c). Human interactions (e.g., fishery-related entanglements and vessel strikes) are the most likely cause of this ongoing UME, and of the 40 mortalities, 15 have been attributed to vessel strikes and 9 to entanglements.

The total annual average detected (i.e., observed) human-caused mortality and serious injury for the NARW is 7.1 individuals per year, averaged over the period between 2017 and 2021, although this likely represents an underestimate as not all mortalities are recorded (NMFS 2024f). Modeling using the 2016 to 2020 estimated annual means to account for undetected mortality and serious injury suggests the mortality rate could be as high as 27.2 animals per year (NMFS 2024f). Importantly, NARW mortalities exceed the species' calculated potential biological removal (0.7 individual per year). The current population estimate for NARWs is at its lowest point in nearly 20 years, with their high mortality rate driven primarily by fishing gear entanglement and vessel strike (NMFS 2024f). When coupled with the species' low fecundity and small population size, all human-caused mortalities have the potential to affect its population status.

Critical habitat for the NARW within the geographic analysis area comprises the Northeastern U.S. Foraging Area (Unit 1) in the Gulf of Maine, including Cape Cod Bay, Stellwagen Bank, and the Great South Channel (81 *Federal Register* [FR] 4837) (**Figure 3-1**). Additional NARW critical habitat is designated in the species' nearshore calving grounds that stretch from Cape Canaveral, Florida to Cape Fear, North Carolina (Southeastern U.S. Calving Area [Unit 2]); this portion of NARW critical habitat does not overlap with the geographic analysis area. The physical and biological features (PBFs) essential to the conservation of the North Atlantic right whale, which provide foraging area functions in Unit 1, are a combination of (1) the physical oceanographic conditions and structures of the Gulf of Maine and Georges Bank region that combine to distribute and aggregate *C. finmarchicus* for North Atlantic right whale foraging, namely prevailing currents and circulation patterns, bathymetric features (basins, banks, and channels), oceanic fronts, density gradients, and temperature regimes; (2) low-flow velocities in Jordan, Wilkinson, and Georges Basins that allow diapausing *C. finmarchicus* to aggregate passively below the convective layer so that the copepods are retained in the basins; (3) late stage *C. finmarchicus* in dense aggregations in the Gulf of Maine and Georges Bank region; and (4) diapausing *C. finmarchicus* in aggregations in the Gulf of Maine and Georges Bank region.

The Gulf of Maine is a highly diverse and dynamic habitat region that supports many key biological functions for several marine mammal species both seasonally and year-round. In particular, Stellwagen Bank National Marine Sanctuary is a known and important feeding area for several marine mammal species (Silva et al. 2021; Robbins et al. 2024). Multiple marine mammal biologically important area (BIA) classifications have also been identified within the Gulf of Maine, including seasonal and spatially explicit BIAs for small resident populations (harbor porpoise: July through September) and reproduction (NARW: November through January). The majority of the identified BIAs are for foraging, which include seasonal and spatially explicit regions for the sei whale (Gulf of Maine: May through November), minke whale (Southwestern Gulf of Maine and Georges Bank: March through November; Central Gulf of Maine Parker Ridge and Cashes Ledge: March through November), humpback whale (Gulf of Maine, Stellwagen Bank, and Great South Channel: March through December), fin whale (Southern Gulf of Maine: year-round; Northern Gulf of Maine: June through October), and NARW (Great South Channel and Georges Bank Shelf Break: April through June; Cape Cod Bay and Massachusetts Bay: February through April; Jeffreys Ledge: June through July and October through December). Additional detailed information for each BIA may be found in LaBrecque et al. (2015) and at https://cetsound.noaa.gov/biologically-important-area-map (NOAA Fisheries n.d.).

As indicated by the BIAs discussed above, the Gulf of Maine represents important foraging habitat for many marine mammal species. Within the geographic analysis area, fin, humpback, and minke whales feed mainly on small schooling fish such as herring, sand lance, young mackerel, and krill (MDMR 2022), whereas NARWs feed on zooplankton, with a preference for the late juvenile developmental stage of the copepod *Calanus finmarchicus* (Mayo et al. 2001). NARW prey tend to occur in dense patches and exhibit both diel and seasonal vertical migration patterns (Baumgartner et al. 2011). The NARW distribution and movement patterns within its foraging grounds is highly correlated with concentrations and distributions of its prey, which exhibit high variability within and between years (Pendleton et al. 2012). Studies have shown that oceanographic shifts due to climate change have led to prey declines in traditional feeding areas for the NARW, prompting individuals to forage in different locations than before (Davies et al. 2019; Record et al. 2019; Meyer-Gutbrod et al. 2021, 2023). NARWs now migrate further north and are frequently observed in the Gulf of St. Lawrence (Simard et al. 2019). In addition, there has been a notable increase in presence in Cape Cod Bay, particularly during the winter and spring (Ganley et al. 2019), but a decrease in most other areas of the Gulf of Maine in all seasons (Roberts et al. 2024). These changes in habitat suitability and distribution are expected to continue in response to changing oceanographic conditions driven by climate change.

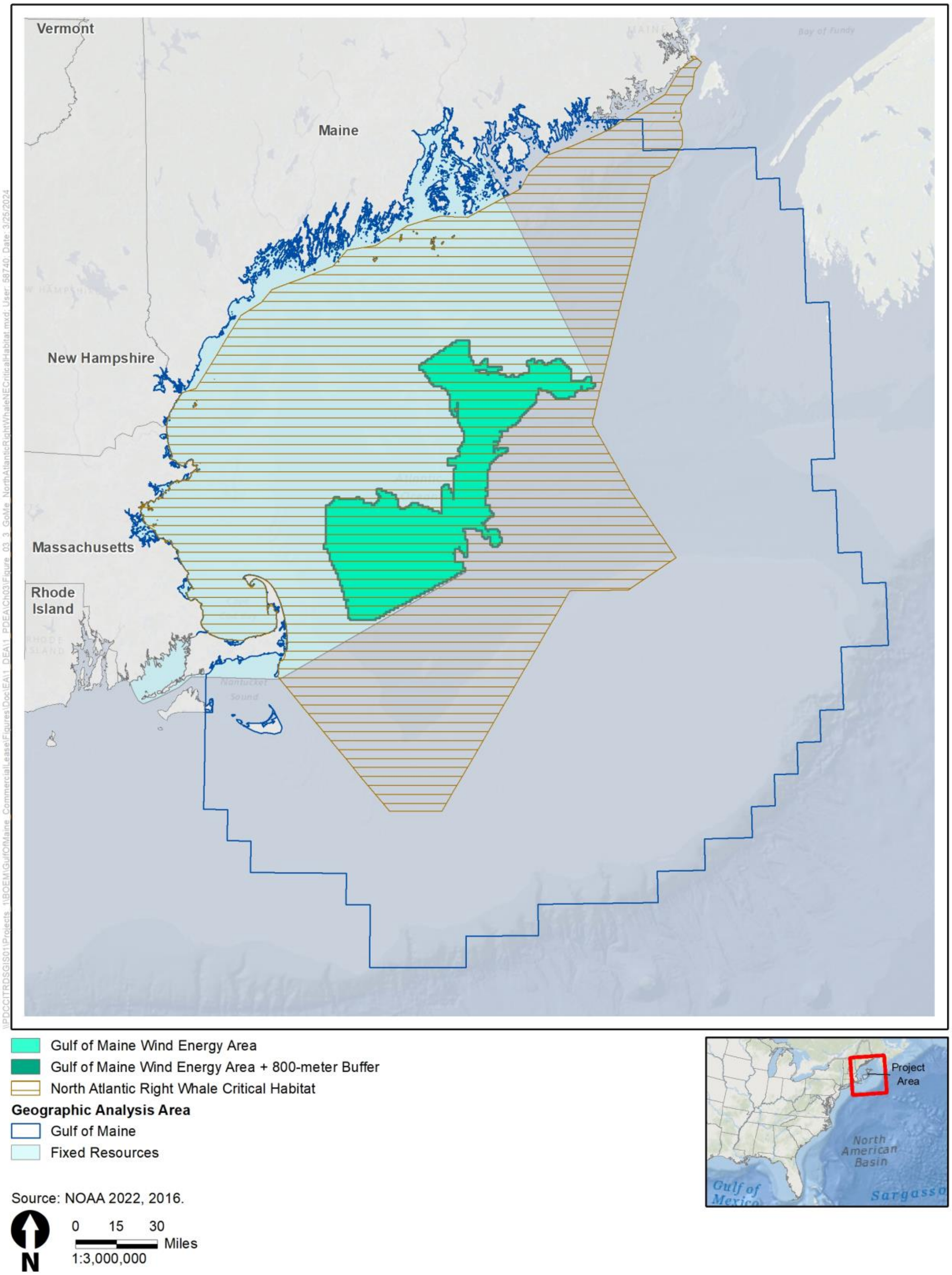

Figure 3-1. North Atlantic right whale northeastern critical habitat within the Gulf of Maine

Marine mammals in the geographic analysis area are subject to a variety of ongoing human-caused impacts that overlap with the Proposed Action, including collisions with vessels (ship strikes), entanglement with fishing gear, fisheries bycatch, anthropogenic noise, disturbance of marine and coastal environments, effects on benthic habitat, changes in prey availability and distribution, disease, and climate change. Many marine mammal migrations cover long distances, and these factors can have direct and indirect impacts on individuals over broad geographical scales. In addition, changes in habitat suitability can alter the distribution and occurrence patterns of individuals, resulting in greater exposure to new or additional stressors.

Vessel strike is relatively common with cetaceans (Kraus et al. 2005) and one of the primary causes of anthropogenic mortality in large whale species (Hayes et al. 2020, 2023; NMFS 2024f; Hill et al. 2017; Jensen et al. 2003; van der Hoop et al. 2013; van der Hoop et al. 2015). NARWs are particularly vulnerable to vessel strikes based on the distribution of preferred coastal region habitats and its feeding, diving, and socializing behaviors (Baumgartner et al. 2017). Risk of collision injury is commensurate with vessel speed; the probability of a vessel strike increases significantly as speeds increase above 10 knots (Conn and Silber 2013; Kite-Powell et al. 2007; Laist et al. 2001; Vanderlaan and Taggart 2007). Vessels operating at speeds exceeding 10 knots under poor visibility conditions have been associated with the highest risk for vessel strikes of NARWs (Vanderlaan and Taggart 2007), although collisions at lower speeds are still capable of causing serious injury, even when smaller vessels (fewer than 20 meters in length) are involved (Kelley et al. 2020).

Entanglement in fishing gear, most notably pot/trap type fisheries that utilize a vertical buoy line, and vessel strike have been identified as the leading causes of mortality in NARWs and may be a limiting factor in the species' recovery (Johnson et al. 2005; King et al. 2021; Knowlton et al. 2012; NMFS 2024f). Current estimates indicate that 83 percent of NARWs show evidence of at least one past entanglement and 60 percent show evidence of multiple fishing gear entanglements, with rates increasing over the past 30 years (King et al. 2021; Knowlton et al. 2012). Of documented NARW entanglements in which gear was recovered, 80 percent were attributed to non-mobile fishing gear (i.e., lobster and gillnet gear) (Knowlton et al. 2012). Entanglement and vessel strike may also be responsible for high mortality rates in other large whale species (Read et al. 2006); the Final Environmental Impact Statement, Regulatory Impact Review, and Final Regulatory Flexibility Analysis for Amending the Atlantic Large Whale Take Reduction Plan: Risk Reduction Rule (NOAA 2021) provides an analysis of data that show entanglement in commercial fisheries gear also represents the highest proportion of all documented serious and non-serious incidents reported for humpback, fin, and minke whales.

Additionally, anthropogenic noise sources are present in the geographic analysis area and may affect marine mammals in a variety of ways. For example, sounds produced during geophysical surveys, military exercises, coastal construction, and vessel traffic are prevalent at different levels across the geographic area. The most notable and widespread noise source is vessel noise emitted by large commercial ships, which are likely to be present and persistent throughout all of the geographical area. Other ongoing vessel traffic in the geographic area that contributes to vessel noise includes commercial and recreational fishing vessels and vessels conducting military operations. A comprehensive review of the literature on marine mammals and vessel noise (Erbe et al. 2019; Richardson et al. 1995) revealed that changes in behavior vary widely across species. Dolphins have shown longer inter-breath intervals (Nowacek et al. 2004) and dolphin pods have shown increased breathing synchrony (Hastie et al. (2003). Changes to foraging behavior, which can have a direct effect on an animal's fitness, have been observed in porpoises (Wisniewska et al. 2018) in response to vessel noise. Thus far, one study has demonstrated a potential correlation between low-frequency anthropogenic noise and physiological stress in baleen whales. Rolland et al. (2012) showed that fecal cortisol levels in North Atlantic right whales decreased following the 9/11 terrorist attacks, when vessel activity was significantly reduced. Interestingly, North Atlantic right whales do not seem to avoid vessel noise nor vessel presence (Nowacek et al. 2004), yet they may incur physiological effects as demonstrated by Rolland et al. (2012). This lack of observable response, despite a physiological response, makes it challenging to assess the biological consequences of exposure. In addition, there is evidence that individuals of the same species may have differing responses if the animal has been previously exposed to the sound versus if it is a completely novel interaction (Finley et al. 1990). Reactions may also be correlated with other contextual features, such as the number of vessels present, their proximity, speed, direction or pattern of transit, or vessel type.

Some marine mammals may change their acoustic behaviors in response to vessel noise, either due to a sense of alarm or in an attempt to avoid masking. For example, fin whales (Castellote et al. 2012) and belugas (Lesage et al. 1999) have altered the frequency characteristics of their calls in the presence of vessel noise. When vessels are present, bottlenose dolphins have increased the number of whistles (Buckstaff 2004; Guerra et al. 2014), while sperm whales decrease the number of clicks (Azzara et al. 2013), and humpbacks and belugas have been seen to completely stop vocal activity (Finley et al. 1990; Tsujii et al. 2018). Some species may change the duration of vocalizations (fin whales shortened their calls: Castellote et al. 2012) or increase call amplitude (killer whales: Holt et al. 2009) to avoid acoustic masking from vessel noise. Understanding the scope of acoustic masking is difficult to observe directly, but several studies have modeled the potential decrease in “communication space” when vessels are present (Clark et al. 2009; Erbe et al. 2016; Putland et al. 2017). For example, Putland et al. (2017) showed that during the closest point of approach (<10 km) of a large commercial vessel, the potential communication space of Bryde’s whale was reduced by 99% compared to ambient conditions.

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 strike risks to marine mammal species (ICF Incorporated 2021). These structures may also displace marine mammals from preferred habitats or cause them to 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.

Global climate change is also an ongoing risk for marine mammal species in the geographic analysis area. Climate change is known to increase ocean temperatures, increase ocean acidity, change ocean circulation patterns, raise sea levels, alter precipitation patterns, increase the frequency and intensity of storms, and increase freshwater runoff, erosion, and sediment deposition. Impacts associated with climate change have the potential to reduce long-term foraging and reproductive success, increase individual mortality and disease occurrence, and affect the distribution and abundance of prey resources for marine mammals (Albouy et al. 2020, Gulland et al. 2022; Lettrich et al. 2023; Love et al. 2013; NASA 2023; USEPA 2022). Long-term data show that water temperatures in the Gulf of Maine have been increasing over the last decade at a rate faster than in 97 percent of the world's oceans (Balch et al. 2022; Gulf of Maine Research Institute 2023; Pershing et al. 2021; Pershing et al. 2015; Seidov et al. 2021). The temperature changes have a cascading effect on all trophic levels that will likely have long-term consequences on marine species that may not be recoverable (Pershing et al. 2021; Pershing et al. 2015). The extent of these effects is unknown; however, populations already stressed by other factors likely will be the most affected by the repercussions of climate change, particularly in the Gulf of Maine given its importance for many marine mammal species as discussed above.

3.3.4 Sea Turtles

Four species of sea turtles may occur within the Gulf of Maine: green (*Chelonia mydas*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and loggerhead (*Caretta caretta*) sea turtles (**Table 3-3**). Sea turtles are highly migratory. As ocean waters warm in the spring, sea turtles migrate northward to their feeding grounds, typically arriving in the Mid-Atlantic and Northeast from spring to summer and remaining through the fall. As water temperatures cool, most sea turtles begin their return migration to the south to nesting grounds in the southern U.S., Gulf of Mexico, and Caribbean. Historically, this southward migration begins in mid- to late fall.

Table 3-3. Sea turtles that may occur within the Gulf of Maine and in the vicinity of the Proposed Action activity area[1]

Common Name	Scientific Name	Distinct Population Segment/ Population	ESA Status	Relative Occurrence in the Proposed Action Activity Area[1,2]	Seasonal Occurrence in the Proposed Action Activity Area[1,3]
Green sea turtle	*Chelonia mydas*	North Atlantic DPS	Threatened	Uncommon	Summer through Fall
Kemp's ridley sea turtle	*Lepidochelys kempii*	--	Endangered	Uncommon	Summer through Fall
Leatherback sea turtle	*Dermochelys coriacea*	Northwest Atlantic Population	Endangered	Uncommon	Summer through Fall
Loggerhead sea turtle	*Caretta caretta*	Northwest Atlantic Ocean DPS	Threatened	Uncommon	Summer through Fall

DPS = distinct population segment

[1] The Proposed Action activity area is considered the area where impacts from the Proposed Action would occur (i.e., waters in and directly around the WEA; survey areas between the WEA and shoreline, and areas where all Proposed Action-related vessels and aircraft may transit to and from).

[2] Relative occurrence in the Proposed Action activity area is defined as:
Common: occurring consistently in moderate to large numbers
Regular: occurring in low to moderate numbers on a regular basis or seasonally
Uncommon: occurring in low numbers or on an irregular basis
Rare: limited records exist for some years

[3] Seasonal occurrence was derived using information and data from NMFS (2023a) and MGEL (2023); stranding data (NMFS 2024h); and species-specific review and recovery documents (NMFS and USFWS 2007; NMFS and USFWS 2008; NMFS and USFWS 2015; NMFS and USFWS 2020; NMFS and USFWS 2023). Seasons are depicted as follows: spring (March–May); summer (June–August); fall (September–November); winter (December–February). Cold-stunned individuals may be present into the winter months.

The Gulf of Maine is near the northern extent for most sea turtle species (except the leatherback), with low rates of occurrences compared to warmer Mid-Atlantic and southern waters. Sea turtle densities within the geographic analysis area are low even at peak occurrences and follow seasonal patterns that are mainly limited to summer and fall months. In fact, the highest density for the most abundant sea turtle species within the WEA (i.e., the leatherback during September) was modeled at 0.0025 to 0.0040 individuals per square kilometer (MGEL 2023), which equates to approximately 1 leatherback per 250 to 400 square kilometers within the WEA. Based on this simplistic analysis, sea turtles are expected to occur in the Proposed Action activity area only in low numbers and seasonally.

Sea turtles utilizing the geographic analysis area are most likely to be foraging, with no documented nesting events within the Gulf of Maine for any sea turtle species. As noted above, the leatherback sea turtle is the most common of the four species that occur within the Gulf of Maine. Sea turtle presence in northern waters, including the Gulf of Maine, is correlated with the highest annual sea surface temperatures (i.e., late summer to fall). Individuals that remain in northern waters longer than this are susceptible to cold stunning or death, which occurs when water temperatures fall below 50 degrees Fahrenheit (10°C) (NMFS 2021). Although the extent and impact on sea turtles remains largely unknown, habitat use within the Gulf of Maine may increase in the future due to the rapid warming of the Gulf of Maine (Griffin et al. 2019; Gulf of Maine Research Institute 2023).

Green sea turtles may be found as far north as Nova Scotia and may be found within the Gulf of Maine, spending most of their time in coastal foraging areas, including open coastline waters (NMFS and USFWS 2007). Juveniles occur more frequently than adults in the Northeast Atlantic, migrating northward and residing in the New England area from June through November (NMFS 2022c, 2023a). Adult Kemp's ridley sea turtles undergo seasonal migration each year in the Atlantic, starting their journey to northern foraging grounds in spring, reaching as far north as Cape Cod Bay by June, and traveling back to southern habitat in the fall (Waring et al. 2012). Their preferred habitat is primarily sheltered areas along the coastline, including estuaries, lagoons, and bays (Burke et al. 1994; NMFS 2022c) and nearshore waters less than 120 feet deep (Shaver and Rubio 2008; Shaver et al. 2005), although they can also be found in deeper offshore waters. The highly mobile and migratory leatherback sea turtle is widely dispersed throughout the Northwest Atlantic. The species is most likely to occur within the Gulf of Maine during the summer months (Musick and Limpus 1996). The continental slope to the east and south of Cape Cod and the OCS south of Nantucket appear to be hotspots, where several tagged leatherback sea turtles were observed feeding for extended periods (James et al. 2006). Loggerhead sea turtles may also occur within the Gulf of Maine, although their presence is considered uncommon

(Warden 2011); they are most likely to occur during the summer and fall when sea surface temperatures are greatest. Loggerhead sea turtles occur in pelagic, nearshore, and coastal inshore waters dependent upon life stage; benthic immature loggerheads have been reported in waters off Cape Cod, Massachusetts (TEWG 2009).

Adult green sea turtles forage mostly on seagrasses and algae (Bjorndal 1997), although they will occasionally feed on sponges and invertebrates (NMFS 2022c). Kemp's ridley sea turtles are generalist feeders that prey on a variety of species including crustaceans, mollusks, fish, jellyfish, and tunicates, and forage on aquatic vegetation (Byles 1988; Carr and Caldwell 1956; Schmid 1998). However, the preferred diet of the Kemp's ridley sea turtle is crabs (NMFS and USFWS 2015). Leatherback sea turtles are dietary specialists, feeding almost exclusively on jellyfish, siphonophores, and salps and the species' migratory behavior is closely tied to the availability of pelagic prey resources (Eckert et al. 2012; NMFS and USFWS 2020). Prey species for omnivorous juvenile loggerheads include crab, mollusks, jellyfish, and vegetation at or near the surface; coastal subadults and adults feed on benthic invertebrates including mollusks and decapod crustaceans (TEWG 2009).

Data from the NOAA Fisheries Sea Turtle Stranding and Salvage Network show a total of 4,822 sea turtle strandings in Maine, New Hampshire, and Massachusetts between January 1, 2018, and April 1, 2024 (NMFS 2024h). It should be noted, however, that an estimated one-third of this total includes strandings that occurred outside of the Gulf of Maine (i.e., on the south coast of Cape Cod, in Buzzards Bay, and around the islands of Nantucket and Martha's Vineyard). The majority of these reported strandings were of Kemp's ridley (83%), followed by loggerhead (9%), green (4%), and leatherback (<4%) sea turtles (NMFS 2024h). The majority of strandings within the Gulf of Maine occurred within Cape Cod Bay and most (>93%) are reportedly due to cold stunning (NMFS 2024h).

In 2023, the Mass Audubon reported 662 sea turtle strandings in Massachusetts, with the majority occurring in Cape Cod Bay (Mass Audubon 2024). Notably, among these were 32 green sea turtles, 54 loggerheads, and 576 Kemp's ridleys, indicating an unusually high number of strandings for that year (Mass Audubon 2024). These strandings were associated with cold-stunning as a result of water temperatures remaining elevated throughout the winter season (Mass Audubon 2024). While this event was unusual, Griffin et al. (2019) proposed that a trend of increasing Kemp's ridley strandings in the Gulf of Maine is related to warmer sea surface temperatures above historical averages during the fall. Furthermore, their study modeled ongoing temperature trends and projected a further escalation in Kemp's ridley strandings (Griffin et al. 2019).

All sea turtles within the geographic analysis area are listed under the ESA as endangered (Kemp's ridley [35 FR 18319]; leatherback [35 FR 8491]) or threatened (green–North Atlantic DPS [81 FR 20057]; loggerhead–Northwest Atlantic Ocean DPS [76 FR 58868]). Nesting trends for leatherback sea turtles are decreasing at nesting beaches with the greatest known nesting female abundance (NMFS and USFWS 2020). The three largest loggerhead sea turtle nesting subpopulations have been declining since at least the late 1990s, indicating a downward trend for this population (TEWG 2009). While some progress has been made since publication of the 2008 Loggerhead Sea Turtle Recovery Plan, the recovery units have not met most of the critical benchmark recovery criteria (NMFS and USFWS 2023). Kemp's ridley sea turtles began to recover in abundance and nesting productivity since conservation measures were initiated following its ESA listing. However, since 2009, the number of successful nests has markedly declined (NMFS and USFWS 2015). The most recent status review for the North Atlantic DPS of green sea turtle estimates that nesting trends are generally increasing (Seminoff et al. 2015). There is no sea turtle critical habitat designated within the geographic analysis area.

Similar to marine mammals, all four sea turtle species likely to occur in the geographic analysis area are subject to regional, ongoing threats. These threats include fisheries bycatch, loss or degradation of habitat, entanglement in fishing gear, vessel strikes, predation and harvest, disease, and climate change. Vessel-animal collisions are a measurable and increasing source of mortality and injury for sea turtles. Sea turtles are expected to be most vulnerable to vessel strikes in coastal foraging areas and may not be able to avoid collisions when vessel speeds exceed 2 knots (1 meter per second) (Hazel et al. 2007). A primary threat to sea turtles is their unintended capture in fishing gear, which can result in drowning or cause injuries that lead to mortality (e.g., swallowing hooks). For example, trawl fishing is among the greatest continuing primary threats to the loggerhead turtle (NMFS and USFWS 2008) and sea turtles are also caught as bycatch in other fishing gear including longlines, gillnets, hook and line, pound nets, pot/traps, and dredge fisheries. A substantial impact of commercial fishing on sea turtles is the entrapment or entanglement that occurs with a variety of fishing gear, both mobile (i.e., trawl) and stationary (i.e., pots) gear types. In particular, bottom-trawling within the geographic analysis area has documented incidents of leatherback and loggerhead sea turtles becoming entangled in fishing gear, frequently leading to fatalities (Murray et al. 2020). Finally, available data also suggest changing ocean temperatures and sea level rise may lead to changes in the sex ratio of sea turtle populations (Booth et al. 2020), loss of nesting area, a decline in population growth due to incubation temperature reaching lethal levels (Patrício et al. 2019; Varela et al. 2019), and increased susceptibility to cold stunning in northern waters, including within the geographic analysis area (Griffin et al. 2019).

3.3.5 Navigation and Vessel Traffic

Bulk cargo vessels, tank vessels, cruise vessels, container vessels, tugs and tows, and military vessels transit the Gulf of Maine. In addition, commercial fishing vessels, recreational fishing vessels, and other types of pleasure craft share the waterways. There are four principal ports in the navigation and vessel traffic geographic analysis area: Searsport and Portland, Maine; Portsmouth, New Hampshire; and Boston, Massachusetts (USACE 2021).[2] **Table 3-4** lists the vessel trips, inbound and outbound, to and from these four principal ports and the ports of Salem and New Bedford, Massachusetts.

Table 3-4. All commercial vessel trips for the six selected ports in the geographic analysis area[a]

Port	2018	2019	2020	2021	Average
Searsport, Maine	249	196	224	143	203
Portland, Maine	51,175	41,765	36,122	10,165	34,806
Portsmouth, New Hampshire	373	338	310	258	319
Boston, Massachusetts	2,853	2,891	1,790	1,710	2,311
Salem, Massachusetts	10	3	0	0	3
New Bedford (Fairhaven), MA[b]	2,290(1)	2,537(10)	2,239(10)	2,156(3)	2305(6)

[2] The USACE gages port capacity by commercial tonnage numbers.

Port	2018	2019	2020	2021	Average
Total	56,951	47,740	40,695	14,435	39,955

Source: USACE 2024.
[a] USACE numbers represent trips reported to USACE from vessel operators and is downloaded from https://ndc.ops.usace.army.mil/wcsc/webpub/#/.
[b] New Bedford numbers in parenthesis represent vessel trips bound for or departing Fairhaven as both harbors are accessed via the Acushnet River and contribute to vessel traffic density within the waterways.

The following primary routing measures are in the geographic analysis area (**Figure D-2**).

1. Traffic Separation Schemes (TSS) and Precautionary Areas:
    a. Approaches to Portland, Maine, which consists of three parts: a precautionary area, an eastern approach, and a southern approach TSS (33 CFR 167.50-167.52).
    b. Approach to Boston, Massachusetts, which consists of three parts: two precautionary areas and a single approach TSS (33 CFR 167.75-167.77).
2. Two-Way Routes (NOAA 2024a):
    a. Cape Cod Bay.
    b. Portland Harbor and Casco Bay, through Hussey Sound to Cousins Island and through Broad Sound to Harpswell, Maine.

The following Seasonal Management Areas with federally established speed regulations overlap with the geographic analysis area. Vessels 65 feet or longer must travel at 10 knots or less in these areas during the indicated dates (NOAA Fisheries 2024).

1. Cape Cod Bay, January 1 through May 15
2. Off Race Point, March 1 through April 30
3. Great South Channel, April 1 through July 31.

In 2023, USCG completed the *Approaches to Maine, New Hampshire, and Massachusetts Port Access Route Stud*y (MNM PARS) (USCG 2023a), which used multiple sources of data, such as the Automated Identification System (AIS), Vessel Monitoring System (VMS) traffic, commercial fishing statistics, public comments, and partner agency submissions to determine if routing measure revisions are necessary to improve navigation safety (USCG 2023aa). The study concluded that port expansion projects, changes in fishery management and species distributions, and offshore renewable energy infrastructure may result in the introduction of larger vessel classes, greater traffic densities, and displacement of some traditional transit routes in the geographic analysis area and recommended implementation of six additional shipping safety fairways (**Figure D-2)** that will preserve unobstructed transit of densely traveled routes and port approaches to mitigate a heightened risk of marine casualties.

For this analysis, vessel data were downloaded from USCG AIS data (BOEM and NOAA 2024) for the area of study from 2019 to 2022. **Table 3-5** reports the vessel trackline counts in the Gulf of Maine and WEA from 2019 to 2022. **Figure 3-2** depicts AIS vessel tracklines in 2022. These trackline counts provide a broad overview of the traffic volume according to type of vessels present in the Gulf of Maine from 2019 to 2022.

Vessel traffic volume in the WEA boundary was 2 percent or less compared to traffic volume within the entire geographic analysis area, with an average of 1,996 vessel tracks per year, of which the majority were commercial fishing vessel tracklines. Vessel types most frequently transiting within the WEA boundaries were cargo vessels, commercial fishing vessels, tankers, and pleasure craft.

Table 3-5. Vessel trackline counts by type for the Gulf of Maine geographic analysis area and WEA (2019–2022)[a]

Vessel Type	Geographic Analysis Area					WEA Only				
	2019	2020	2021	2022	Average	2019	2020	2021	2022	Average
Cargo	953	769	775	925	855	130	92	122	141	121
Fishing	28,090	28,954	30,656	29,123	29,205	1,068	1,357	1,347	1,051	1,205
Passenger	19,931	12,850	17,198	19,634	17,392	75	9	16	87	46
Pleasure Craft/Sailing	50,106	51,718	61,522	64,952	57,074	308	138	114	224	196
Tanker	1,253	1,190	1,307	1,346	1274	226	259	266	281	258
TugTow	5,550	4,897	5,629	5,390	5366	31	18	18	11	19
Other	5,654	5,186	7,367	8,561	6,692	69	35	66	96	66
Not Available[b]	3,706	4,112	3,445	2,656	3,479	129	152	37	12	82
Total	115,243	109,676	127,899	132,587	121,351	2,036	2,060	1,986	1,903	1,996

Source: BOEM and NOAA 2024.
[a] Vessel trackline counts are not equivalent to USACE trips. The latter represent inbound and outbound passage to and from a port, whereas a trackline is a 24-hour segment (duration) of an AIS signal within the boundaries of the geographic analysis area or the WEA.
[b] An unidentified vessel type within the USCG National Automatic Identification System data.

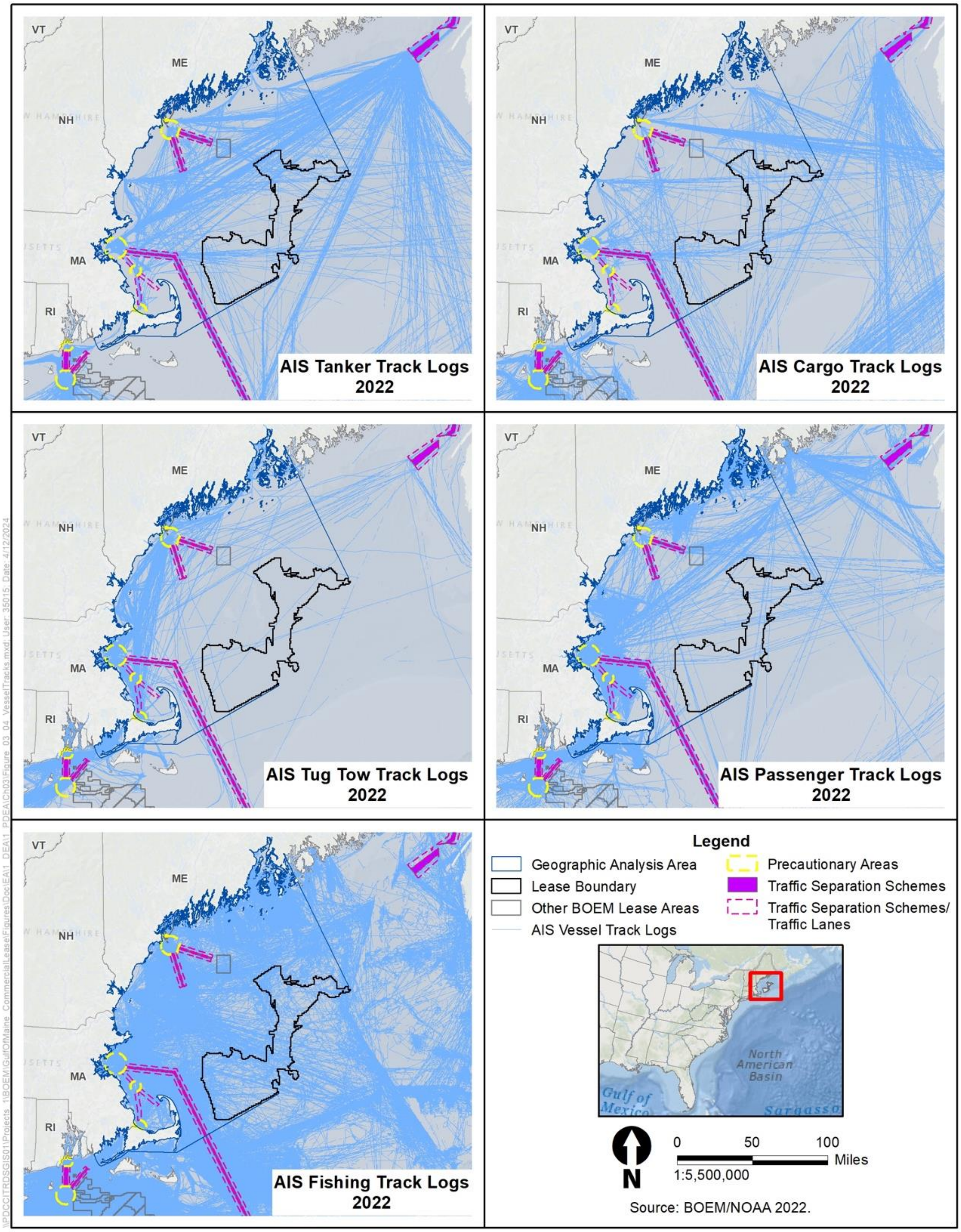

Figure 3-2. Automatic Identification System vessel track lines by vessel type, 2022

Table 3-6 reports the unique vessel counts within the Gulf of Maine and WEA from 2019 to 2022. Based on the 4-year average, pleasure craft/sailing traffic, fishing vessels, cargo vessels, and tankers were the most common vessel types transiting through the WEA.

Table 3-6. Unique vessel counts by type for the Gulf of Maine and WEA (2019–2022)

Vessel Type	Gulf of Maine Wind Energy and Fixed Resource Areas					WEA				
	2019	2020	2021	2022	Average	2019	2020	2021	2022	Average
Cargo	284	227	247	330	272	62	56	70	84	68
Fishing	740	767	822	833	790	67	76	87	79	77
Passenger	293	192	228	281	248	28	5	8	30	17
Pleasure Craft/Sailing	3,974	3,538	4,593	4,726	4,207	221	92	88	143	136
Tanker	168	149	213	194	181	56	56	77	70	64
TugTow	203	160	170	181	178	8	4	7	8	6
Other	273	207	306	361	286	25	16	39	38	2
Not Available	237	291	306	219	263	45	50	18	8	30
Total	6,172	5,531	6,885	7,125	6,428	512	355	394	460	430

Source: BOEM and NOAA 2024.

[a] USCG National Automatic Identification System data does not include vessel type.

Aside from recreational vessels (pleasure craft/sailing), fishing vessels were generally the most prevalent vessel type within the geographic analysis area from 2019 to 2022. Also, while fishing vessels accounted for only 12 percent of the average annual unique vessel counts, they represented approximately 24 percent of the average annual vessel track counts (**Table 3-6**).

As noted previously, USCG supplemented data in the MNM PARS with VMS data. These data cannot be used in exact comparison to the AIS numbers extracted for this analysis due to a difference in geographic analysis area boundaries and the potential for double counting of tracklines between AIS and VMS. AIS and VMS data sources can capture the presence of unique fishing vessels; however, both AIS and VMS data sources likely underestimate the volume of fishing vessel activity in the area because not all vessels are required to use AIS or VMS transceivers.

Over the timeframe considered in this analysis, it is likely that commercial vessel traffic will continue to use the selected ports and navigate current traffic patterns. There was a clear decline in vessel traffic numbers during the COVID era; however, counts in 2022 reflect a possible upward trend. Port improvement projects (see Appendix D) will contribute to vessel traffic fluctuations as deeper channels and berth depths allow for larger vessels.

3.3.6 Commercial and Recreational Fishing

Multiple commercial and recreational fishing grounds and banks are located within the Gulf of Maine. VMS data provides information for monitoring the location and movement of commercial fishing vessels in the United States. However, these data do not distinguish between areas of active fishing and vessel transits, and therefore may appear to show heavy density of fishing vessels near ports and along transit corridors though little to no fishing may be occurring at those locations. In addition, not all commercial fishing vessels are required to be VMS-enabled, including those fishing for American lobster. Pentony (2022) notes an analysis which suggests that less than 4 percent of lobster landings in the Gulf of Maine are from VMS-enabled vessels. Therefore, with the exception of the American lobster fishery, VMS data can provide a reasonably good indicator of commercial fishing vessel locations within and near the Gulf of Maine WEA and geographic analysis area (**Figure 3-3**).

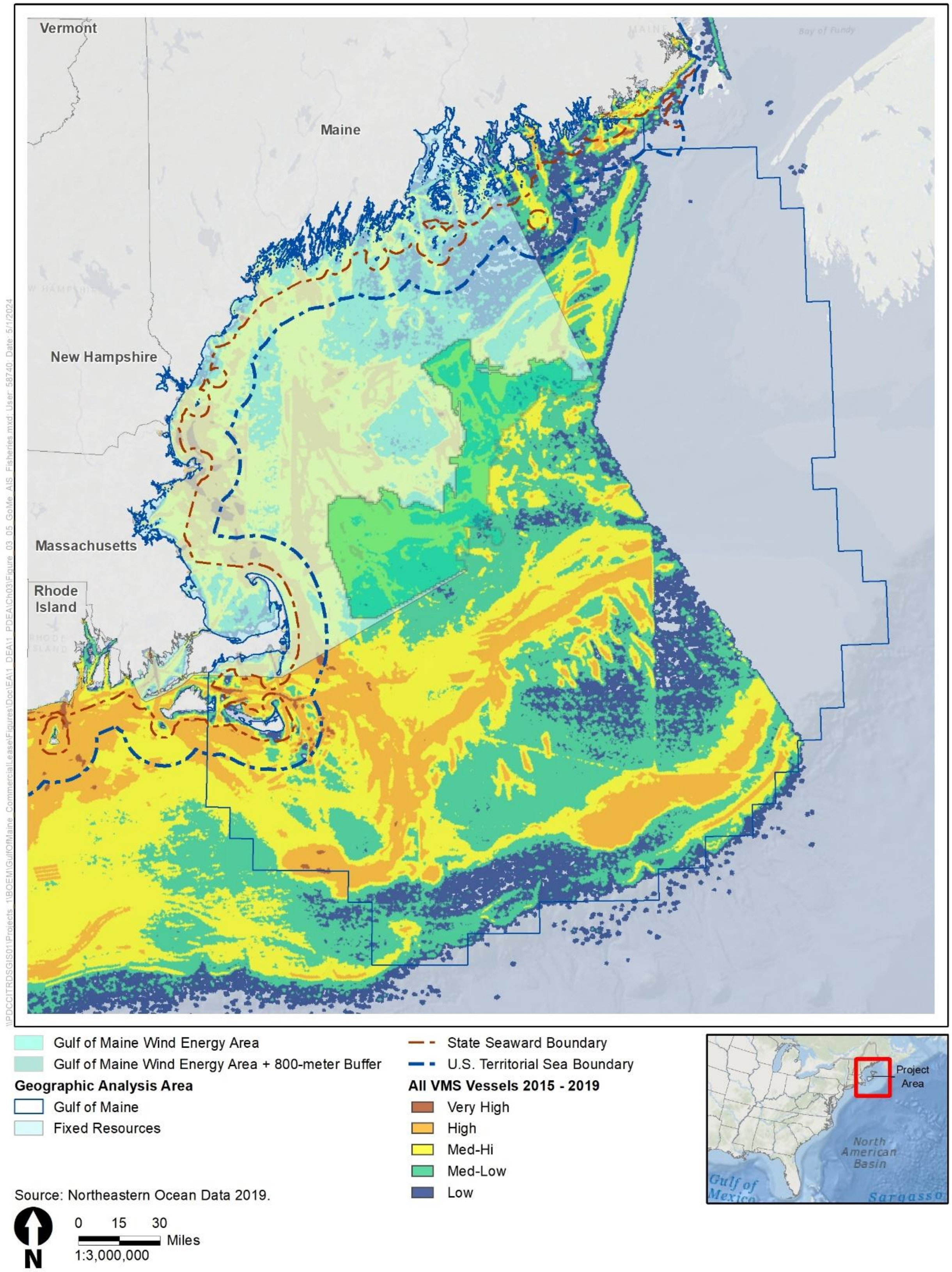

Figure 3-3. Vessel Monitoring System data for all fisheries, 2015–2019

Fisheries in the geographic analysis area are managed at both federal and regional levels. The NEFMC for Connecticut, Massachusetts, Maine, New Hampshire, and Rhode Island is responsible for management of fisheries within the geographic analysis area on a federal level, as designated by the Magnuson-Stevens Fishery Conservation and Management Act. The geographic analysis area for commercial and recreational fishing is entirely within the jurisdiction of NEFMC. At the regional level, the 15 Atlantic states form the Atlantic States Marine Fisheries Commission. **Table 3-7** identifies the management jurisdiction for top commercially targeted fish species in the Gulf of Maine, which includes two other councils: the Mid-Atlantic Fishery Management Council and the NOAA Fisheries/Atlantic Highlight Migratory Management Division.

Table 3-7. Federal and regional management jurisdiction for top fisheries in the Gulf of Maine

Species	New England Fishery Management Council (Federal)	Mid-Atlantic Fishery Management Council (Federal)	Atlantic States Marine Fisheries Commission (Regional)	NOAA Fisheries/ Atlantic Highly Migratory Species Management Division
American Lobster			X	
Atlantic sea scallop	X			
Bluefin tuna				X
Haddock	X			
Herring	X		X	
Mahogany quahog		X		
Monkfish	X	X		
Northeast Multispecies (groundfish)[1]	X			

[1] The Northeast Multispecies (groundfish) fishery includes Acadian redfish, American plaice, Atlantic cod, Atlantic halibut, Atlantic pollock, Atlantic wolffish, haddock, ocean pout, red hake, silver hake, white hake, windowpane flounder, winter flounder, witch flounder, and yellowtail flounder.

NOAA Fisheries maintains landings data for commercial and recreational fisheries based on year, state, and species. Commercial fisheries that utilize the waters in the Gulf of Maine WEA to the greatest extent include the American lobster, menhaden, and Atlantic sea scallop fisheries. The American lobster fishery accounts for approximately 38.8 percent of the total fishing revenue from Maine, New Hampshire, and Massachusetts waters, and 67.1 percent of revenue when considering Maine alone based on 2022 landings data. Additional fisheries include menhadens, haddock, herring, monkfish, northeast multispecies (groundfish), skates, bluefin tuna, and mahogany quahog (Pentony 2022). **Table 3-8** presents a summary of the 2022 commercial revenue and landings for the top ten species by landings weight for Maine, New Hampshire, and Massachusetts combined.

Table 3-8. Commercial revenue and landings summary for 2022 for the top ten species by landings weight for Maine, New Hampshire, and Massachusetts

Species	Pounds	U.S. Dollars
American Lobster	118,662,874	507,275,233
Withheld for Confidentiality	37,030,625	98,936,550
Menhadens	34,695,129	14,512,220
Ocean Quahog	30,234,750	26,258,141
Atlantic Sea Scallop	26,667,717	403,204,170
Seaweed/Rockweed	12,842,974	522,584
Goosefish	11,681,821	10,159,771
Haddock	11,053,937	17,959,065
Jonah Crab	10,113,445	16,430,750
Atlantic Surf Clam	9,230,685	13,605,616

Source:

There are multiple recreational fishing areas within the Gulf of Maine, many of which are along the shoreline (MDMR 2023b). There are also numerous charter and head boats available in Maine that target a variety of species including striped bass, bluefin tuna, mackerel, sharks, bluefish, and others (MDMR 2023a). In 2022, the fisheries with the highest landings included striped bass, Atlantic mackerel, bluefin tuna, scup, haddock, tautog, Atlantic menhaden, and bluefish, each with over one million pounds landed. **Table 3-9** presents a summary of the 2022 recreational landings for Maine, New Hampshire, and Massachusetts combined (NOAA Fisheries 2023a). NMFS (2022b) reports that haddock had the highest number of fish kept between 2008 and 2020 (1,051,481 individuals), followed by pollock (631,685), cod (521,827), and Atlantic mackerel (369,957). For more information on fish species potentially present in the geographic analysis area, see **Section B.3.3** and the EFH Assessment prepared in support of this EA (BOEM 2024e).

Table 3-9. Recreational landings summary for 2022 for Maine, New Hampshire, and Massachusetts

Species/Species Group	Pounds
Striped bass	6,118,809
Atlantic mackerel	2,638,175
Bluefin tuna	2,229,993
Scup	2,098,597
Haddock	1,476,094
Tautog	1,448,174

Species/Species Group	Pounds
Atlantic menhaden	1,336,401
Bluefish	1,332,023
Cunner	908,693
Black sea bass	896,046

Source: NOAA Fisheries 2023a.

Generally, the activity and value of fisheries are expected to remain relatively stable during the timeframe considered in this EA. Commercial fisheries and recreational fishing in the Gulf of Maine 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 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) and may have different effects on commercial and recreational fisheries. Habitat may increase for some stocks and decrease for others, depending on the targeted species and the ability of fishing regulations to adapt. Changing environmental and ocean conditions (e.g., currents, water temperature), increased storm magnitude or frequency, and shoreline changes can affect fish distribution, populations, and availability to commercial and recreational fisheries.

3.4 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 3.3**).

3.4.1 Benthic Resources

The routine activities associated with the Proposed Action that would affect benthic resources include noise from geological and geophysical (G&G) vessels, survey equipment, and seafloor disturbance from the site assessment and characterization activities (including fisheries monitoring surveys), along with the anchoring of the met buoys, and associated anchor drag. Increased vessel presence within the WEA and surrounding Gulf of Maine would also lead to an increased risk for routine vessel discharges, with the potential for secondary impacts from the possible release of invasive species. Site assessment and site characterization activities, sampling methods and equipment for the Proposed Action are detailed in **Tables 2-3**, **2-4** and **2-6**.

Underwater noise may be pulsed at specific frequencies (e.g., active acoustic survey equipment) or be broad spectrum and continuous (e.g., from project-associated marine transport vessels). Vessels conducting site assessment and site characterization activities and aircraft conducting site characterization surveys would also contribute to noise above the ocean surface. The increase in noise would come from increased vessel traffic as well as sound-emitting sources used during site assessment and characterization activities. The two primary components of underwater noise impacts include pressure and particle motion. Pressure can be characterized as the compression and rarefaction of the water as the noise wave propagates through it. Particle motion is the displacement, or back-and-forth motion, of the water molecules that create compression and rarefaction.

Geophysical surveys would include the use of HRG surveys, sparkers, sub-bottom profilers, and other active acoustic sources (non-air gun) to identify benthic features (**Table 2-4**). HRG survey equipment such as multibeam echosounders, side-scan sonars, sub-bottom profilers, and magnetometers typically use frequencies above the hearing range identified for most fish and invertebrates (approximately 2 kHz), as detailed in **Table 2-5** (Hogan et al. 2023; Popper and Hawkins 2018), and therefore would not affect these taxa. For the sources that are audible, it is important to consider other factors such as source level, beamwidth, and duty cycle (Ruppel et al. 2022). Boomers, sparkers, hull-mounted sub-bottom profilers, and bubble guns have source levels close to the threshold for injury for invertebrates, so unless an individual was within a few meters of the source, injury is highly unlikely (Crocker and Fratantonio 2016; Popper et al. 2014). Behavioral impacts could occur over slightly larger spatial scales assuming a sound pressure level (SPL) threshold of 150 decibels (dB) referenced to 1 micropascal (re 1 μPa) for behavioral disturbance (Greater Atlantic Regional Fisheries Office 2020). Although most literature focuses on seismic airgun surveys, which have much higher source levels than the HRG sources proposed here, the conclusions of these studies indicate that low-frequency noise does affect the behaviors of invertebrate species (Murchy et al. 2020; Wang et al. 2022; Weilgart 2018). It should be noted that these numbers are reported in terms of acoustic pressure because there are currently no behavioral disturbance thresholds for particle motion. Lack of evidence for any source due to extreme difficulty of measuring particle motion and determining fishes’ sensitivity to particle motion renders establishment of any guidelines or thresholds for particle motion exposure currently impossible (Popper and Hawkins 2018; Popper et al. 2014). However, particle motion is expected to be dominant only within short ranges (i.e., within 33 feet [10 meters]) around the source (Harding and Cousins 2022; Mickle and Higgs 2022), outside of which sound pressure effects would dominate. It is therefore expected that behavioral impact ranges would be even smaller for particle motion-sensitive species, including invertebrates, as particle motion would dominate the sound field within only a few meters from the source. Therefore, based on the available information, the planned HRG surveys could affect the behavior of benthic species, but impacts would be short term due to the intermittent nature of these sources and the relatively short duration of these surveys, and no population-level effects are anticipated.

To date, research on invertebrate response to vessel noise is inconclusive (Carroll et al. 2017; Popper et al. 2022). Some crustaceans seem to increase oxygen consumption (crabs: Wale et al. 2013) or show increases in stress indicators (spiny lobsters: Filiciotto et al. 2014). Other species (American lobsters and blue crabs) showed no difference in stress indicators but spent less time handling food, defending food, and initiating fights with competitors (Hudson et al. 2022). While these studies indicate there is evidence that certain behaviors and stress biomarkers in invertebrates could be negatively affected by vessel noise, it is difficult to draw conclusions from this work because it has been limited to the laboratory and in most cases did not measure particle motion as the relevant cue. Based on the available literature and infrequent and dispersed nature of the vessel traffic, minimal impacts on behavior or stress response of benthic communities are anticipated.

Site assessment surveys also include geotechnical and benthic sampling as well as seafloor habitat characterization sampling and surveys (detailed in **Table 2-6**). Geotechnical and benthic survey methods include piston or gravity cores, vibracores, deep borings, and CPT. Obtaining these benthic samples would cause benthic disturbances and increased temporary sounds but is not expected to exceed the sound sources already mentioned. Although specific numbers of required samples are not yet determined, an estimated 15,972 geotechnical and benthic samples in total are expected (**Table A-2**). There are different sampling methods, which are expected to disturb from 1.1 square feet (0.1 square meters) per sample for a standard Van Veen up to 43 square feet (4 square meters) per sample for a CPT. Based on the assumptions stated in Section 2.4.2, approximately 50% of deployments for this sampling work could involve vessel anchoring which is estimated to impact up to 108 square feet (10 square meters) per sample. Based on these assumptions a maximum impact of 108 square feet (10 meters) is estimated for 7,986 samples, while 43 square feet (4 square meters) is estimated for the other 7986 samples. These assumptions bring the total expected benthic impact from site assessment sampling to 27.63 acres (0.11 square kilometers). To put this in perspective, the WEA is 1,440,000 acres (5,827.5 square kilometers).

BOEM has concluded that fisheries surveys that may be conducted in association with Gulf of Maine lease issuance are not “effects of the action” as defined in 50 CFR 402.02. Therefore, benthic disturbances associated with any fisheries surveys are not considered in this EA.

The primary potential impacts on benthic organisms include crushing or smothering by survey equipment and anchors or anchor chain or smothering by sediment displaced by disturbance activities. Injury or mortality of benthic organisms could occur from contact with vessel anchors, anchor chain, or survey equipment, which could crush benthic organisms or lead to fatal injuries. Mobile species, such as lobsters and crabs, may be able to avoid lethal impacts but would experience temporary habitat displacement. Expected mortality and benthic disturbance is anticipated to be undetectable within the overall benthic region, and impacts on benthic resources are expected to be negligible.

During any benthic-disturbing activities, a localized short-term increase in turbidity and sediment suspension is expected near the activities. The range of sediment suspension resulting from the Proposed Action is expected to be limited and would be based on the sediment composition, direction, and water flow rate. The sedimentation tolerance for benthic organisms varies among species and is primarily based on their type of motility, feeding structures, and feeding modes (Hendrick et al. 2016; Jumars et al. 2015; Trannum et al. 2010). The sensitivity threshold for shellfish varies by species as well as life stage, generally with juveniles more sensitive than adults (Colden and Lipcius 2015), but can be generalized as deposition greater than 0.79 inch (20 millimeters) (Essink 1999). Anchor drag and anchor sweep around the met buoy could potentially result in scarring or additional disturbance to benthic habitats.

Geotechnical and biological benthic sampling may occur within Cashes Ledge, Jeffreys Ledge, and Stellwagen Bank. Areas of structurally complex habitat (e.g., eelgrass, kelp bed, shellfish beds, corals, rocky reefs) could be affected during survey efforts used to identify and characterize potential future export cable corridors and an inshore wet storage area. The level of potential adverse effects on these benthic habitats cannot yet be quantified since the total number of geotechnical/benthic samples that would be taken within these areas (if any) by the lessee for site characterization has not yet been determined.

The Proposed Action assumes that a maximum of two met buoys per lease would be installed; thus, with an assumed 15 leases within the WEA, a total of 30 buoys are considered. The buoys would be towed or transported by vessel to the installation location before being lowered to the seafloor. A spar-type met buoy is estimated to disturb a maximum of 118 square meters 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 square meters (BOEM 2014; Fugro Marine GeoServices Inc. 2017). Therefore, disturbance from installation of a met buoy could result in a maximum impact area of 34,398 square meters, inclusive of anchor chain sweep, per buoy. The type of buoy chosen depends on its intended installation location and measurement requirements, therefore specifics and benthic disturbance areas are not known at this time. Should the met buoy anchors on soft substrates introduce hard substrate, it could be colonized by benthic invertebrates. The additional hard surfaces would allow for the recruitment of hard-bottom species and the potential attraction of mobile invertebrates (e.g., crabs, lobsters) and pelagic and demersal fish (Degrear et al. 2020).

Recovery of the soft-bottom habitats could take a few months to a few years depending on the substrate composition, with sandy substrates recovering more quickly than silt and clay. However, recovery is expected to take longer in the complex or gravel habitats based on studies of the impacts within Georges Bank (Collie et al. 2005; Kaiser et al. 2002; Kaiser et al. 2006). Empirical studies of gravel habitat communities on the Northeast Peak of Georges Bank subject to strong tidal currents and a well-mixed water column have recovery times in excess of 10 years based on time-series monitoring (Collie et al. 2005; Tamsett et al. 2010). Per the BOEM BA, live bottom features such as sensitive bottom habitats including submerged aquatic vegetation and deep-sea corals would be avoided to reduce the risk of adverse effects (BOEM 2023b). This protection also restricts anchoring within these live bottom features. All vessel anchoring and seafloor sampling must occur at least 492 feet (150 meters) from any known locations of threatened or endangered coral species. Benthic disturbance in complex or sensitive habitats including coral gardens would have a greater impact and require a longer timeframe for recovery (Brooks et al. 2006; Kritzer et al. 2016; Lindholm et al. 2004); as very slow-growing species, deep-sea corals often only grow a few millimeters per year (NOAA Fisheries 2022).

Increases in routine vessel discharge would be expected due to an increase in vessel activity within the regional waters and ports. All vessels involved in site assessment and characterization activities are required to comply with existing state and federal regulations related to ballast and bilge water discharge, including USCG ballast discharge regulations (33 CFR 151.2025) and EPA National Pollutant Discharge Elimination System Vessel General Permit standards, both of which aim in part to prevent the release and movement of invasive species. Adherence to these regulations would reduce the likelihood of discharge of ballast or bilge water contaminated with invasive species. All vessels in coastal waters will operate in a manner to minimize propeller wash and seafloor disturbance and transiting vessels should follow deep-water routes (e.g., marked channels), as practicable, to reduce disturbance. An estimated 3,996 total vessel roundtrips would occur in relation to the Proposed Action within the WEA (**Table A-3**).

According to the Maine Port Authority, the Port of Portland is the largest foreign inbound tonnage transit port in the United States, the largest tonnage port in New England, and the largest oil port on the U.S. East Coast, with trans-oceanic shipping (i.e., container ships) representing the most likely means of introduction of invasive species (Trott et al. 2020). The aorid amphipod *Grandidierella japonica* and an encrusting bryozoan (*Cribrilina* [*Juxtacribrilina mutabilis*]) were identified invasive species found in the Gulf of Maine in 2018 eelgrass surveys in Casco Bay (Trott and Enterline 2019). There is a potential for introduction of invasive species through the discharge of ballast water; however, many if not all surveys will begin in local ports, thereby reducing the likelihood of the introduction of new invasive species to a negligible impact. Invasive species already present in the Gulf of Maine such as the green crab (*Carcinus maenas*) would continue to widen their northern range with warming waters (Fitzgerald 2021). Overall, the range expansion of invasive species is more likely to be focused in inshore, shallower waters (Adams et al. 2014; Firth et al. 2016). Due to the small volume of bilge water released, state federal and state regulations related to ballast and bilge water discharge, and the small, localized areas of benthic disturbance as a result of the Proposed Action, the introduction of invasive species is considered unlikely and expected to be negligible.

Non-Routine Events

Non-routine events that could potentially have benthic impacts include storms, allisions and collisions, spills, and the recovery of lost survey equipment, as described in **Section 2.4.5**. Storms can cause benthic disturbances, damage met buoys, increase the likelihood of allisions and collisions, especially during hurricane season (June through November) and Nor'easters. The met buoys are designed to withstand storm conditions, however in the unlikely case that a structural failure occurs, debris may break loose creating a navigational hazard or disturb benthic species and habitats in shallow environments.

Allisions occur when a vessel strikes fixed project infrastructure such as a met buoy, while collisions occur when two or more vessels (or moving objects) strike each other. The risk of either of these scenarios is low, especially since there are measures in place to control vessel traffic in a safe manner such as USCG Navigation Rules and Regulations, aids to navigation, safe fairways, and traffic separation schemes. Surveys related to the Proposed Action would be postponed during inclement weather conditions, and overall vessel traffic is greatly reduced during storms. Areas with high vessel traffic were excluded from the WEA boundary, see **Section 3.4.4** for more details. Should an allision/collision occur, it could also lead to hull damage, spilling petroleum products, such as diesel fuel.

Spills of petroleum products in this scenario would likely consist of fuels, lubricating oils, and other compounds that tend to float in seawater and would therefore be unlikely to affect benthic environments in offshore waters, although they could harm organisms in nearshore shallow habitats. An oil weathering model from the NOAA, ADIOS, using a maximum of 2,500 barrels showed that dissipation to less than 0.05% diesel fuel concentration varied between 0.5 and 2.5 days, depending on ambient wind (Tetra Tech Inc. 2015). From 2011 to 2021, the average spill size for vessels other than tank ships and tank barges was 95 gallons (360 liters) (USCG 2022). Should a spill from a vessel associated with the Proposed Action occur, BOEM anticipates that the volume would be similar and is therefore expected to dissipate very rapidly and evaporate within a couple of days. These factors combined limit the potential impacts to the benthic resources.

The possibility exists that equipment used during the Proposed Action could be accidentally lost. Recovery of lost equipment may be carried out in a variety of ways and depends on the type of equipment lost. Most commonly the recovery of lost survey equipment is accomplished by dragging grapnel lines in hopes of catching the loose gear and bringing it to the surface for recovery. Often this process involves multiple passes within a given area, which can lead to substantial seafloor disturbance in a concentrated area. Environmental conditions and the cost of the gear would guide decisions about the level of effort for recovery, determining the area of impact and time expended. Survey equipment that cannot be retrieved because either it is too small, carried away by currents, or embedded in the seafloor could create a potential hazard for bottom-tending fishing gear or cause additional bottom disturbance and may need to be cut and capped 3.3 to 6.6 feet (1 to 2 meters) below the seafloor. Lost survey gear would be reported within 24 hours to BSEE and NMFS. Marine debris that is not able to be retrieved could continue to cause benthic disturbance, as well as accumulate other marine debris which can negatively impact benthic habitats and species.

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.

Conclusion

The primary effects of routine activities associated with the Proposed Action would be crushing from direct contact with the gear, smothering by elevated turbidity levels, sediment resuspension, and deposition. The recovery of affected benthic communities would vary based on habitat and the degree of impact. Per the BOEM BA, live bottom features such as the sensitive bottom habitats including submerged aquatic vegetation and deep-sea corals would be avoided to reduce the risk of adverse effects (BOEM 2024d). Overall, the impacts from site characterization and site assessment activities on benthic resources are expected to be **negligible** to **minor** even without mitigation. The maximum area affected by geotechnical investigations, benthic sampling, installation of the met buoys, and vessel anchoring would be small, with no population-level effects anticipated.

Impacts on benthic resources from non-routine events are expected to be **negligible**. The rare chance of occurrence and compliance with best management practices, laws, and regulations would further minimize the likelihood.

Cumulative Impacts: The incremental impacts from the Proposed Action in combination with ongoing and reasonably foreseeable planned activities, resulting from individual IPFs, would range from **negligible** to **minor** for benthic resources due to the small, localized areas of impact, temporal scale, and the ability of disturbed species and habitats to recover, even without mitigation.

3.4.2 Marine Mammals

Factors that could potentially impact marine mammals from the Proposed Action include acoustic effects from site characterization surveys, vessels, and equipment noise; benthic disturbance effects from anchoring (vessel and met buoys) and site characterization surveys; and vessel strike. BOEM has developed SOCs and mitigation measures (**Chapter 4** and **Appendix H**) that would apply to site assessment and site characterization activities, as applicable. These include measures designed to prevent or reduce possible impacts on marine mammals during activities associated with the Proposed Action and are hereby incorporated by reference for the analysis below.

Detailed discussions on underwater sound and its importance to marine mammals and their hearing capabilities can be found in the NMFS BA (BOEM 2024d). Site assessment and characterization surveys that produce noise that could affect marine mammals include geophysical reconnaissance and HRG surveys (**Table 2-4**), geotechnical surveys (**Table 2-6**), and vessel noise. 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 (2020) 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 3-10**). No otariid pinnipeds are expected to occur in the Gulf of Maine, so this hearing group was not included in the assessment. These criteria represent the most recent guidance from NMFS.

Table 3-10. 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

Hearing Group		Impulsive Sound	Non-impulsive Sound
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 2020.
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 behavioral disturbance thresholds for marine mammals are provided as unweighted SPL to assess behavioral impacts (NMFS 2023b). 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).
- SPL 160 dB re 1 µPa for the potential onset of behavioral disturbance from an *impulsive* or *nonimpulsive, intermittent* source (e.g., HRG surveys, geotechnical coring).

Geophysical survey equipment for reconnaissance and HRG surveys under the Proposed Action include non-impulsive sources and impulsive sources that have operating frequencies above relevant marine mammal primary hearing sensitivities (i.e., above 180 kHz) or that produce very narrow beamwidths (i.e., highly directional) with low noise levels such that noise from equipment is unlikely to be detectable beyond a few meters from the sources for most marine mammal species. As a result, the likelihood of auditory injury such as PTS is extremely low due to the nature of these noise sources. All survey activities would follow the SOCs and mitigation measures described in **Chapter 4** and **Appendix H** which would further limit the likelihood of PTS being realized for any marine mammal species.

For example, multibeam echosounder and side-scan sonar typically used during site characterization surveys operate at frequencies over 180 kHz. Parametric 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).

The proposed HRG surveys using the sub-bottom profiler and ultra-high-resolution seismic imaging equipment may produce noise levels within hearing frequencies and above regulatory hearing thresholds for some marine mammals (Crocker and Fratantonio 2016; Ruppel et al. 2022), including highly directional parametric sub-bottom profilers (i.e., Innomar), non-parametric (i.e., CHIRPs) sub-bottom profilers, and omni-directional ultra-high-resolution seismic imaging systems (i.e., boomers, sparkers) (**Table 2-5**). In the BA for Data Collection and Site Survey Activities for Renewable Energy on the Atlantic OCS, BOEM (2021b) estimated distance to the behavioral threshold was a maximum of 1,640 feet (500 meters) for marine mammals during use of sparker systems operating at the highest power. Therefore, this represents a maximum potential area of effect that can be used to assess the risk of impacts on marine mammals from the Proposed Action. No PTS is expected to occur for any marine mammal species given the small distances to the PTS thresholds, the sound source characteristics of this equipment (Ruppel et al. 2022), and the implementation of mitigation measures to reduce noise exposure to HRG sound sources, such as clearance and shutdown zones (**Appendix H**).

Although some geophysical sources can be detected by marine mammals and may exceed behavioral disturbance thresholds, given several key physical characteristics of the sound sources, including source level, frequency range, duty cycle, and beamwidth, most HRG sources are unlikely to result in behavioral disturbance of marine mammals, even without mitigation (Ruppel et al. 2022). This finding is further supported by Kates Varghese et al. (2020), who found no change in three of four beaked whale foraging behavior metrics (i.e., number of foraging clicks, foraging event duration, click rate) in response to a 12-kHz multibeam echosounder; Vires (2011), who found no change in Blainville's beaked whale click durations before, during, and after a scientific survey with a 38-kHz EK-60 echosounder; and Quick et al. (2016), who found that short-finned pilot whales did not change foraging behavior but did increase their heading variance during use of an EK-60 echosounder. Conversely, Cholewiak et al. (2017) found a decrease in beaked whale echolocation click detections during use of an EK-60 echosounder.

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 harassment threshold (i.e., behavioral disturbance as defined by the MMPA). Behavioral reactions are expected to occur over a wide spectrum of variable responses, depending on the species and source type. However, with the proposed equipment types, short duration of the HRG surveys, and implementation of mitigation measures, prolonged behavioral disruptions are not expected.

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 on 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 (**Appendix H**), the risk of acoustic impacts on marine mammals from HRG surveys is likely to be **minor**.

Geotechnical surveys that employ coring equipment may produce non-impulsive, intermittent, low-frequency noise (less than 3 kHz) with a back-calculated source level, expressed as SPL, estimated to be 187 dB re 1 µPa at 1 meter (Chorney et al. 2011). This noise is within the hearing range of most marine mammals, and although the estimated source levels would exceed the behavioral disturbance threshold of 160 dB re 1 µPa, they would only be exceeded within approximately 65 feet (20 meters) of the source using spherical spreading loss equations. The 2021 NMFS Letter of Confirmation (LoC) concluded that noise associated with geotechnical surveys is below the level that we expect may result in physiological or behavioral responses, and as such, effects from exposure to this noise source are extremely unlikely to occur. Therefore, while geotechnical survey noise may be detectable it is unlikely to result in measurable behavioral effects for any marine mammal species and potential impacts therefore would be **negligible**.

Vessel noise is characterized as low frequency, typically below 1,000 hertz (Hz), with peak frequencies between 10 and 50 Hz; non-impulsive; and continuous, meaning there are no substantial pauses in the sounds that vessels produce. Noise levels vary based on the type of vessel (BOEM 2023a), but generally underwater source levels can range from 177 to 200 dB re 1 µPa at 1 meter for large vessels and barges (Erbe et al. 2019, McKenna et al. 2012) and between 150 and 180 dB re 1 µPa at 1 meter for smaller crew vessels (Kipple and Gabriele 2003, 2004). Parsons et al. (2021) reviewed literature for the source levels and spectral content of vessels fewer than 82 feet (25 meters) in length, a category often not addressed in vessel noise assessment measurements, and found reported source levels in these smaller vessels to be highly variable (up to 20 dB difference) However, an increase in speed was consistently shown to increase source levels while vessels at slower speeds were shown to emit low-frequency acoustic energy (less than 100 Hz) that is often not characterized in broadband analyses of small vessel sources.

Effects from vessel noise during both site assessment and characterization activities would predominantly be behavioral responses and potential auditory masking. A detailed review of the effects of vessel noise on specific marine mammal groups is provided in Erbe et al. (2019), but a high-level summary of the potential effects is provided for this discussion. Most of the reported adverse effects of vessel noise and presence are changes in behavior, although the specific behavioral changes vary widely across species (Erbe et al. 2019; Mikkelsen et al. 2019; Richardson et al. 1995; Sprogis et al. 2020; Williams et al. 2022). Physical behavioral responses include changes to dive patterns, disruptions to resting behavior, increases in swim velocities, and changes in respiration patterns (Finley et al. 1990; Mikkelsen et al. 2019; Nowacek et al. 2006; Sprogis et al. 2020; Williams et al. 2022). Behavioral disturbances that alter an animal's foraging behavior can have a direct effect on an animal's fitness, as has been observed in porpoises (Wisniewska et al. 2018) and killer whales (Holt et al. 2021) in response to vessel noise. Physical stress has also been demonstrated in baleen whales in response to low-frequency anthropogenic noise by Rolland et al. (2012).

Some marine mammals may change their acoustic behaviors in response to vessel noise, either due to a sense of alarm or in an attempt to avoid masking, by altering the frequency characteristics of their calls (Castellote et al. 2012; Lesage et al. 1999), changing the number of discrete calls produced in a given time period (Azzara et al. 2013; Buckstaff 2006; Guerra et al. 2014), or ceasing vocal activity completely (Finley et al. 1990; Tsujii et al. 2018). Some species may change the duration of vocalizations (Castellote et al. 2012) or increase call amplitude (Holt et al. 2009) to avoid acoustic masking from vessel noise.

Acoustic masking is another effect of long-term anthropogenic noise, such as vessel traffic, and is detailed further in . However, the Proposed Action is unlikely to result in any long-term acoustic masking given the relatively low volume of vessels required for the site assessment and characterization activities compared to existing vessel traffic in the region (**Section 3.3.5**) and the duration of the vessel transits under the Proposed Action. While the contribution of noise from project vessels under the Proposed Action would increase ambient noise conditions within the Gulf of Maine, the increase would be temporary and spread out within the geographic analysis area. Additionally, although behavioral responses may occur, these responses are unlikely to result in physiological effects due to stress responses or impacts on foraging, migrating, or mating behavior given the low volume of vessel traffic under the Proposed Action and relatively short duration (**Section 3.4.4**). Furthermore, the vessel speed reductions included in the SOCs would help lower the level of noise produced by project vessels (ZoBell et al. 2021). Overall, the behavioral disturbances that could result from exposure to vessel noise would not disrupt the normal routine function of marine mammals in the geographic analysis area and would therefore be **minor**.

Increased vessel activity in the geographic analysis area associated with the Proposed Action poses an increased risk of collision-related injury and mortality for marine mammals. All marine mammal species are susceptible to vessel strike. However, vessel strikes are of particular concern for mysticetes due to their size, relatively slow maneuverability, proportion of time spent at the surface between dives, lack of clear and consistent avoidance behavior, and their relatively low detectability by vessels without focused observation efforts and (Garrison et al. 2022; Gende et al. 2011; Martin et al 2016; Rockwood et al. 2017). BOEM estimates that a total of 3,996 vessel roundtrips (to and from the lease areas) will be conducted under the Proposed Action, with up to 603 vessel roundtrips conducted per year during Phase 1 (10 leases; April 2025–August 2029) and up to 302 vessel roundtrips per year during Phase 2 (5 leases; April 2029–December 2033). The volume of vessel traffic under the Proposed Action represents a 0.5% increase and 0.25% increase during Phase 1 and Phase 2, respectively, in the average annual vessel tracks counted in the geographic analysis area from 2019 to 2022. Vessel types, estimates of roundtrips, and assumptions are described in **Section 3.4.4** and **Appendix A**. BOEM assumes that there is the possibility of up to 10 leases conducting site characterization and site assessment activities concurrently, which represents the maximum case scenario considered in this assessment. Under this scenario, the increase in vessel traffic anticipated as a result of Proposed Action would result in a small increase over existing baseline traffic in the region (**Section 3.4.4**). However, BOEM's required implementation of the SOCs and mitigation measures (**Appendix H**) for vessels operating under the Proposed Action includes measures designed to minimize potential vessel strikes to marine mammals. These include use of trained observers, vessel speed restrictions, minimum separation distances, and clear strike avoidance protocols. Furthermore, typical site assessment and site characterization surveys are generally conducted at slow operational speeds (typically 4 to 6 knots), further reducing the risk of a strike by allowing observers to spot a marine mammal within the vessel strike zone and take evasive maneuvers, to avoid a strike. However, transits may be conducted at higher speeds (10 knots or greater), and all vessels would comply with all active and applicable NOAA NARW vessel speed restrictions (73 FR 60173). Vessel strike risk, and importantly, injury resulting from vessel strikes, can be significantly reduced to a negligible level by strict adherence to vessel strike avoidance measures as part of the SOCs and mitigation measures. Because of the low probability of such an event, potential impacts on marine mammals from vessel strikes resulting from site assessment and site characterization activities are therefore expected to be **negligible**.

BOEM has concluded that fisheries surveys that may be conducted in association with Gulf of Maine lease issuance are not “effects of the action” as defined in 50 CFR 402.02. While an individual Gulf of Maine lessee may opt to carry out such biological surveys to characterize resources in its lease area to inform its COP development, there is not an affirmative requirement to carry out any biological surveys, nor are fisheries survey plans yet developed; thus any such surveys are not reasonably certain to occur, and effects at this time are unknowable. Therefore, entanglement risk associated with fisheries surveys is not considered in this EA. A condition of the proposed lease would require appropriate consultation prior to carrying out any such fisheries surveys.

Potential impacts on marine mammals during met buoy installation, operation, and decommissioning include associated vessel traffic (considered above for vessel strike risk), possible entanglement in the mooring, and temporary disturbance of benthic habitat. This Draft EA assumes that a maximum of two buoys per lease would be installed; thus, with an assumed 15 leases within the WEA, a total of 30 buoys are considered. The installation and presence of a buoy and its associated mooring would result in a temporary disturbance and a loss of benthic habitat over a very small area within the geographic analysis area (see **Section 3.4.1**). The 30 met buoys within the Gulf of Maine are unlikely to alter distribution of any forage species for marine mammals. The anchor chain sweep for each buoy mooring is expected to denude a small area (i.e., several square meters) around the anchor, but the area of benthic habitat loss would be very small compared to the available habitat in the Gulf of Maine and is not expected to have any measurable or detectable negative impact on foraging abilities of marine mammals. 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 mammal 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; BOEM and USACE 2013). 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. Potential impacts on marine mammals due to benthic disturbance, changes to prey abundance, and entanglement from installation, operation and maintenance, and removal of the met buoy are expected to be **negligible**.

Given the overlap between NARW critical habitat for the Gulf of Maine foraging habitat Unit 1 and the geographic analysis area, most Project-related vessels and survey activities would operate almost exclusively within designated NARW critical habitat. The PBFs essential to the conservation of the NARW address the factors associated with NARW prey concentrations and availability (**Section 3.3.3**). Any disturbances resulting from Project activities on the essential features and foraging resources within Unit 1 of the NARW critical habitat would be so low as to be undetected. Therefore, potential impacts on any PBFs for NARW critical habitat from any activities from the Proposed Action would be **negligible**.

Non-Routine Events

Non-routine events (**Section 2.4.5**) that could affect marine mammals include spills and recovery of lost equipment. Marine mammals are susceptible to the effects of contaminants from pollution and spills, which can lead to issues in reproduction and survivorship and other health concerns (e.g., Hall et al. 2018; Jepson et al. 2016; Murphy et al. 2018; Pierce et al. 2008). All vessels would be expected to comply with USCG requirements relating to prevention and control of oil and fuel spills. Any spill associated with the Proposed Action would be an isolated event with rapid dissipation and low risk of exposure to marine mammals.

As described in **Section 2.4.5,** recovery of lost equipment could be carried out in a variety of ways and depends on the type of equipment lost. The recovery of lost equipment could affect marine mammals through the potential impact from entanglement stemming from the dragging of grapnel lines, if used. A decision to use grapnel lines and the extent of impacts would be dependent upon the type of lost equipment, which would dictate the number of attempts made at recovery, as well as coordination with agencies. Lost survey gear would be reported within 24 hours to BSEE and NMFS. See **Section 2.4.5** and **Appendix H** for additional details. 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 Gulf of Maine. Impacts from additional vessel traffic and noise associated with spill response or recovery of lost equipment likely would be from a low number of vessels and are therefore not expected to disrupt the normal or routine functions of marine mammals. Based on these factors, impacts on marine mammals from non-routine events are expected to be **negligible.**

Similarly, impacts on any PBFs for NARW critical habitat resulting from non-routine events would also be extremely unlikely to occur for the reasons presented above. Impacts on NARW critical habitat would therefore be **negligible**.

Conclusion

Impacts from site characterization and site assessment activities on marine mammals in the geographic analysis area are expected to range from **negligible** to **minor**. Potential impacts on individuals from the scale and nature of activities proposed, while detectable and measurable, would not threaten viability of marine mammal species with the application of mitigation measures. It is expected that most impacts on the affected resource will be avoided with proper mitigation. While it is possible for more significant impacts to occur (i.e., vessel strike), the probability of such an occurrence is considered very low. If a vessel strike were to occur, effects on mysticete (other than the NARW), odontocete, and pinniped individuals would be detectible and measurable. Severe population-level effects that compromise the viability of the NARW would be possible. However, the likelihood of a vessel strike as a result of the Proposed Action is considered very low given the expected limited total extent and duration of activities considered, so the viability of the species would not likely be threatened. Furthermore, implementation of SOCs and mitigation measures (**Appendix H**) would minimize potential impacts on marine mammals.

Impacts on marine mammals from non-routine events are expected to be **negligible** and would be minimized through project design criteria and best management practices.

Impacts on NARW critical habitat from site characterization and site assessment activities under the Proposed Action, including from non-routine events, are expected to be **negligible** and would be minimized through project design criteria and best management practices.

Cumulative Impacts: The incremental impacts under the Proposed Action resulting from individual IPFs would range from **negligible** to **minor** for marine mammals. Impacts from ongoing and reasonably foreseeable planned actions (**Appendix D**) are expected to be several times greater than the incremental impacts of the Proposed Action alone. BOEM anticipates that the cumulative impacts associated with the Proposed Action in combination with ongoing and reasonably foreseeable planned actions and the environmental baseline would be **moderate** for mysticetes (except the NARW), odontocetes, and pinnipeds 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 of this determination stem from construction-related noise related to planned wind projects and increased vessel traffic associated with the Planned Action Scenario (**Appendix D**). For NARW, the cumulative impacts associated with the Proposed Action in combination with ongoing and reasonably foreseeable planned actions and the environmental baseline would be **major** due to the risk of vessel strikes and entanglements from ongoing and reasonably foreseeable planned (non-offshore wind related) activities, leading to mortalities that exceed what is sustainable for the population (**Section 3.3.3**).

The incremental impacts under the Proposed Action resulting from individual IPFs would be **negligible** for NARW critical habitat. BOEM anticipates that the cumulative impacts associated with the Proposed Action in combination with ongoing and reasonably foreseeable planned actions and the environmental baseline would be **moderate** on the PBFs for NARW critical habitat, mainly driven by oceanographic changes resulting from ongoing climate change not associated with the Proposed Action.

3.4.3 Sea Turtles

Factors that could potentially have an impact on sea turtles from the Proposed Action include acoustic effects from site characterization surveys, vessels, and equipment noise; benthic disturbance effects from anchoring (vessel and met buoys) and site characterization surveys; and vessel strike. BOEM has developed SOCs and mitigation measures (**Appendix H**) that would apply to site assessment and site characterization activities, as applicable. These include measures designed to prevent or reduce possible impacts on sea turtles during activities associated with the Proposed Action and are hereby incorporated by reference for the analysis below.

Detailed discussions on underwater sound and its importance to sea turtles and their hearing capabilities can be found in the NMFS BA (BOEM 2024d). Site assessment and characterization surveys that produce noise that could affect sea turtles include geophysical reconnaissance and HRG surveys (**Table 2-4**), geotechnical surveys (**Table 2-6**), and vessel noise, as discussed below.

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). Many HRG sources operate at frequencies above the sea turtle hearing range and thus are not expected to affect them. Recently, BOEM and the U.S. Geological Survey characterized the acoustic qualities of HRG sources and their potential to affect marine animals, including sea turtles (Ruppel et al. 2022). In addition to frequency range, other characteristics of the sources like the source level, duty cycle, and beamwidth make it very unlikely that these sources would result in behavioral disturbance of sea turtles (SPL of 175 dB re 1 µPa, as recommended by Finneran et al. 2017), even without mitigation (Ruppel et al. 2022).

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 and may cause short-term behavioral disturbance, avoidance, or stress. The potential for PTS and TTS is considered possible close 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). BOEM will require a lessee to implement SOCs to minimize acoustic impacts (**Appendix H**), and new stipulations will be developed if needed for compliance with best management practices identified in Anderson (2021).

Given the intensity of noise generated by this equipment (Crocker and Fratantonio 2016) and the short duration of proposed surveys, HRG activities are unlikely to result in PTS for any turtle species. There is potential for sea turtles to be exposed to sound levels that meet or exceed behavioral disturbance thresholds from these sources. However, any effects of exposure to noise above thresholds are transient and will dissipate as the vessel moves away from the turtle. With the relatively short duration of the HRG surveys, the small distances to the behavioral disturbance thresholds, and the mitigation included in the Proposed Action (**Appendix H**), impacts from HRG surveys under the Proposed Action will not disrupt the normal or routine functions of sea turtles and be **minor**.

Geotechnical surveys using drilling or coring equipment would also be detectable by sea turtles but, based on the back-calculated source level, expressed as SPL, of 187 dB re 1 μPa at 1 meter (Chorney et al. 2011), the behavioral disturbance threshold for sea turtles would only be exceeded within approximately 16 feet (5 meters) of the source using spherical spreading loss equations. Therefore, while geotechnical survey noise may be detectable it is unlikely to result in measurable behavioral effects for any sea turtle species and potential impacts are therefore **negligible**.

The most likely effects of vessel noise on sea turtles are behavioral disturbances. Vessel noise has the potential to result in infrequent behavioral impacts on sea turtles, including temporary startle responses and changes to submergence patterns, masking of biologically relevant sounds, and physiological stress (NSF and USGS 2011; Samuel et al. 2005). Sea turtles may respond to vessel approach, noise, or both, with a startle response (diving or swimming away) and/or a temporary stress response by increasing submergence time between breaths, increasing duration of dives, or swimming to the surface (Lenhardt 1994; NSF and USGS 2011; O'Hara and Wilcox 1990; Samuel 2004). A recent study suggests that sea turtles may exhibit temporary threshold shift effects even before they show any behavioral response (Woods Hole Oceanographic Institution 2022). Hazel et al. (2007) demonstrated that sea turtles appear to respond behaviorally to vessels at approximately 33 feet (10 meters) or closer. Based on the source descriptions provided in **Section 3.3.4**, the behavioral threshold for sea turtles is likely to be exceeded by project vessels. Popper et al. (2014) suggest that in response to continuous shipping sounds, sea turtles have a high risk for behavioral disturbance closer to the source (e.g., tens of meters), moderate risk at hundreds of meters from the source, and low risk at thousands of meters from the source.

Behavioral effects are considered possible but would be temporary, with effects dissipating once the vessel or individual has left the area. The Proposed Action includes the implementation of minimum vessel separation distance of 164 ft (50 m) for sea turtles which, though geared towards vessel strike avoidance, would help to reduce the level of noise a turtle is exposed to and reducing the likelihood of sea turtles receiving sound energy above the behavioral threshold. Overall, the behavioral disturbances that could result from exposure to vessel noise would not disrupt the normal routine function of sea turtles in the geographic analysis area and impacts would therefore be **minor.**

Increased vessel activity in the geographic analysis area associated with the Proposed Action poses an increased risk of collision-related injury and mortality for sea turtles. Effects from vessel strikes range from minor injuries to mortality, depending on the species and severity of the strike. BOEM estimates that a total of 3,996 vessel roundtrips (to and from the lease areas) will be conducted under the Proposed Action, with up to 603 vessel roundtrips conducted per year during Phase 1 (10 leases; April 2025–August 2029) and up to 302 vessel roundtrips per year during Phase 2 (5 leases; April 2029–December 2033) (**Appendix A**). The volume of vessel traffic under the Proposed Action represents a 0.5%increase and 0.25% increase during Phase 1 and Phase 2, respectively, in the average annual vessel tracks counted in the geographic analysis area from 2019 to 2022 (**Section 3.4.4**). Vessel types, estimates of roundtrips, and assumptions are described in **Appendix A**. BOEM assumes that there is the possibility of up to 10 leases conducting site characterization and site assessment activities concurrently, which represents the maximum case scenario considered in this assessment. Under this scenario, the increase in vessel traffic anticipated as a result of Proposed Action would result in a substantial increase over existing baseline traffic in the region (**Section 3.4.4**). BOEM's required implementation of the SOCs and mitigation measures for site assessment and site characterization activities (**Appendix H**) includes measures designed to minimize potential vessel strikes. However, the relatively small size of turtles and the significant time spent below the surface makes their observation by vessel operators extremely difficult, thereby reducing the effectiveness of observers to mitigate vessel strike risk on sea turtles. Nevertheless, the use of trained observers would serve to reduce potential collisions. In addition to the low risk of strikes, typical site assessment and site characterization surveys are generally conducted at slow operational speeds (typically 4 to 6 knots), further reducing the risk of a strike by allowing observers to spot a sea turtle within the vessel strike zone and take evasive maneuvers, if needed, to avoid a strike. However, transits may be conducted at higher speeds (10 knots or greater).

As discussed in **Section 3.3.4**, sea turtle densities within the WEA and along expected vessel transit routes is very low; sea turtles (all species) occur only in low numbers and seasonally. Therefore, the likelihood of encounter between a vessel operating under the Proposed Action and a sea turtle is inherently low. Furthermore, mitigation measures (e.g., minimum vessel separation distances, vessel speed restrictions) would reduce the overall encounter potential. Given these factors, the probability of a vessel strike occurring is considered very low. Therefore, impacts on sea turtles from vessel strikes resulting from the Proposed Action would be **minor**.

BOEM has concluded that fisheries surveys that may be conducted in association with Gulf of Maine lease issuance are not "effects of the action" as defined in 50 CFR 402.02. While an individual Gulf of Maine lessee may opt to carry out such biological surveys to characterize resources in its lease area to inform its COP development, there is not an affirmative requirement to carry out any biological surveys, nor are fisheries survey plans yet developed; thus any such surveys are not reasonably certain to occur, and effects at this time are unknowable. Therefore, entanglement risk associated with fisheries surveys is not considered in this EA. A condition of the proposed lease would require appropriate consultation prior to carrying out any such fisheries surveys.

Benthic impacts from biological surveys (**Section 3.4.1**) 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 on listed species resulting from benthic disturbance would be **negligible**.

Potential impacts on sea turtles during met buoy installation, operation, and decommissioning include associated vessel traffic (considered above for vessel strike risk), possible entanglement in the mooring, and temporary disturbance of benthic habitat. This EA assumes that a maximum of two buoys per lease would be installed; thus, with an assumed 15 leases within the WEA, a total of 30 buoys are considered. The installation and presence of a buoy and its associated mooring would result in a temporary disturbance and a loss of benthic habitat over a very small area within the geographic analysis area (see **Section 3.4.1**). The 30 met buoys within the Gulf of Maine are unlikely to alter distribution of any forage species for sea turtles. The anchor 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 Gulf of Maine and is not expected to have any measurable or detectable negative impact on foraging abilities of sea turtles. Additionally, high tension of the buoy chain for the met buoy would reduce risk of entanglement (Anderson 2021; BOEM and USACE 2013). Potential impacts on sea turtles from met buoy installation and operation are expected to be negligible. 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. Potential impacts on sea turtles due to benthic disturbance, changes to prey abundance, and entanglement from installation, operation and maintenance, and removal of the met buoy is expected to be non-measurable and **negligible**.

Non-Routine Events

Non-routine events (**Section 2.4.5**) that could affect sea turtles include spills and recovery of lost equipment. Similar to marine mammals, sea turtles are susceptible to the effects of contaminants from pollution and spills, which can lead to issues in reproduction and survivorship and other health concerns (e.g., Hall et al. 2018; Jepson et al. 2016; Murphy et al. 2018; Pierce et al. 2008). All vessels would be expected to comply with USCG requirements relating to prevention and control of oil and fuel spills. Any spill associated with the Proposed Action would be an isolated event with rapid dissipation and low risk of exposure to sea turtles.

As described in **Section 2.4.5**, recovery of lost equipment could be carried out in a variety of ways and depends on the type of equipment lost. The recovery of lost equipment could affect sea turtles through entanglement risk related to the dragging of grapnel lines, if used. A decision to use grapnel lines and 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, as well as coordination with agencies. Lost survey gear would be reported within 24 hours to BSEE and NMFS; see **Section 2.4.5** and **Appendix H** for additional details. Regardless, the potential for sea turtles to interact with the grapnel line and become entangled is extremely low given the low probability of a sea turtle encountering the line within the geographic analysis area. Impacts from additional vessel traffic and noise associated with spill response or recovery of lost equipment likely would be from a low number of vessels with possible but temporary behavioral effects on a limited number of individual sea turtles. Based on these factors, impacts on sea turtles from non-routine events are expected to be **negligible.**

Conclusion

Impacts on sea turtles from site characterization and site assessment activities would range 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. While it is possible for more significant impacts to occur (i.e., vessel strike), the probability of such an occurrence is considered very low. Vessel strike and noise are the most important factors that may affect sea turtles. However, implementation of SOCs and mitigation measures (**Appendix H**) would minimize the potential for adverse impacts on sea turtles.

Impacts on sea turtles from non-routine events are expected to be **negligible** and would be minimized through project design criteria and best management practices.

Cumulative Impacts: The incremental impacts from the Proposed Action resulting from individual IPFs would range from negligible to minor for sea turtles. BOEM anticipates that the cumulative impacts associated with the Proposed Action in combination with ongoing and reasonably foreseeable planned actions (**Appendix D**) and the environmental baseline 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**).

3.4.4 Navigation and Vessel Traffic

The routine activities associated with the Proposed Action that would affect navigation and vessel traffic are space-use conflicts due to vessel traffic for site characterization surveys and installation, maintenance, and decommissioning of met buoys and oceanographic devices. After the met buoys are installed, presence of structures would affect navigation and vessel traffic. BOEM estimates 2,664 vessel roundtrips (to and from the lease areas) would be needed to conduct routine activities during Phase 1, and 1,332 vessel roundtrips would be needed to conduct routine activities during Phase 2 (**Appendix A**).[1] Survey and sampling activities during each phase is estimated to last a minimum of 53 months with approximately 6 months of overlap (**Chapter 2**). Trip estimates incorporate fish surveys and benthic and geotechnical sampling in the lease area and over export cable routes leading to onshore connections. Vessel movement during survey activity would potentially be slower and require more maneuvering. Vessel traffic anticipated as a result of the Proposed Action would add to the existing vessel traffic in the area (**Figure D-2** and **Tables 3-8 and 3-9**).

If vessel survey activities are evenly distributed during a 53 month period during Phase 1, the approximately 2,664 vessel roundtrips are estimated to be 603 vessel trips per year resulting from the Proposed Action.[2] This represents a 0.50 percent increase of the average annual vessel tracks counted in the geographic analysis area (the Gulf of Maine) from 2019 to 2022 and a 30 percent increase of the average annual vessel tracks counted in the WEA (**Table 3-5**) during the same time period. Similar calculations for Phase 2 using 302 vessel roundtrips per year result in a 0.25 percent increase of the

[1] Vessel trips for site characterization surveys and installation, maintenance, and decommissioning of met buoys were estimated as one (24-hour) vessel day. This is consistent with how a vessel trackline using AIS data was counted.
[2] Survey and sampling activities for each phase are anticipated to take slightly less time than the full 5 years (see Chapter 2). To be conservative vessel trip calculations were estimated over a period of 53 months instead of 60 months.

average annual vessel tracks counted in the Gulf of Maine from 2019 to 2022 and a 15 percent increase of the average annual vessel tracks counted in the requested WEA (**Table 3-5**) during the same time period. During the approximate half year of overlap (April - August 2029), a total of 453 estimated roundtrips for buoy placement and maintenance and survey and sampling would result in a 0.75 percent increase and 45 percent increase in the geographic analysis area and the WEA, respectively. Vessel roundtrips in Phase 1 and Phase 2 resulting from the Proposed Action represent 1.51 percent and 0.76 percent, respectively, of the average total commercial vessel trips per year within the six ports of interest in the Gulf of Maine from 2018 to 2021 (**Table 3-4**). The approximately 6-month overlap period would increase vessel traffic by 1.13 percent for the six ports of interest.

The additional vessel traffic associated with the Proposed Action would increase the potential for interference with other marine uses in the area, particularly the shorter trips in the WEA and along the transmission cable corridors (for fish surveys and benthic and geotechnical sampling) taking place over an approximate 9-year span (with 6 months of overlap) of the Proposed Action. However, the site characterization survey and sampling activities would be staggered in time and across 15 leases. And during those 9 years the introduction of the six proposed fairways could funnel vessel traffic away from the WEA reducing the estimated traffic density. Moreover, sampling and survey vessel trip comparisons with vessel tracks within the WEA are conservative because they also include travel outside of the WEA along the transmission cable corridors. Impacts could be minimized by adherence to standard marine navigation rules and through proper scheduling and notification to the marine community.[3]

Existing vessel traffic in the WEA is no more than 2 percent of the total volume in the geographic analysis area and follows distinct patterns to and from the regional ports. The WEA is not within or in proximity (5 nm [9.3 km] or less) to existing designated routing measures.[4]

The USCG's Final Port Access Route Study on the Approaches to Maine, New Hampshire, and Massachusetts recommends establishing six new fairways designed to facilitate the needs of various types of vessel traffic throughout the port access route study area (USCG 2023a). Most notably, the study recommends a Gulf of Maine Fairway to meet the needs of vessel traffic, primarily cargo and tanker vessels, proceeding across the Gulf of Maine between Boston and the Bay of Fundy. The fairway extends from the Boston Approach TSS precautionary area in Massachusetts Bay to the international boundary outside of the Bay of the Fundy. Most of the fairway width is 8 nm (14.8 km), including the portion of the fairway which connects with the Portland Eastern Approach Fairway. Near the intersection of these two fairways, approximately 43,761 acres (177 km^2) or 2 percent of the WEA overlaps with the southeastern edge of the Gulf of Maine Fairway.

Within portions of the WEA that overlap the recommended fairway, there is the potential for space-use conflicts with the current vessel traffic and Proposed Action activities, such as the installation of a met

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[3] Local Notice to Mariner (LNM) applications for project activity must be submitted at least 30 days prior to expected activity dates to the USCG First District office. LNMs for each USCG District can be found at https://www.navcen.uscg.gov/local-notices-to-mariners-by-cg-district/.

[4] USCG's Marine Planning Guidelines (USCG 2023b) recommend a minimum distance of 5 nm (9.3 km) from a TSS entry and exit area (where vessels are converging and diverging from multiple locations) to provide sufficient sea room for vessels to detect one another visually and by radar and for a large vessel to maneuver in an emergency. The same guidelines recommend at least a 1 nm (1.9 km) minimum buffer zone from the parallel outer or seaward boundary of an International Maritime Organization (IMO) routing measure. The Proposed Action border is 6.94 nm (12.9 km) at the nearest point with the inbound traffic lane of the Boston TSS and at no point is closer than 5 nm (9.3 km) to any nearby TSS entry and exit.

buoy and slow-moving survey vessels with limited maneuverability. A review of AIS vessel transit count data from years 2019 through 2021 (as presented in USCG 2023a) shows an average of 23 track counts per month in 2019, 15 track counts per month in 2020, and 14 track counts per month in 2021 intersecting a nearby “area of interest” (Portland TSS 2, also known as the Eastern approach). In consideration of the low volume of existing vessel traffic (less than one track count per day), there is a remote potential for space-use conflicts in complex navigational scenarios. Should a portion of any commercial leases be issued within the Gulf of Maine Fairway, potential future installation of permanent or temporary offshore wind energy structures would be prohibited if the fairway is codified through future rulemaking.

Non-Routine Events

Non-routine events that could potentially have impacts on navigation and vessel traffic include the recovery of lost survey equipment, allisions and collisions, and oil spills through temporary space-use conflicts. The extent of impacts from lost survey equipment would depend on the type of lost equipment. The size of the lost equipment or the replacement cost would dictate the type of equipment deployed and the number of attempts made at recovery. The number of recovery attempts could affect 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. However, the potential for recovery operations to interact with vessel traffic is low, given that recovery operations would likely involve one vessel for a short period of time; therefore, impacts are not expected to disrupt the activity of other vessels. The potential for allisions and collisions would be minimized through adherence to USCG Navigation Rules and Regulations; therefore, risk of damage to vessels and equipment and other conflicts are considered unlikely. The potential for and size of an oil spill, should one occur, would be minimized through application of National Contingency Plan (40 CFR 300) response requirements and impacts on vessel traffic would be limited to a localized area for a short duration.

Conclusion

Overall, BOEM anticipates that impacts on navigation and vessel traffic from site characterization and installation, maintenance, and decommissioning of met buoys and oceanographic devices are expected to be **negligible** to **minor** depending on the location selected for installation of the buoys and USCG’s final rulemaking for the recommended Gulf of Maine Fairway. Vessel activity over the approximately 9-year span (with 6 months of overlap) of activities associated with the Proposed Action is expected to be relatively small compared to existing vessel traffic at the ports and between the shore and the WEA. However, if installation of a met buoy and survey vessel traffic occurs within the recommended Gulf of Maine Fairway, **minor** impacts could result from space-use conflicts with shipping vessel traffic. These space-use conflicts are anticipated to be uncommon based on the relatively low volume of existing vessel traffic, notification requirements, and buoy lighting but could occur in complex navigational scenarios. Should the execution of commercial leases and associated site assessment and site characterization activities occur outside of the recommended Gulf of Maine Fairway, impacts are expected to be **negligible** because areas outside of the fairway are less likely to be used for maneuvering of shipping vessels. In either scenario, the overall effect would be small, and the resource would be expected to return to a condition with no measurable effects without any mitigation. Port improvement projects (**Appendix D**) might also affect vessel activity negatively as dredging operations or infrastructure improvements adjoining the waterway may impact vessel maneuverability in congested port areas. However, once port improvements are completed, some ports may be able to accommodate larger vessels delivering more cargo in one trip, which could result in less vessel traffic overall.

Impacts on navigation and vessel traffic from non-routine events would be **negligible** to **minor** depending on the location selected for installation of the met buoys and USCG's final rulemaking for the recommended Gulf of Maine Fairway.

Cumulative Impacts: The incremental impacts from the Proposed Action, such as increased vessel presence including slow-moving survey and sampling vessels and the presence of met buoys, in combination with ongoing and reasonably foreseeable planned activities, resulting from individual IPFs, would range from **negligible** to **minor** for navigation and vessel traffic.

3.4.5 Commercial and Recreational Fishing

The Proposed Action 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. Exclusion/displacement is a result of survey activities involving site assessment and site characterization, 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 assessment activities that may be transiting the area could use USCG notices (i.e., Local Notice to Mariners) to avoid the areas where the site assessment or site characterization activities are occurring. Regardless, impacts on commercial and recreational fishing activities from surveys for site characterization could vary depending on the fishing gear type used (e.g., anglers using fixed gear such as lobster pots could need to retrieve their gear before a survey vessel in their fishing location could potentially transit over their gear).

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 Gulf of Maine WEA or associated survey areas; 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 some surveys are occurring. Decreased catch rates may be most notable in hook and line fisheries because behavioral 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 expected to range from negligible to minor.

ADCP or met buoy anchors could provide previously unavailable habitat for species that prefer structured and hard-bottom habitats, creating a temporary increase in numbers of these types of fish near the anchors while the structures are in place. Additionally, the met buoy itself may provide habitat for pelagic species such as dorado (also known as dolphinfish). Installation of a ADCPs or met buoys could, therefore, have a temporary 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 3.4.3** and **3.4.4**, mollusks, such as sea scallops, and other commercially important sessile species would likely be adversely affected (buried or crushed) in the immediate area of ADCP or met buoy anchors and suffer from increases in suspended sediment load during the installation and removal (i.e., decommissioning) process; however, the area affected would be small relative to the area available for commercial and recreational fishing.

Most coastal recreational fishing for Maine, New Hampshire, and Massachusetts takes place outside of the WEA. Considering increases in vessel traffic associated with the Proposed Action are expected to be a negligible portion of the overall number of vessel trips in the Gulf of Maine region, impacts of increased vessel traffic on commercial and recreational fishing are anticipated to be negligible. Although commercial fishing vessels may transit the WEA on route to historical fishing grounds, site assessment and site characterization activities or ADCP or met buoy installation activities likely would not interfere with access to active fishing grounds outside of the need to change transit routes slightly to avoid survey and installation vessels. After the ADCPs or met buoys are removed, the proposed sites would pose no obstacle to commercial or recreational fishing.

There are numerous port and marina locations shoreward of the WEA that may be used by commercial fishing vessels, recreational vessels, and project vessels. The estimated maximum number of vessel trips needed conduct routine activities for the Proposed Action (**Appendix D**), which may originate out of various ports identified in , would be small relative to existing use and are not expected to adversely affect current use of these facilities. The approximate maximum of 3,996 vessel roundtrips that may occur resulting from the Proposed Action represent a 0.5 percent increase and 0.25 percent increase during Phase 1 and Phase 2, respectively, in commercial vessel counts per year for the six major ports in the Gulf of Maine from 2018 to 2021 (**Section 3.4.4**).

Non-Routine Events

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. As described in **Section 2.4.5**, recovery of lost equipment could be carried out in a variety of ways and depends on the type of equipment lost. The extent of impacts would depend on the method of recovery and type of lost equipment; the larger the equipment lost, or the more costly it would be to replace, the more attempts would be made at recovery. The number of recovery attempts could affect the size of the resultant impact area and time spent searching. The location where the equipment is lost would also dictate the impact on other resources. See **Section 2.4.5** and **Appendix H** for additional details.

Furthermore, unrecovered lost survey equipment 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 3.3 to 6.6 feet (1 to 2 meters) 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 less than 3.3 feet (1 meter), but 6.6-foot (2-meter) burial may be required and would be determined on case-by-case basis with BOEM and BSEE. In any case, the potential for recovery operations to interact with commercial or recreational fishing activities is low given that recovery operations would likely involve one vessel for a short period of time.

Conclusion

Overall, impacts on commercial and recreational fishing under the Proposed Action are expected to be **negligible** to **minor** 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 a ADCPs and/or met buoys would be installed over a large geographic area, the relatively small spatial area and limited duration of sound produced from routine activities and events, and that the resource would be expected to recover completely without remedial or mitigating action. Communication and coordination between a lessee and affected anglers could greatly reduce the potential for conflict during vessel movement and buoy installation activities.

Impacts on commercial and recreational fishing from non-routine events are expected to be **negligible** to **minor**, depending on the frequency of lock equipment recovery operations and whether or not interference is caused to fishing activities.

Cumulative Impacts: The incremental impacts from the Proposed Action in combination with ongoing and reasonably foreseeable planned activities, resulting from individual IPFs, would range from **negligible** to **minor** for commercial and recreational fishing. If multiple IPFs acted synergistically, could be expected to be minor, but in most circumstances cumulative impacts from the Proposed Action on commercial and recreational fishing are expected to be **negligible**.

3.5 Cumulative Impacts

This section considers the cumulative impacts of the No Action Alternative and Proposed Action on resources discussed in **Chapter 3** when combined with impacts of other ongoing and reasonably foreseeable planned activities.

Appendix D provides a description of ongoing and reasonably foreseeable planned activities with IPFs that overlap both spatially and temporally with IPFs from the Proposed Action. These ongoing and reasonably foreseeable planned activities could contribute to cumulative impacts on the same resources. **Appendix D** also discusses the effects of climate change, which would contribute to a variety of ongoing and interconnected changes to future baseline conditions of the affected environment.

The No Action Alternative would have no impacts on the baseline condition of the affected environment and, therefore, would not result in incremental effects that contribute cumulatively to impacts from other ongoing and reasonably foreseeable planned activities.

The cumulative impacts of the Proposed Action are described in the following sections.

3.5.1 Ecosystem-Based Management and Trade-Offs

Per Spooner et al. (2021), both domestic and international regulators and natural resource managers are implementing ecosystem-based management (EBM) (e.g., Garcia et al. 2003; NMFS 2016; Pedreschi et al. 2019) to address ecosystem-level changes, address project-specific impacts, and protect ecosystem function. EBM, within an adaptive management framework that allows revisitation and potential revision, uses the expertise and working knowledge of natural and social scientists, interested parties, and resource managers to broaden their assessment of current ecosystem condition and identify key drivers affecting ecosystem function. This approach is being considered within the context of cumulative impacts, the latter of which considers all similar activities within the spatial and temporal boundaries of the Proposed Action.

A well-founded EBM approach depends on the availability of reliable and accurate ecological, social, and economic information and the identification and consideration of key data deficiencies. The advantages of an EBM approach are based, in part, on the shortcomings evident in standard environmental impact assessment methodologies, which include a focus on individual species or major taxonomic groups. An EBM approach provides a more holistic characterization of the ecosystem and allows for further insight into how a particular ecosystem functions. Under this approach, regulators have the ability to weigh the ecosystem costs and benefits of specific projects. EBM is an integrated approach to management that considers the entire ecosystem, including the biological, physical, chemical, and social aspects of the affected environment. It requires consideration of all elements that are integral to ecosystem function, accounting for economic, social, and environmental costs and benefits (e.g., McLeod et al. 2005). The ultimate goal of an EBM approach to impact assessment and identification of viable mitigation measures is to maintain an ecosystem in a productive and resilient condition, one that supports proper ecosystem function and allows for long-term support of potentially a broad suite of ecosystem services.

A resilient and productive ecosystem is the foundation for sustainable development, continuing productivity and ecosystem function, and the conservation of biodiversity. Functioning marine ecosystems support the provisioning of food, energy, and natural products while simultaneously providing cultural and aesthetic value and providing opportunities for tourism and recreation, among other activities. Additionally, marine ecosystems play important roles in nutrient cycling, climate regulation, and storm protection. Marine ecosystems also support human livelihoods for coastal communities, with a variety of economic sectors depending on a fully functioning ecosystem.

In the current context, the implementation of EBM requires a framework to assess the status of the Gulf of Maine ecosystems in relation to specific regulator-based management goals and objectives and to evaluate the potential outcomes of alternative management strategies. Per McLeod et al. (2005), an optimal EBM approach should (1) emphasize the protection of ecosystem structure, functioning, and key processes; (2) be location specific, focusing on a specific ecosystem and the range of activities affecting it; (3) explicitly account for the internal linkages within the ecosystem (e.g., identifying the important interactions between target species or key services and other non-target species); (4) recognize that society relies upon and benefits from the ecosystem through ecosystem services; (5) acknowledge the internal linkages among systems; and (6) integrate ecological, social, economic, and institutional perspectives, recognizing their strong interdependences.

3.5.2 Cumulative Impact Conclusions for the Proposed Action

Table 3-11 characterizes the total cumulative impacts on each affected resource resulting from incremental effects of (1) ongoing and reasonably foreseeable planned activities, and (2) impacts of the Proposed Action. The incremental contribution of the Proposed Action to cumulative impacts for individual resources would range from negligible to minor and be limited in duration to the timeframe necessary to conduct site assessment and site characterization activities. Considered together, the Proposed Action's contribution to cumulative impacts would not result in significant impacts on marine ecosystem condition or function (due to biological, physical, or chemical changes), the livelihood of coastal communities that rely on marine resources (due to impacts on commercial fisheries), or other social uses (such as marine mineral or military use). Climate change could contribute to cumulative impacts when combined with the incremental impacts of the Proposed Action by altering baseline environmental conditions and putting stress on natural ecosystems. Climate change results primarily from the increasing concentration of GHG emissions in the atmosphere, which causes planet-wide physical, chemical, and biological changes, substantially affecting the world's oceans and lands. BOEM's goal for executive commercial offshore wind leases is to combat climate change and promote renewable energy to reduce GHG emissions. These long-term social and economic aspirations are weighed against the short-term, negligible to moderate impacts of BOEM issuing the research lease and the resultant site assessment and site characterization activities.

Table 3-11. Cumulative impact conclusions

Resource	Incremental Impacts of Ongoing and Reasonably Foreseeable Planned Activities	Incremental Impacts of Proposed Action	Total Cumulative Impacts
Air Quality and Greenhouse Gas Emissions	**Minor** impacts on air quality due to vessel traffic as well as pollutants emitted from onshore sources and transported by winds in the geographic analysis area.	**Negligible** impacts on air quality from vessel operations.	The Proposed Action in combination with ongoing and reasonably foreseeable planned activities would result in **negligible** to **minor** impacts on air quality.

Resource	Incremental Impacts of Ongoing and Reasonably Foreseeable Planned Activities	Incremental Impacts of Proposed Action	Total Cumulative Impacts
Water Quality	**Minor** impacts on water quality during the study period due to continuation of climate change-influenced increases in ocean temperatures and acidification, resulting in shifts in the distribution of and suboptimal conditions for marine organisms.	**Negligible** impacts on water quality from routine vessel discharges and seafloor disturbances that would temporarily increase local turbidity and water clarity.	The Proposed Action in combination with ongoing and reasonably foreseeable planned activities would result in **negligible** to **minor** impacts on water quality predominated by the effects of climate change.
Benthic Resources	**Minor** impacts on benthic resources from ongoing activities and conditions, especially climate change, commercial fishing using bottom-tending gear (e.g., dredges, bottom trawls, traps/pots), and sediment dredging for navigation.	**Negligible** to **minor** impacts on benthic resources due to small, localized areas subject to crushing from direct contact with the gear, smothering by elevated sedimentation levels, and resuspension.	The Proposed Action in combination with ongoing and reasonably foreseeable planned activities would result in **negligible** to **minor** impacts on benthic resources due to temporary and localized impacts as well as mitigation measures.
Finfish, Invertebrates, and Essential Fish Habitat	**Minor** impacts on finfish, invertebrates, and EFH from ongoing activities and conditions, especially harvest, bycatch, dredging, bottom trawling, and climate change.	**Negligible** impacts on finfish, invertebrates, and EFH from survey activities associated with the Proposed Action. Once the survey activities are complete, the EFH and the managed species that utilize the habitats within the geographic analysis area are expected to return to pre-survey conditions.	The Proposed Action in combination with ongoing and reasonably foreseeable planned activities would result in **negligible** to **minor** impacts on finfish, Invertebrates, EFH, or ESA-listed species and no population-level impacts were identified. The survey activities would not increase or synergistically compound any environmental impacts originally occurring within the defined geographic analysis area.

Resource	Incremental Impacts of Ongoing and Reasonably Foreseeable Planned Activities	Incremental Impacts of Proposed Action	Total Cumulative Impacts
Marine Mammals	**Minor** impacts on marine mammals from ongoing and reasonably foreseeable planned activities within the geographic analysis area, including vessel strikes and entanglement risk from commercial marine vessels and commercial and recreational fishing activities.	**Negligible** to **moderate** impacts on marine mammals depending on the activity being conducted and the species affected. Most impacts on the affected resource would be avoided with implementation of mitigation.	The Proposed Action in combination with ongoing and reasonably foreseeable planned activities would result in **negligible** to **moderate** impacts on marine mammals except the NARW and **major** impacts on the NARW due to the potential for vessel strikes and entanglements that could lead to population-level impacts.
Sea Turtles	**Minor** impacts on sea turtles from ongoing and reasonably foreseeable planned activities within the geographic analysis area, including vessel strikes and entanglement risk from commercial marine vessels and commercial and recreational fishing activities.	**Negligible** to **minor** impacts on sea turtles depending on the activity being conducted and the species affected. The resource would be expected to recover completely with implementation of mitigation.	The Proposed Action in combination with ongoing and reasonably foreseeable planned activities would result in **moderate** impacts on sea turtles, as vessel strikes, entanglement, and noise would occur but would be minimized by mitigation measures.
Military Use	**Negligible** impacts on military use are anticipated as a result of ongoing and reasonably foreseeable planned activities in the region, as routine functions and activities will not be disrupted.	The WEA overlaps with the Airspace Warning Areas W104B/W-104C and W-104A, and the potential cable corridors also overlap with Airspace Warning Areas W-103, W-102L/W-102H, W-105A and W-506, creating the potential for space-use conflicts between military vessels and vessels conducting site assessment and site characterization activities as part of the Proposed Action; however, impacts on military use are anticipated to be **negligible**, as routine functions and activities could still continue.	The Proposed Action in combination with ongoing and reasonably foreseeable planned activities would result in **negligible** impacts on military use, as routine functions and activities would not be disrupted.

Resource	Incremental Impacts of Ongoing and Reasonably Foreseeable Planned Activities	Incremental Impacts of Proposed Action	Total Cumulative Impacts
Navigation and Vessel Traffic	**Negligible** impacts on navigation and vessel traffic use are anticipated as a result of ongoing and reasonably foreseeable planned activities in the region, as routine functions and activities will not be disrupted.	Impacts on navigation and shipping are anticipated to be **negligible** if commercial leases in the WEA are issued outside of the Portland Eastern Approach TSS and recommended Gulf of Maine Fairway, as routine functions and activities could still continue and impacts can be minimized by adherence to standard marine navigation rules and through proper scheduling and notification to the marine community. Impacts are anticipated to be **minor** if commercial leases in the WEA are issued within the Portland Eastern Approach TSS or recommended Gulf of Maine Fairway due to the remote potential for space-use conflicts in complex navigational scenarios.	The Proposed Action in combination with ongoing and reasonably foreseeable planned activities would result in **negligible** to **minor** impacts on navigation and shipping use, as routine functions and activities would not be disrupted, but the remote potential for space-use conflicts exists in complex navigational scenarios.
Commercial and Recreational Fishing	**Minor** impacts on commercial and recreational fishing as a result of pressure from ongoing activities, including regulated fishing effort, vessel traffic, other bottom-disturbing activities, and climate change.	**Negligible** to **minor** impacts on commercial and recreational fishing depending on the fishery and Proposed Action activity. The resource would be expected to recover completely without remedial or mitigating action.	The Proposed Action in combination with ongoing and reasonably foreseeable planned activities would result in **negligible** to **minor** impacts on commercial and recreational fishing.
Recreation and Tourism	Ongoing and reasonably foreseeable planned activities are anticipated to have a **negligible** impact on recreation and tourism, as these activities have co-existed in the Gulf of Maine for a substantial amount of time.	Impacts on recreation and tourism as a result of the Proposed Action are anticipated to be **negligible**, as the increased vessel activity and placement of a temporary met buoy are not expected to lead to substantial space-use conflicts with existing recreational activities in the region.	The Proposed Action in combination with ongoing and reasonably foreseeable planned activities would result in **negligible** impacts on recreation and tourism routine functions and activities would not be disrupted.

Resource	Incremental Impacts of Ongoing and Reasonably Foreseeable Planned Activities	Incremental Impacts of Proposed Action	Total Cumulative Impacts
Cultural, Historical, and Archaeological Resources	Minor to major impacts on cultural, historical, and archaeological resources as a result of ongoing and reasonably foreseeable planned activities, including climate change, the extent of potential permanent and irreversible impacts on marine cultural resources and long-term impacts on historic aboveground resources. Implementation of existing federal and state cultural resource laws and regulations would reduce the severity of potential impacts in a majority of cases, resulting in overall **moderate** impacts on cultural resources.	Impacts on submerged historic properties from site characterization activities are expected to be **negligible** with prior identification and avoidance of these resources through geophysical surveying and interpretation. Visual effects of the met buoys and vessels used for the Proposed Action would be temporary and indistinguishable from existing vessel traffic and would have **negligible** impacts on onshore historic properties.	The Proposed Action in combination with ongoing and reasonably foreseeable planned activities would result in **moderate** impacts on cultural, historical, and archaeological resources, which in the majority of cases would be reduced in severity through implementation of existing federal and state cultural resource laws and regulations.

EFH = Essential Fish Habitat; ESA = Endangered Species Act; NARW = North Atlantic right whale; WEA = Wind Energy Area; TSS = traffic separation scheme.

4 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 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 on offshore cultural resources or biologically sensitive habitats, if present. After lease issuance, the lessee would conduct surveys in accordance with the SAP including within the vicinity of the buoy deployments. Should these surveys reveal sensitive/complex habitat, BOEM would request locating/micrositing the anchors/moorings away from those features.

Using best available science and in consultation with NMFS (the agency primarily responsible for overseeing marine 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) 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 protocols for all ESA-listed species, in addition to any applicable ITA requirements under the MMPA for marine mammals.

While an individual Gulf of Maine lessee may opt to carry out such biological surveys to characterize resources in its lease area to inform its COP development, there is not an affirmative requirement to carry out any biological surveys, nor are fisheries survey plans yet developed; thus any such surveys are not reasonably certain to occur, and effects at this time are unknowable. Therefore, entanglement risk associated with fisheries surveys is not considered in this EA. A condition of the proposed lease would require appropriate consultation prior to carrying out any such fisheries surveys.

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, 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 clear of 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 protected species observer (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 to 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 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 or revisions to these conditions may be developed for incorporation into lease stipulations or as conditions of SAP approvals 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**, which lists the SOCs that are part of the Proposed Action. The SOCs to minimize or eliminate potential impacts on protected species, including ESA-listed species of marine mammals and sea turtles, were developed by BOEM and refined during consultations with NMFS and USFWS under Section 7 of the ESA.

5 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.

5.1 Public Involvement

5.1.1 Gulf of Maine – Ocean User and Stakeholder, and Renewable Energy Task Force Meetings

In 2019, BOEM established an Intergovernmental Renewal Energy Task Force for the Gulf of Maine (Task Force), composed of federal officials and elected Tribal, state, and local officials from Maine, New Hampshire, and Massachusetts. The first meeting of the Task Force was held on December 12, 2019, to initiate coordination and consultation between federal, state, local, and Tribal governments and identify roles and responsibilities in the offshore wind renewable energy leasing process. The meeting included presentations on the offshore energy leasing process, government roles, and updates on recent activities related to offshore wind in the three states. The public was invited to attend and provide public comments.

On May 19, 2022, BOEM held the second Task Force meeting to seek feedback on the recently published Gulf of Maine offshore wind planning area and the development of a Request for Interest (RFI) for the Gulf of Maine. BOEM and the three states also presented their planned engagement strategies over the course of BOEM's planning and leasing process. BOEM also provided an overview of the State of Maine's Research Lease application. The public was invited to attend and provide public comments. Common themes raised by public commenters included concerns with BOEM's schedule and the complexity of the Gulf of Maine, requests for fishermen and communities to be engaged with early and often, and requests for considering how conditions may change in the Gulf of Maine over time.

On August 19, 2022, BOEM published the RFI for the Gulf of Maine. The purpose of the RFI was to gage interest in commercial wind energy leases within a 13,000,000-acre RFI Area. BOEM received nominations of interest from five companies.[1]

Based on the nominations and public comments received on the RFI, in January 2023 BOEM published a Draft Call Area developed with NOAA's National Centers for Coastal Ocean Science (NCCOS). To collect feedback on the Draft Call Area, BOEM held both in-person and virtual information exchange sessions in January through March 2023. These sessions included meetings with Tribal Nations, environmental non-governmental organizations, fisheries sectors, and the shipping and commercial maritime industry.

On April 24, 2023, BOEM published the Gulf of Maine call for Information and Nominations (Call) to collect input on and assess interest in commercial offshore wind development in the Call Area, as well as input on the data and modeling used by BOEM and NOAA NCCOS to develop the WEA through spatial

[1] All nominations are posted to BOEM's website: https://www.boem.gov/renewable-energy/state-activities/maine/gulf-maine.

analysis. BOEM received 127 unique public comments and 7 nominations of areas of interest from companies.

On May 10 and 11, 2023, BOEM held the third Task Force meeting. This meeting included discussions on floating offshore wind technology, offshore wind data collection activities and analyses for whales and other protected species, and transmission planning. The meeting also provided information on the steps in the commercial offshore win leasing process and the State of Maine's Research Lease. Several Tribes offered comments and concerns, including representatives from the Passamaquoddy Tribe of Indians, Indian Township; Passamaquoddy Tribe of Indians, Pleasant Point; Penobscot Nation; and Houlton Band of Maliseet Indians. Comments focused on the importance of involving Tribes in the process, seeking assurance that the submerged paleocultural heritage will be properly identified and avoided, concerns about potential increased use of a road leading to Eastport that impacts Tribal members, concerns about having enough time and resources to engage in the process, and a strong desire to ensure there are no negative impacts on ecosystems and fishing livelihoods. BOEM leadership and staff visited the Passamaquoddy Tribe of Indians, Pleasant Point, at Sipayik the day following the Task Force meeting.

On October 19, 2023, BOEM published a Draft WEA for the Gulf of Maine that covered around 3,500,000 acres located 23 to 120 miles off the coast. The publication also included the draft NCCOS WEA Siting Analysis Report. BOEM held a 30-day public comment period on the Draft WEA, as well as three Secondary Areas for Further Analysis that were excluded from the Draft WEA but were still receiving consideration. The Final WEA published on March 15, 2024, was developed through the above-described engagement and public comment opportunities.

Full summaries of each meeting and associated presentations made at each meeting, as well as all public notices and reports, can be found at the relevant links here: https://www.boem.gov/renewable-energy/state-activities/maine/gulf-maine.

5.1.2 Notice of Intent to Prepare an Environmental Assessment

On March 15, 2024, BOEM made an announcement regarding the finalization of a WEA situated in the Gulf of Maine. This development came about after extensive engagement and feedback from a diverse array of stakeholders, including states, Tribes, local residents, ocean users, federal government partners, and members of the public. BOEM initiated an environmental assessment process by publishing a Notice of Intent (NOI) in the *Federal Register* on March 18, 2024. The NOI signaled the commencement of a 30-day public comment period, providing an opportunity for interested parties to contribute their perspectives and insights. During the 30-day comment period, BOEM received 35 comments from various 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 commenters raised specific areas of interest and concern:

- Requests for changes to the Final WEA and requests for specific aspects of lease design, including size and spacing.
- Requests to consider the cumulative impacts of future construction and operation of wind farms, including suggestions that BOEM prepare a Programmatic Environmental Impact Statement (EIS).

- Requests for BOEM to use floating wind technology, which is anticipated for the Gulf of Maine, to develop assumptions and analyze impacts.
- Concern for impacts on various species, with most concern for whales.
- Concern for impacts on navigation safety due to increased vessel traffic.
- Concern for impacts to commercial fisheries, especially from future construction and operation of wind farms.

The comments can be viewed at www.regulations.gov by searching for docket ID **BOEM-2024-0020**.

5.1.3 Cooperating Agencies

As part of BOEM's announcement (89 FR 19354) for the Notice of Intent to prepare this EA, BOEM invited Tribal governments and federal, state, and local government agencies to consider becoming Cooperating Agencies in the preparation of this EA. CEQ regulations implementing the procedural provisions of NEPA define Cooperating Agencies as those with "jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative)" (40 CFR 1508.1(e)).

BSEE, NMFS, and USACE participated as Cooperating Agencies in the development of this EA. NPS and USFWS were Participating Agencies in the development of this EA.

5.2 Consultation and Coordination

5.2.1 Endangered Species Act

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 will initiate consultation with USFWS and NMFS for activities considered in this EA and species under their respective jurisdictions. The status of consultations for each of the agencies is described below.

U.S. Fish and Wildlife Service

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 Gulf of Maine. BOEM submitted the biological assessment to USFWS on June 3, 2024, to request concurrence with BOEM's determination that, given the small increase in vessel traffic and installation of met buoys, the Proposed Action *may affect, but is unlikely to adversely affect* ESA-listed bird and bat species.

National Marine Fisheries Service

BOEM prepared another biological assessment evaluating species and critical habitat under the jurisdiction of NMFS that could be affected by the Proposed Action. As described in the assessment, the

Proposed Action is subject to project design criteria and best management practices developed through programmatic consultation under Section 7 of the ESA regarding data collection and site survey activities for renewable energy on the Atlantic OCS (BOEM 2023f). Appendix A of the NMFS biological assessment contains an updated list of project design criteria and best management practices confirmed through consultation for the Proposed Action. BOEM submitted the biological assessment to NMFS on June 12, 2024, and request concurrence with BOEM's determination that the Proposed Action *may affect, but is unlikely to adversely affect* ESA-listed marine mammals, sea turtles, and fish species.

5.2.2 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 Part 600. BOEM will submit an EFH Assessment to NMFS that identifies potential adverse effects on designated EFH from activities described in the Proposed Action.

5.2.3 National Marine Sanctuaries Act

The National Marine Sanctuaries Act (NMSA) (16 U.S.C. § 1431 et seq.) provides NOAA's Office of National Marine Sanctuaries (ONMS) with authority to comprehensively manage uses of the National Marine Sanctuary System. Section 304(d) requires federal agencies to consult with the ONMS whether their proposed action is *likely to destroy, cause the loss of, or injure a sanctuary resource*. In addition, federal agencies are required to consult on proposed actions that *may affect* resources in the Stellwagen Bank National Marine Sanctuary (SBNMS). Site assessment and site characterization activities related to potential transmission cable routes may occur within the boundaries of SBNMS. (The SBNMS does not overlap within the WEA and therefore would not include installation of any met buoys.) These activities may involve conducting a prohibited activity as described in 15 CFR 922.142 (such as altering the seabed or discharging material or matter), and a sanctuary permit or authorization may be needed.

5.2.4 Coastal Zone Management Act

The Coastal Zone Management Act requires 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 Part 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 Gulf of Maine with the enforceable provisions of the Coastal Zone Management Programs of Maine, Massachusetts, and New Hampshire.

BOEM prepared a CD for each state under 15 CFR 930.33 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 Maine, Massachusetts, and New Hampshire 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 Massachusetts Ocean Sanctuaries Act (302 CMR 5.00)[2] is a part of the Massachusetts Coastal Zone Management Program and covers the Cape Cod Ocean Sanctuary, the Cape Cod Bay Sanctuary, the Cape and Islands Ocean Sanctuary, the North Shore Ocean Sanctuary, and the South Essex Ocean Sanctuary. Per 302 CMR 5.08, it prohibits any activity, use or facility associated with the generation, transmission, or distribution of power within the Cape Cod Ocean Sanctuary. In addition, 302 CMR 5.08 includes limitations on wastewater treatment facilities and discharges, laying of electric and telephone cables, and extraction of sand and gravel from the seabed and subsoil of ocean sanctuaries. For any site assessment and site characterization activities in cable route corridors, lessees would need to acquire all applicable certificates, licenses, permits, and approvals for allowable activities. (These ocean sanctuaries do not overlap with the Gulf of Maine WEA.)

5.2.5 Tribal Coordination and Government-to-Government Consultations with Federally Recognized Tribal Nations

BOEM recognizes the unique legal relationship of the United States with Tribal Nations as set forth in the U.S. Constitution, treaties, statutes, executive orders, and court decisions. BOEM is required to consult with federally recognized Tribal Nations if a BOEM action has Tribal implications, which are defined as any departmental regulation, rulemaking, policy, guidance, legislative proposal, grant-funding formula change, or operational activity that may have substantial direct effect on an Indian Tribe.

BOEM invited federally recognized Tribal Nations to be part of the Task Force and participate in the Task Force meetings in 2022 and 2023. Representatives from Shinnecock Indian Nation and Mashpee Wampanoag Tribe attended the May 19, 2022 Task Force meeting.

On December 12, 2022, BOEM staff met with Penobscot Nation representatives to discuss the two Gulf of Maine processes and learn more about the Tribe's concerns. Representatives raised concerns about impacts on anadromous fish, subsistence hunting and fishing rights, and environmental restoration. On April 20 and 21, 2023, BOEM's Director and Chief of the Office of Renewable Energy Programs met with Tribal leaders from Wampanoag Tribe of Gay Head (Aquinnah), Passamaquoddy Tribe, Pleasant Point and Indian Township, Narragansett Indian Tribe, Mashantucket (Western) Pequot Tribal Nation, Penobscot Indian Nation, Shinnecock Indian Nation, Mohegan Tribe of Connecticut, Houlton Band of Maliseet Indians, and Mashpee Wampanoag Tribe. The discussion focused on concerns about BOEM's offshore wind energy program, improving Tribal consultation and collaboration, the rapid pace of offshore wind development, and the Tribes' limited capacity to provide timely feedback.

At the May 10, 2023, Task Force meeting, Tribal representatives from the Passamaquoddy Tribe of Indians, Indian Township and Pleasant Point, Penobscot Nation, and Houlton Band of Maliseet Indians offered comments on BOEM's Gulf of Maine processes. Comments focused on the importance of involving Tribes in the process, seeking assurance that BOEM will properly identify and avoid submerged paleo-cultural heritage, concerns about potential increased use of a road leading to Eastport, concerns about having enough time and resources to engage in the process, and a strong desire to ensure no negative impacts on ecosystems and fishing livelihoods.

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[2] https://www.rockportharbormasters.org/cmr/302500.pdf.

On May 6, 2024, BOEM invited the following 11 federally recognized Native American tribes with ancestral ties to the region under consideration in the EA to participate in government-to-government consultation: Houlton Band of Maliseet Indians, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, Mi'kmaq Nation, Mohegan Tribe of Indians of Connecticut, Narragansett Indian Tribe, Passamaquoddy Tribe of Indians – Indian Township, Passamaquoddy Tribe of Indians – Pleasant Point, Penobscot Indian Nation, Shinnecock Indian Nation, and Wampanoag Tribe of Gay Head (Aquinnah).

In recognition of this special relationship, BOEM extended invitations to the same Tribal Nations for a government-to-government and Tribal Nation coordination meeting on June 13, 2024, regarding the May 1, 2024**,** Proposed Sale Notice and the Draft EA.

5.2.6 National Historic Preservation Act (Section 106)

Section 106 of the NHPA (54 U.S.C. § 306108) and its implementing regulations (36 CFR Part 800) require federal agencies to consider the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment. BOEM has determined that issuing commercial leases within the Gulf of Maine WEA and granting ROWs and RUEs within the region constitutes an undertaking subject to Section 106 of the NHPA and its implementing regulations, because the resulting site characterization and site assessment activities have the potential to cause effects on historic properties.

BOEM initiated consultation through letters on March 21, 2024, with the Maine State Historic Preservation Office (SHPO), Massachusetts SHPO, New Hampshire SHPO, ACHP, and the aforementioned list of 11 federally recognized Native American tribes. On June 6, 2024, the Passamaquoddy Tribe Joint Tribal Council accepted BOEM's invitation to participate as a Cooperating Tribal Nation during the preparation of the EA. No additional federally recognized Tribes have responded to express interest in consulting with BOEM; however, BOEM has elected to keep the remaining nine federally recognized Tribes informed of the Section 106 consultation process for this undertaking unless they respond to BOEM to opt out.

BOEM further identified potential consulting parties pursuant to 36 CFR 800.3(f) through its March 21, 2024 letter to over 100 entities—including federal and state agencies; local governments; state-recognized Tribes; and non-governmental organizations (NGOs) such as historical societies, museums, and historic preservation organizations—to notify and invite them to the Section 106 consultation; to solicit comment and input regarding the identification of, and potential effects on, historic properties for the purpose of obtaining consulting party review and input for the Section 106 review (36 CFR § 800.2(d)(3)); and to invite the recipients to participate as a consulting party.

Consistent with 36 CFR 800.4(d)(1), BOEM will prepare a Finding of No Historic Properties Affected for consulting parties, request concurrence on the finding from the Maine SHPO, and invite comments from other consulting parties. Per 40 CFR 800.4(d)(1)(i), "[i]f the SHPO/[Tribal Historic Preservation Officer], or the [Advisory] Council [on Historic Preservation] 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."

5.2.7 Clean Water Act and the Rivers and Harbors Act

The U.S. Army Corps of Engineers (USACE) issues permits for the discharge of dredged or fill material into waters of the United States under Section 404 of the Clean Water Act (33 CFR 323). Under Section 10 of the Rivers and Harbos Act (RHA), USACE issues permits for structures and/or work in or affecting navigable waters of the United States and for devices affixed to the seabed on the Outer Continental Shelf (33 CFR 322). USACE New England District has developed a set of regional general permits (GPs) for each state in New England to streamline the evaluation and approval process for certain types of activities that have only minimal adverse impacts, both individually and cumulatively, on the aquatic environment. Most site characterization and site assessment activities under the Proposed Action would be covered by GPs, in particular those for scientific measurement devices and survey activities. Massachusetts General Permit (MA GP) 14, New Hampshire General Permit (NH GP) 14, and Maine General Permit (ME GP) 17 all cover 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. MA GP 15, NH GP 15, and ME GP 18 all cover a variety of survey activities, including soil borings, 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. USACE indicated that site characterization and site assessment activities outlined in the EA that may require USACE authorization, such as met buoys, would likely qualify for these USACE GPs. An individual permit may be required from USACE if the proposed survey activities do not meet the terms and conditions of the GPs or if USACE determines that the survey activities would result in more than minimal adverse effects on the aquatic environment. In addition, Section 408 permission, pursuant to Section 14 of the RHA (33 U.S.C. 408), may be required for any proposed alterations that have the potential to modify, alter, or occupy any federally authorized civil works projects, including federal navigation projects.

Additionally, other federal, state, and local permits, approvals, or authorizations may also be required. SAPs submitted by lessees would identify the specific activities proposed to be conducted and the permit requirements applicable to the proposed activities.

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6 Preparers

Table 6-1. BOEM contributors

Name	Role/Resource Area
NEPA Coordinators	
Sangunett, Brandi	NEPA Compliance
Resource Scientists and Contributors	
Ajilore, Ololade	Navigation and Vessel Traffic
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Bigger, David	Birds and Bats
Chaiken, Emma	Demographics and Employment
Chaky, Sindey	Coastal Zone Management Act Compliance; Environmental Justice
Jensen, Brandon	Benthic Resources; Finfish, Invertebrates, and Essential Fish Habitat
Jensen, Mark	Demographics and Employment; Recreation and Tourism
Lewis, Jo’Anne	Navigation and Vessel Traffic
McCarty, John	Visual Resources
Schnitzer, LK	Cultural Resources; Tribal Nation Coordination
Hogan, Charissa	Air Quality; Water Quality
Price, Franklin	Section 106 and Cultural Resources
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Stromberg, Jessica	Chief, Environment Branch for Renewable Energy; NEPA Compliance

Table 6-2. Consultants

Name	Role/Resource Area
ICF	
Baer, Sarah	NEPA Support
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ODonnell, Megan	U.S. Fish and Wildlife Service Biological Assessment Lead and Coastal Zone Consistency Determination Lead
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Name	Role/Resource Area
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Fulling, Greg	NMFS Biological Assessment
Martin, Tony	Finfish, Invertebrates, and EFH Assessment Lead
McMahon, Adrianna	Benthic Resources
Murray, Deb	Document Processing
Orue, Rebeca	Marine Mammals; Sea Turtles
Pennell, Jeff	Finfish, Invertebrates, and EFH
Stevens, Tara	Project Manager; Marine Mammals; Sea Turtles; NMFS Biological Assessment
Tiggelaar, John	Commercial and Recreational Fishing

Appendix A: Vessel Trips and Scenarios

This appendix provides the Proposed Action scenario assessed in the Gulf of Maine Commercial Lease 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, and timing of some surveys. Vessels provided in this appendix are a total across all assumed 15 lease areas, but calculations in the EA consider vessel traffic split across two phases of leasing (up to 10 leases issued in 2024 and up to 5 leases issued in 2028).

Table A-1. Summary of high-resolution geophysical survey calculations for the Commercial Lease WEA

Location	Vessel Type[a]	% Survey Activity by Vessel Type[a]	Kilometers	Hours	Days	Months	Distance (km) Transited to/from Shore Monthly[b]	Vessel Trips
Grand Total Export Cable Routes	24-hr vessel	70%	176,469.05	21,147.59	882.27	29.41	39,308.14	30
	12-hr vessel	30%	75,629.59	9,074.82	756.24	25.21	N/A	757
Grand Total Wind Energy Area	24-hr vessel	100%	383,233.40	45,984.33	1916.01	63.87	85,364.51	64
Grand Combined Totals			**635,332.04**	**76.233.75**	**3,554.52**	**118.48**	**124,672.65**	**851**

hr = hour; km = kilometer; m = meter; WEA = Wind Energy Area

[a] It is assumed that nearshore work (i.e., portions of the cable route corridor surveys) could use 12-hour vessels (vessels that work for 12 hours per day), but WEA surveys would use 24-hour vessels (vessels that work for 24 hours per day).

[b] 24-hour vessels only

Assumptions:
Transit Speed = 18.52 km/hr (10 knots).
Survey Speed = 8.334 km/hr (4.5 knots).
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 WEA 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-Hour Day	979	33
20 Benthic Samples per 24-Hour Day	309	10

Assumptions:
24-hour vessels would be used, with trips lasting 30 days each.
BOEM assumes wind turbine generator sample locations would be spaced 1 nautical mile apart. BOEM does not have data to support an assumption for spacing between floating wind structures. Therefore, assumptions (including spacing values and subsequent assumptions based on spacing values) are based on fixed, not floating, wind turbine generators.
BOEM assumes on average there would be three anchors per floating wind turbine generator, and therefore has estimated three geotechnical samples at every potential wind turbine location.

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

m^2 = square meters

Number of Samples

Four geotechnical samples (vibracore, CPT, and/or deep boring) at every potential wind turbine location and transmission station location	3,645
One geotechnical sample (vibracore, CPT, and/or deep boring) every kilometer of transmission cable corridor	6,149
One benthic sample every kilometer of transmission cable corridor	6,149
One benthic sample at each buoy site	30
TOTAL	**15,972**

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

	Installation			
	Number of Leases	# Buoys per Lease	Round Trips for Construction per Buoy	Total Round Trips
Low Estimate	15	2	1	30
High Estimate	15	2	2	60

	Maintenance – Quarterly/ Monthly					
	Number of Leases	# Buoys per Lease	Years	# Visits	Years	Total Trips
Low Estimate	15	2	5	4	5	300
High Estimate	15	2	5	12	5	900

	Decommissioning			
	Number of leases	# Buoys	Round Trips for Construction per Buoy	Total Round Trips
Low Estimate	15	2	1	30
High Estimate	15	2	2	60

Total		
Alternative	Low Estimate	High Estimate
B	360	1,020

BOEM acknowledges that while an individual Gulf of Maine lessee may opt to carry out biological surveys, including fisheries surveys, to characterize resources in their lease area to inform their COP development, there is not an affirmative requirement to carry out any biological surveys nor fisheries survey plans yet developed, thus any such surveys are not reasonably certain to occur and effects at this time are unknowable. Therefore, entanglement risk associated with fisheries surveys is not considered in this EA. A condition of the proposed lease would require appropriate consultation prior to carrying out any such fisheries surveys. However, BOEM has used potential biological survey types and frequency to estimate vessel traffic associated with future surveys in order to estimate impacts associated with vessel traffic (e.g., air emissions, impacts to navigation).

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

Survey	Vessel Days/Lease	Vessel Days/WEA
1. Trawl	40	600
2a. Gill net	48	720
2b. Beam trawl	24	360
3. Ventless trap	16	240
4. Molluscan shellfish	Concurrent with Benthic	Concurrent with Benthic
TOTAL	128	1920

Assumptions:

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

Vessel trips are counted as one vessel trip per vessel day for the purposes of analysis.

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 + 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

<u>a. Gill net:</u>

- 2 years x 2 quarters (spring and fall) x 3 events/quarter = 12 surveys
- 6 samples per survey = 72 samples
- Vessel trips = 2 days round trip + 2 day (1–2 days) on site = 4 days per survey
- 4 days/survey x 12 surveys = 48 vessel days

<u>b. Beam trawl (might be able to piggyback with trawl survey):</u>

- 2 years x 4 quarters = 8 surveys
- 6 samples/survey = 48 samples
- Vessel trips = 2 days round trip + 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 round trip (day 1 travel and set, 3 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[a] = 417 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[a] = 417 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

km = kilometer

[a] Round trip distance is calculated as the average distance from the potential ports identified in Chapter 2.

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.*

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Appendix B: Resources Eliminated from Detailed Consideration and Assessment of Resources with Negligible Impacts

B.1 Introduction

This appendix describes resources eliminated from detailed consideration and provides an assessment of resources with negligible impacts from implementation of the Proposed Action. **Chapter 3, Section 3.2** of the Environmental Assessment (EA) provides the impact level determinations used to characterize the environmental impacts.

B.2 Resources Eliminated from Further Consideration

The National Environmental Policy Act (NEPA) employs a scoping process to determine which environmental issues warrant analysis in detail and which issues can be eliminated from detailed analysis, thereby narrowing the scope of the EA to those issues most relevant to the decision. Scoping includes both internal scoping with Bureau of Ocean Energy Management (BOEM) subject matter experts and cooperating agencies and public scoping with other interested parties. Some resources were not carried forward for analysis in the EA because impacts on those resources from the Proposed Action are anticipated to be negligible or lower. Details on the analysis for these resources are described in this appendix. However, the resources listed here may be within the scope of analysis for future actions, such as the construction and operation of wind energy-related research facilities.

B.2.1 Bats

Bat activity in the Atlantic Coast has declined dramatically 11 nautical miles (nm) (20.3 kilometers [km]) from shore (Sjollema et al. 2014), and it is generally considered unlikely that any bats would travel 15 nm (27.8 km) or more from land over open water to forage (Peterson 2016; Sjollema et al. 2014). The nearest shoreline and mainland areas from the Wind Energy Area (WEA) boundary are 20 nm (37 km) away. Although bats are rare in the WEA, bats could have avoidance or attraction responses to the survey vessels and meteorological (met) buoys due to noise, lighting, and the possible presence of insects. Due to the scarcity of bats offshore in the WEA, the limited amount of added vessel traffic (relative to existing traffic described in EA **Chapter 3, Section 3.3.5**), and relatively small number of buoys installed in relation to the total WEA, collisions between bats and boats or meteorological buoys are extremely unlikely. There also may be temporary impacts on bats from operational noise and human activity during survey operations near coastal areas or the offshore export cable route; however, these operations would be temporary, infrequent, localized around existing ports, and substantially similar to existing vessel traffic and operations. Therefore, the overall impact of activities associated with the Proposed Action would be negligible. The U.S. Fish and Wildlife Service (USFWS) Biological Assessment (BA) prepared in association with this EA provides additional evaluation of potential impacts on northern long-eared bats (*Myotis septentrionalis*) and tricolored bats (*Perimyotis subflavus*) (BOEM 2024). The BA concluded that the Proposed Action *may affect but is not likely to adversely affect* all listed bat species in the WEA.

B.2.2 Birds

The Atlantic Coast is a major flyway for birds, including terrestrial species, shorebirds, waterbirds, and marine birds. Fifteen special-status birds regularly migrate through Maine (Maine Department of Inland Fisheries and Wildlife 2023). Relative to existing vessel traffic in the Gulf of Maine, the Proposed Action would introduce a small number of vessels over the timeframe of the Proposed Action. BOEM anticipates that up to 3,996 round trips of various vessel types may occur as a result of the activities covered in this EA (2,664 during Phase 1 and 1,332 during Phase 2), with up to 30 met buoys anticipated to be installed in the leases in the WEA. Impacts could include the effects associated with light, noise (from vessels, aircraft, and equipment), vessel traffic, installation of met buoys, and non-routine events. However, given the limited contribution to existing vessel traffic, and that only a limited number of buoys would be installed in relation to the size of the WEA, overall impacts on birds would be negligible. Additionally, lessees would be required to abide by the Standard Operating Conditions (SOCs) for birds (EA **Chapter 4, Section 4** and **Appendix H**) to reduce the potential for the Proposed Action to adversely affect this resource. The BA prepared in association with this EA to the USFWS provides additional evaluation of the potential impacts on roseate terns (*Sterna dougallii dougallii*); the BA concluded the Proposed Action *may affect, but is not likely to adversely affect* roseate terns (BOEM 2024c).

B.2.3 Coastal Habitats

The nearest shoreline from the WEA boundary is approximately 20 nm (37 km) away. Most vessel traffic from site assessment and site characterization activities would be concentrated around this area and would have no direct impacts on coastal habitats. Nearshore vessel traffic for some surveys (e.g., of potential export cable routes) and transiting to and from ports would be temporary, infrequent, and have minimal potential to affect coastal habitats in already heavily used port areas. No expansion of these ports is expected in support of the Proposed Action, and no direct impacts on coastal habitats are anticipated from routine activities associated with site assessment and site characterization activities, 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 lower given the small amount of added vessel traffic to existing traffic in the area.

B.2.4 Coastal Infrastructure

Existing commercial ports, harbors, or industrial areas composing the coastal infrastructure would be used for the Proposed Action, primarily for loading and unloading equipment from vessels and vessel moorage and passage. Activities associated with the Proposed Action would not require additional coastal infrastructure to be constructed or expansion of existing ports. There would be no impacts on coastal infrastructure because the existing infrastructure and facilities would be adequate to accommodate Proposed Action activities.

B.2.5 Demographics and Employment

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 Gulf of Maine. No port expansion or construction or operation activities are a part of the Proposed Action. In an evaluation of geological and geophysical activities in the Mid- and South Atlantic, BOEM concluded that renewable energy site assessment and characterization surveys are likely to be conducted by existing engineering or oceanographic/environmental firms, with little or no new employment (BOEM 2014). Vessel crews generally range from 10 to 20 people, so even some new employment would likely result in a small number of new workers directly employed for site assessment and site characterization activities and therefore would not have a perceptible impact on local employment and demographic characteristics, such as population. Additionally, some site characterization surveys are likely to be conducted by contracted commercial fishing vessels and crews, which may result in economic benefits to local business and income but are unlikely to generate additional long-term employment opportunities. BOEM expects any beneficial impacts on employment, population, and the local economies in and around the port to be short term and imperceptible; therefore, impacts would be negligible.

B.2.6 Environmental Justice

Based on the distance of the nearest shoreline from the WEA boundary (20 nm or 37 km) and the negligible impacts of the Proposed Action on demographics and employment, site assessment and site characterization activities would not result in disproportionate and adverse environmental or health effects on minority or low-income populations. Only the use of existing coastal facilities has the potential to affect minority or low-income populations. However, existing coastal facilities in the Gulf of Maine would support proposed activities without any need for expansion. There would be no impacts on environmental justice communities 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.

B.2.7 Visual Resources

The potential impacts on visual resources associated with site assessment and site characterization activities would be negligible. The WEA boundary is approximately 20 nm (37 km) or farther from the nearest shoreline, and the small number (30) of met buoys, which would be the only continuously moored equipment, would not be distinguishable from a vessel at those distances because it would sit only a few meters above the waterline. There would be a relatively small amount of vessel traffic associated with the Proposed Action (0.25% to 0.275% of average annual vessel traffic across the geographic analysis area; see EA **Chapter 3, Section 3.4.4**), and vessels used for site characterization and investigation are typically of comparatively smaller size (overall vessel lengths ranging from 3 to 80 meters). Given the distance of the WEA from shore, no new coastal infrastructure would be necessary, and the relatively small amount of vessel traffic associated with the Proposed Action, visual impacts on 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. Therefore, impacts on visual resources would be negligible.

B.3 Alternative A – No Action Alternative and Affected Environment

B.3.1 Air Quality and Greenhouse Gas Emissions

Air quality within a region 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 (USEPA) pursuant to the Clean Air Act (CAA) (42 U.S.C. 7409) to be protective of human health and welfare. The NAAQS have been established in 40 CFR 50 for each of the six criteria pollutants: sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), particulate matter with a diameter less than or equal to 10 (PM_{10}) and particulate matter with a diameter less than 2.5 micrometers ($PM_{2.5}$), and lead. O_3 is not emitted directly but forms in the atmosphere from precursor pollutants such as nitrogen oxides (NO_X) and volatile organic compounds (VOCs) in the presence of sunlight.

When the monitored pollutant levels in an area exceed the NAAQS for any pollutant, USEPA designates the area as being in "nonattainment" for that pollutant, requiring the development of a State Implementation Plan (SIP) to improve air quality in the area. To redesignate an area as "maintenance," the State is responsible for submitting a redesignation request along with an approved maintenance plan that meets the requirements of CAA Section 175A. USEPA will redesignate a nonattainment area as a "maintenance area" once it meets the standards and additional redesignation requirements in CAA Section 107(d)(3)(E).

The following coastal counties in Massachusetts, New Hampshire, and Maine are nearest the WEA.

- Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, and Suffolk in Massachusetts
- Rockingham and Strafford in New Hampshire
- Androscoggin, Cumberland, Hancock, Kennebec, Lincoln, Sagadahoc, and York in Maine

All coastal counties nearest the WEA are currently designated as unclassifiable or attainment for all criteria pollutants, except Rockingham County, New Hampshire, which is designated as maintenance for the 2010 SO_2 NAAQS, and Dukes County, Massachusetts, which is designated as nonattainment (marginal) for the 2008 O_3 NAAQS (USEPA 2023, 2024b, 2024c, 2024d).

Federal Class I Areas

CAA Section 162(a) establishes air quality protections against degradation for designated federal Class I areas such as national parks, national wilderness areas, and national monuments. Class I areas consist of national parks larger than 6,000 acres and wilderness areas larger than 5,000 acres that were in existence before August 1977. Federal land managers identify a Class I area's air quality–related values (AQRVs) and evaluate the potential for projects to cause or contribute to adverse impacts on AQRVs. Federal land managers must be notified of facilities that will be within 62 miles (100 km) of a Class I area. The Class I area closest to the WEA is Acadia National Park, which is approximately 47 miles (75 kilometers [km]) from the WEA. It is not anticipated that activities in or near the WEA would affect visibility in Acadia National Park.

Climate Change

Climate change is a global issue that results from the increase in greenhouse gases (GHGs) in the atmosphere. The Intergovernmental Panel on Climate Change released its Sixth Assessment Report, summarizing the state of knowledge of climate change, its widespread impacts and risks, and climate change mitigation and adaptation (IPCC 2023). The report found that, under the current nationally determined contributions of mitigation from each country until 2030, average global temperature is expected to rise to approximately 3 degrees Celsius (°C) by 2100 and continue rising afterward (IPCC 2023). Climate-related risks depend on the rate, peak, and duration of global warming. Increased average global temperatures correspond to more significant risks associated with climatic changes, such as extreme weather and drought; global sea level rise; impacts on terrestrial ecosystems; impacts on marine biodiversity, fisheries, and ecosystems and their functions and services to humans; and impacts on health, livelihoods, food security, water supply, and economic growth.

The most recent available data on GHG emissions in the United States indicate that annual emissions in 2022 were an estimated 6,341,200 metric tons (USEPA 2024a). Additional information about the impacts of climate change is presented in **Appendix D, Section D.2.8**.

Under Alternative A, no commercial leases would be issued, and site assessment activities undertaken by lessees would not occur within the identified WEA of the Gulf of Maine. Although some site characterization surveys and site assessment activities could still be conducted under Alternative A, these activities are less likely to occur without a commercial wind energy lease. As a result, there would be no effects on air quality. However, BOEM expects ongoing and reasonably foreseeable planned activities, such as other wind energy development activities and global climate change, to have continuing regional air quality impacts over the timeframe considered in the EA (**Appendix D, Section D.2**). Over the timeframe considered in this EA, local impacts on air quality 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 air quality stem from vessel traffic.

Ongoing and reasonably foreseeable planned wind energy development activities could result in increased vessel traffic resulting in increased air emissions and impacts on regional air quality. These activities could also lead to reduced emissions from fossil-fuel power-generating facilities and result in beneficial impacts on regional air quality. However, fossil-fuel energy facilities may increase in number and level of pollution-generating activities or remain operational to meet future increases in power demand and would likely be fired by natural gas or oil. Considering all IPFs together, BOEM anticipates that the ongoing and reasonably foreseeable planned actions in the geographic analysis area may result in **minor** adverse impacts due to criteria pollutant emissions.

B.3.2 Water Quality

Water quality in the Gulf of Maine is affected by contaminants entering the marine environment through various sources, including point source and non-point source discharges. Water quality is generally good in most coastal and marine waters of Maine due to mixing action from large tides. However, naturally warmer shallow waters that received contaminated runoff and discharge and that experience less tidal mixing, are more vulnerable to degradation.

The Maine Department of Environmental Protection, Marine Environmental Monitoring Program was established in 1991 to monitor the “extent and effect of industrial contaminants and pollutants on marine and estuarine ecosystems and to determine compliance with and attainment of water quality standards” (38 Maine Revised Statutes 410-F). The state has three water quality classes that establish goals for and direct management of marine and estuarine waters—SA, SB, and SC—listed in order from the highest-quality goal and most resiliency to degradation to the lowest-quality goal and least resiliency to degradation (38 Maine Revised Statutes 465-B). Based on monitoring of ambient water quality, nutrients, and eutrophication indicators, the majority of marine and coastal waters are classified as SB, with waters intermittently classified as SA (highest-quality goal) along less-developed portions of the Gulf of Maine coastline and islands, and localized areas at the outlets of industrialized or nutrient-rich watersheds classified as SC (lowest-quality goal) (Maine Department of Environmental Protection 2023). In accordance with Section 305(b) of the Clean Water Act, the Maine Department of Environment Protection also assesses the condition of water bodies in Maine and assigns each to one of five categories, different from water quality classes described above, based on the most recent available water quality data. Category 1 represents waters attaining all designated uses, and Category 5 represents waters listed as impaired or threatened under Section 303(b) requiring development of a Total Maximum Daily Load calculation to determine pollution reduction targets. Based on monitoring data collected in calendar years 2013 through 2020 and presented in the 2018/2020/2022 Integrated Report, the Maine Department of Environment Protection categorized the majority of estuarine and marine waters as Class II: attaining some designated uses, and insufficient or no data to determine if remaining uses are attained (with the presumption that all uses are attained) (Maine Department of Environmental Protection 2022). The Class II estuarine and marine waters include 86.4 percent of 2,884 square miles (7,470 km^2) assessed that are designated for shellfish harvest, 99.5 percent of 2,889 square miles (7,482 km^2) assessed that are designated for all other uses, and 99 percent of 39 miles (63 km) assessed that are coastal designated beaches. Only 1.3 percent of shellfish harvest waters, 0.3 percent of all other use waters, and 2 percent of coastal designated beaches were classified as impaired or threatened (Category 5) (Maine Department of Environmental Protection 2022).

The Gulf of Maine has experienced rapid increases in sea surface temperatures greater than much of the global ocean, likely due to increased atmospheric GHG concentrations and changes in western North Atlantic circulation (Whitney et al. 2022). Water quality in the Gulf of Maine is influenced by other compounding effects of global climate change, such as acidification, as summarized in **Appendix D, Section D.2.8**.

B.3.3 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 118 finfish families consisting of 252 species (Collette and Klein-MacPhee 2002). This estimate of finfish is limited to a 275-meter (902-foot) bathymetric contour initially set by Bigelow and Schroeder (1953). The Gulf of Maine contains approximately 2,645 named invertebrate species (Incze et al. 2010). Many finfish and invertebrate species found in the Gulf of Maine are important due to their value as commercial and recreational fisheries (EA **Chapter 3, Section 3.3.6**). NOAA Fisheries ESA-listed endangered finfish species inhabiting the Gulf of Maine include the Atlantic salmon Gulf of Maine distinct population segment (DPS) and the shortnose sturgeon. Fish species that are listed as threatened include the Gulf of Maine DPS of Atlantic sturgeon and oceanic whitetip shark.

Several managed invertebrate species occur in the geographic analysis area, including American lobster, ocean quahog (*Arctica islandica*), Atlantic sea scallop, red crab (*Chaceon quinquedens*), Jonah crab (*Cancer borealis*), northern shrimp (*Pandalus borealis*), surfclam (*Spisula solidissima*), shortfin squid (*Illex illecebrosus*), and longfin squid (*Doryteuthis [Amerigo] pealeii*). Other invertebrates, such as copepods, krill, amphipods, isopods, ostracods, mysid shrimp, and unclassified mollusks, are managed under the Mid-Atlantic Fishery Management Council's 2016 Unmanaged Forage Species Omnibus Amendment (Mid-Atlantic Fishery Management Council 2017). These managed invertebrate species are important components of the food webs within the offshore and nearshore ecosystems (Malek et al. 2016; Willis et al. 2017).

The Magnuson-Stevens Fishery Conservation and Management Act (1976) set in place multiple mandates related to the collection of science-based fisheries data, fisheries management, and conservation of aquatic resources for the preservation of commercial and recreational fisheries resources. It requires federal agencies to consult with the Secretary of Commerce, through NMFS, on "any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any essential fish habitat" (16 United States Code [U.S.C.] 1855(b)(2)). This process is guided by the requirements of the essential fish habitat (EFH) regulation at 50 CFR 600.905.

Each Fishery Management Plan must identify and describe EFH for the managed fishery, and the statute defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (16 U.S.C. 1853(a)(7) and 1802(10)). NOAA's regulations further define EFH, adding the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem and clarifying "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle and includes direct and indirect effects. The EFH final rule also states that the loss of prey may have an adverse effect on EFH and managed species. As a result, actions that reduce the availability of prey species, either through direct harm or capture or through adverse impacts on the prey species' habitat, may also be considered adverse effects on EFH. EFH for fish and shellfish resources of the geographic analysis area as depicted in (**Appendix D, Figure D-1**), was characterized using broad ecological/habitat categories: soft bottom, hard bottom, and pelagic. The EFH Assessment prepared in association with this EA lists the life stage composition and distribution within each ecological/habitat category (BOEM 2024d).

The geographic analysis area primarily includes EFH for soft-bottom associated species (Atlantic sea scallop, squids, bluefish, hakes, skates, cod, and flatfishes) and several highly migratory species such as Atlantic salmon (*Salmo salar*), albacore tuna (*Thunnus alalunga*), Atlantic bluefin tuna (*T. thynnus*), skipjack tuna (*Katsuwonus pelamis*), and sharks including basking shark (*Cetorhinus maximus*), blue shark (*Prionace glauca*), common thresher (*Alopias vulpinus*), sand tiger (*Carcharias taurus*), smoothhound shark complex (*Mustelus* spp.), white shark (*Carcharodon charcharias*), and porbeagle (*Lamna nasus*).

Habitat areas of particular concern (HAPCs) within the Gulf of Maine (**Figure B-1**) include Jeffreys Ledge/Stellwagen Bank, Cashes Ledge, Great South Channel Juvenile Cod, Inshore Juvenile Cod, Northern Edge Juvenile Cod, and summer flounder submerged aquatic vegetation nursery areas, such as eelgrass. HAPCs for highly migratory species include the Sand Tiger Shark (Plymouth-Duxbury-Kingston Bay) HAPC.

The Jeffreys Ledge/Stellwagen Bank HAPC is within the Stellwagen Bank National Marine Sanctuary and is a diverse marine habitat formed during glacial geomorphological forming processes and includes gravel/cobble substrates, boulder reefs, sand plains, and deep mud basins (NEFMC 2017). This dual HAPC is an important habitat and fishing ground for Atlantic cod (EFH managed species), haddock (EFH managed species), pollock (EFH managed species), cusk, hake (red, white, and silver hake EFH), flounders (winter, windowpane, yellowtail, and witch flounder EFH), herring (Atlantic herring EFH), and Atlantic mackerel (EFH managed species [NEFMC 2017]).

The Cashes Ledge HAPC is a unique marine habitat comprised of a series of rocky pinnacles that form a relatively shallow habitat where kelp occurs in high abundance and provides important habitat for cod (EFH managed species), wolffish, pollock (EFH managed species), and sharks (porbeagle, basking, and common thresher EFH) and is closed to many types of fishing (NEFMC 2017).

The Great South Channel Juvenile Cod HAPC contains structurally complex gravel, cobble, and boulder habitat which provides important food sources and shelter for juvenile cod (NEFMC 2017).

The NOAA-designated HAPC for inshore juvenile Atlantic cod extends from the shoreline to 66 feet (20 meters) throughout the geographic analysis area along the coasts of Maine, New Hampshire, and Massachusetts (**Figure B-1**). Juvenile cod habitat is defined as structurally complex benthic habitat, such as eelgrass beds, algae, rocky benthic habitat, and contiguous sandy habitats that support a diverse emergent epifauna and benthic invertebrates assemblage (NEFMC 2017).

The Northern Edge Juvenile Cod HAPC is located at the far eastern edge of the geographic analysis area, along the northern edge of the Georges Bank. This area comprises a bottom of gravel pavement habitat, which has been identified as an important habitat type for juvenile cod survival and is closed to many types of fishing (NEFMC 2017).

HAPCs for summer flounder include native species of macroalgae, seagrasses (eelgrass), 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 of seagrass and macroalgae have been eliminated from an area, exotic aquatic plant species are included as HAPC (MAFMC 1998, 2016).

The designated Sand Tiger Shark HAPC is in the southwestern corner of the geographic analysis area, in the vicinity of Plymouth, Massachusetts. Studies suggest that the area is a seasonal nursery area for juvenile sand tiger sharks (NEFMC 2017).

Three canyon HAPCs fall within the geographic analysis area. These canyons are located south of the Georges Bank and offshore of the Mid-Atlantic Bight, along the southern limit of the geographic analysis area. These canyon HAPCs include Heezen Canyon HAPC, Hydrographer Canyon HAPC, and Lydonia, Gilbert, and Oceanographer Canyons HAPC. These HAPCs are geologically diverse areas that provide nursery habitat for several species, including lobster, crabs, tilefish, and hake, and extend to a maximum depth of 4,921 feet (1,500 m).

Within the geographic analysis area are two HAPCs for golden tilefish. These include the Lydonia Canyon HAPC and the Oceanographer Canyon HAPC. These areas are clay outcrops that provide habitat for juvenile and adult golden tilefish and are located between 328 to 984 feet (100 and 300 m).

Within the Gulf of Maine and the geographic analysis area, New England Fishery Management Council (NEFMC) and NOAA Fisheries have designated multiple Habitat Management Areas (HMAs) and fishery closure areas. The HMAs and fishery closure areas shown on **Figure B-1** are the Western Gulf of Maine HMA/Groundfish Closure Area and the Western Gulf of Maine Shrimp Exemption Area; the Jeffreys Bank and Eastern Maine HMAs; the Great South Channel HMA; the Western Gulf of Maine and Closed Area II Groundfish Closure Areas; and the Fippennies Ledge, the Cashes Ledge HMA and Groundfish Closure Area, and the Ammen Rock HMA. As depicted on **Figure B-1**, the geographic analysis area overlaps all of these areas. Potential impacts on HMAs would be in those areas that might be crossed by potential cable routes and survey areas. HMAs that could be impacted include the Eastern Maine HMA, the Jeffreys Bank HMA, the Cashes Ledge HMA and Groundfish Closure Area, the Ammen Rock HMA, the Fippennies Ledge HMA, the Western Gulf of Maine HMA/Closure Area, and the Western Gulf of Maine Shrimp Exemption Area. Other potential impacts on HMAs would be in the Gulf of Maine Cod Protection Closure areas. The Cod Protection Closure Areas are sectors of the Gulf of Maine that extend to and encompass the coastal and nearshore areas (NOAA Fisheries 2022a). The areas are closed during various periods throughout the year to support Atlantic cod recovery efforts. The other HMAs would be outside of any potential survey areas and would not be impacted.

Estuarine (inshore) portions of the geographic analysis area are characterized mostly by sedimentary soft-bottom habitat but also support salt marshes, oyster reefs, and mussel beds, as well as stands of eelgrass and kelp beds (Stevenson et al. 2014). Fish and invertebrates segregate into these habitats by species and life stages. Managed species present in inshore waters include cod, little skate, pollock, hakes, and flounders (Stevenson et al. 2014). 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 (*Anchoa mitchilli*), Atlantic herring (*Clupea harengus*), Atlantic menhaden (*Bevoortia tyrannus*), butterfish (*Peprilus triacanthus*), killifishes, and Atlantic silversides (*Menidia menidia*) (Lapointe 2013; Raposa and Schwartz 2009).

Finfish, invertebrates, and EFH in the Gulf of Maine are subject to pressures from ongoing activities, especially harvest, bycatch, dredging and bottom trawling, and climate change (NOAA Fisheries 2023; Gustavson 2011; Lapointe 2013). As discussed in **Section B.3.1**, climate change is also predicted to affect U.S. Northeast fishery species (Hare et al. 2016) and the Gulf of Maine particularly; some stocks may increase 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 (sea scallops), disturbs seafloor habitat on a recurring basis. 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 Gulf of Maine (December 2022), seven managed species were reported as overfished (NOAA Fisheries 2022b). These included herring (northwestern Atlantic coast stock), cod (Georges Bank and Gulf of Maine stocks), halibut (northwestern Atlantic coast stock), red hake (*Urophycis chuss*) (Southern Georges Bank/Mid-Atlantic stock), and witch flounder (*Glyptocephalus cynoglossus*) (northwestern Atlantic coast stock).

Finfish, invertebrates, and EFH are also subject to noise sources. The most widespread and persistent source is vessel noise. Avoidance of vessels and vessel noise has been observed in several pelagic, schooling fishes, including Atlantic herring (Vabo et al. 2002), Atlantic cod (Handegard et al. 2003) and others (reviewed in De Robertis and Handegard [2013]). Fish may dive toward the seafloor, move horizontally out of the vessel's path, or disperse from their school (De Robertis and Handegard 2013). These types of changes in schooling behavior could render individual fish more vulnerable to predation, but are unlikely to have population-level effects. A body of recent work has documented other, more subtle behaviors in response to vessel noise, but it has focused solely on tropical reef-dwelling fish. For example, damselfish antipredator responses (Ferrari et al. 2018; Simpson et al. 2016) and boldness (Holmes et al. 2017) seem to decrease in the presence of vessel noise, while nest-guarding behaviors seem to increase (Nedelec et al. 2017). There is some evidence of habituation, though: Nedelec et al. (2016) found that domino damselfish increased hiding and ventilation rates after two days of vessel sound playbacks, but responses diminished after one to two weeks, indicating habituation over longer durations.

The limited research on invertebrates' response to vessel noise has yielded inconsistent findings thus far. Some crustaceans seem to increase oxygen consumption (crabs: Wale et al. [2013]) or show increases in some hemolymph (an invertebrate analog to blood) biomarkers like glucose and heat-shock proteins, which are indicators of stress (spiny lobsters: Filiciotto et al. [2014]). Other species (American lobsters and blue crabs) showed no difference in hemolymph parameters but spent less time handling food, defending food, and initiating fights with competitors (Hudson et al. 2022). While there does seem to be some evidence that certain behaviors and stress biomarkers in invertebrates could be negatively affected by vessel noise, it is difficult to draw conclusions from this work because it been limited to the laboratory and, in most cases, did not measure particle motion as the relevant cue.

The planktonic larvae of fishes and invertebrates may experience acoustic masking from continuous sound sources like vessels. Several studies have shown that larvae are sensitive to acoustic cues and may use these signals to navigate toward suitable settlement habitat (Montgomery [2006]; Simpson et al. [2005]), to stimulate metamorphosis into their juvenile forms (Stanley et al. 2012), or even to maintain group cohesion during their pelagic journey (Staaterman et al. 2014). However, given the short range of such biologically relevant signals for particle motion-sensitive animals (Kaplan and Mooney 2016), the spatial scale at which these cues are relevant is rather small. If vessel transit areas overlap with settlement habitat, it is possible that vessel noise could mask some biologically relevant sounds (e.g., Holles et al. [2013]), but these effects are expected to be short-term and would occur over a small spatial area.

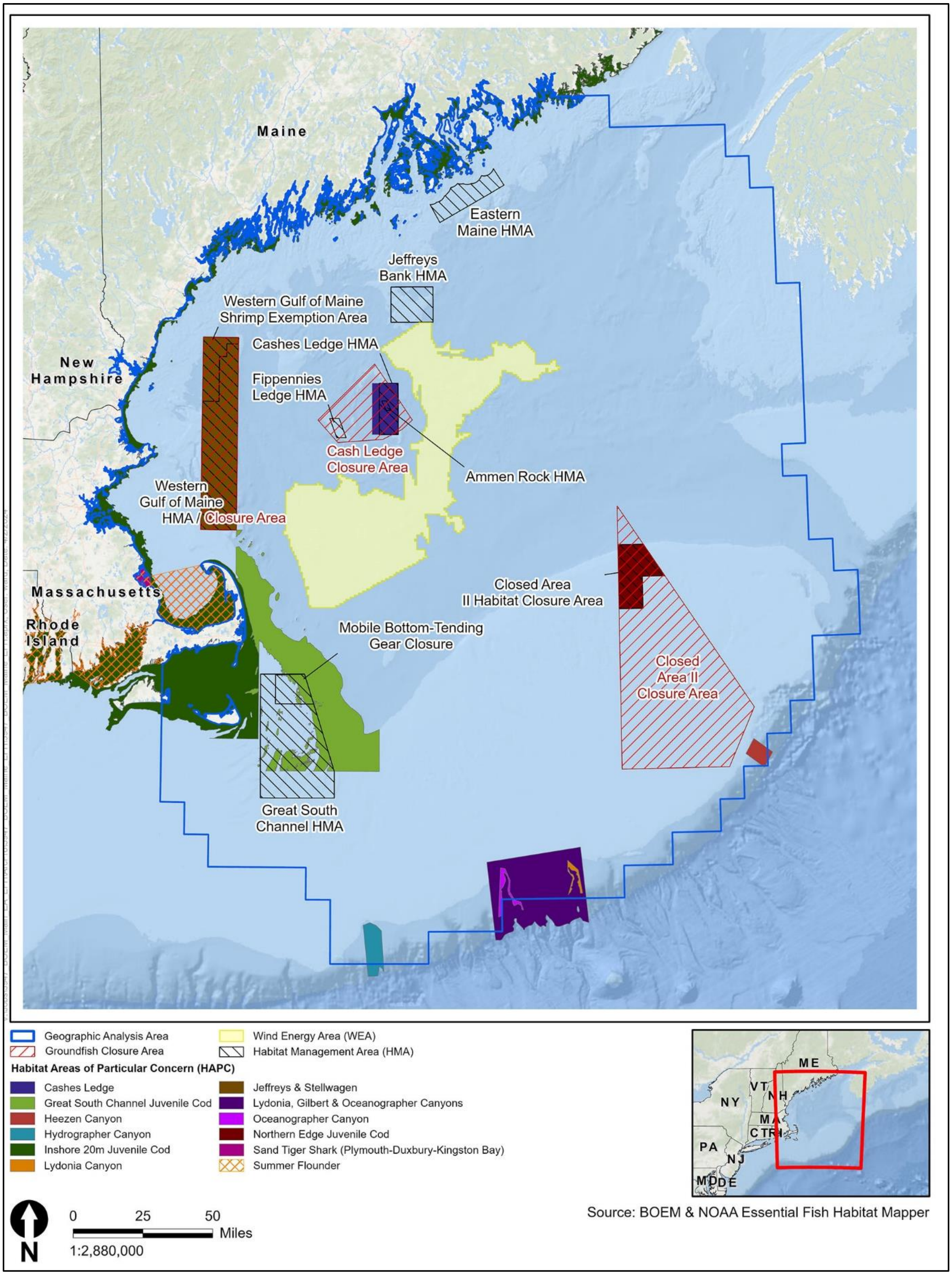

Figure B-1. Habitat Areas of Particular Concern in the vicinity of the WEA within the Gulf of Maine

B.3.4 Military Use

Eight military danger zones and restricted areas, areas where general use by the U.S. government may limit public access, exist within the Gulf of Maine: a 1.5-nm (2.8-km) radius circle just easterly of Seal Island, Maine used as a naval aircraft bombing target area; a rectangular danger zone off Cape Small, Maine used as a naval aircraft practice mining range area; a 1-nm (1.8-km) radius circle 7.9 nm (14.6 km) from Pemaquid Point, Maine used as a naval sonobuoy test area; a 0.25-nm (0.45-km) radius circle centered on Shag Rock in the vicinity of Duck Island, Maine, used as a naval aircraft bombing target; a 0.5-nm (0.93-km) radius circle in Cape Cod Bay, Massachusetts used as a naval aircraft bombing target area; an almost rectangular area surrounding Nomans Island, Massachusetts used for naval operations; and two restricted areas within and just outside of Narragansett Bay, Rhode Island (33 CFR Part 334.10–40, 334.60-82). **Figure B-2** shows the locations of military use areas in relation to the Gulf of Maine Wind Energy Area.

Two surface and subsurface operating areas are present in the geographic analysis area. The Boston Range Complex off the coast of Maine, New Hampshire, and Massachusetts is used for U.S. Navy fleet training and testing activities and consists of associated special use airspace. The Narragansett Bay Complex located in waters adjacent to the Rhode Island and Long Island, New York coasts is used as an exercise and operating area. Airspace Warning Areas W-104A and W-104B/W-104C overlap with the Gulf of Main Wind Energy Area (U.S. Navy 2013). Additionally, within the geographic analysis area, W-103 and W-102L/W-102H are present off the coast of Maine, and W-105A and W-506 are offshore Massachusetts and Rhode Island.

Additional activities in the region include the U.S. Navy sea trials of Arleigh Burke-class destroyers that include a series of in-port and at-sea demonstrations to assess the ship's systems and take place in the vicinity of Bath, Maine and offshore in the Gulf of Maine. Six Arleigh Burke-class destroyer vessels are under contract to be built in a shipyard in Bath, Maine (Shelbourne 2023). USCG activities in the region include search and rescue missions and response to oil discharges and hazardous substance releases into the navigable waters under the agency's Marine Environmental Protection mission.

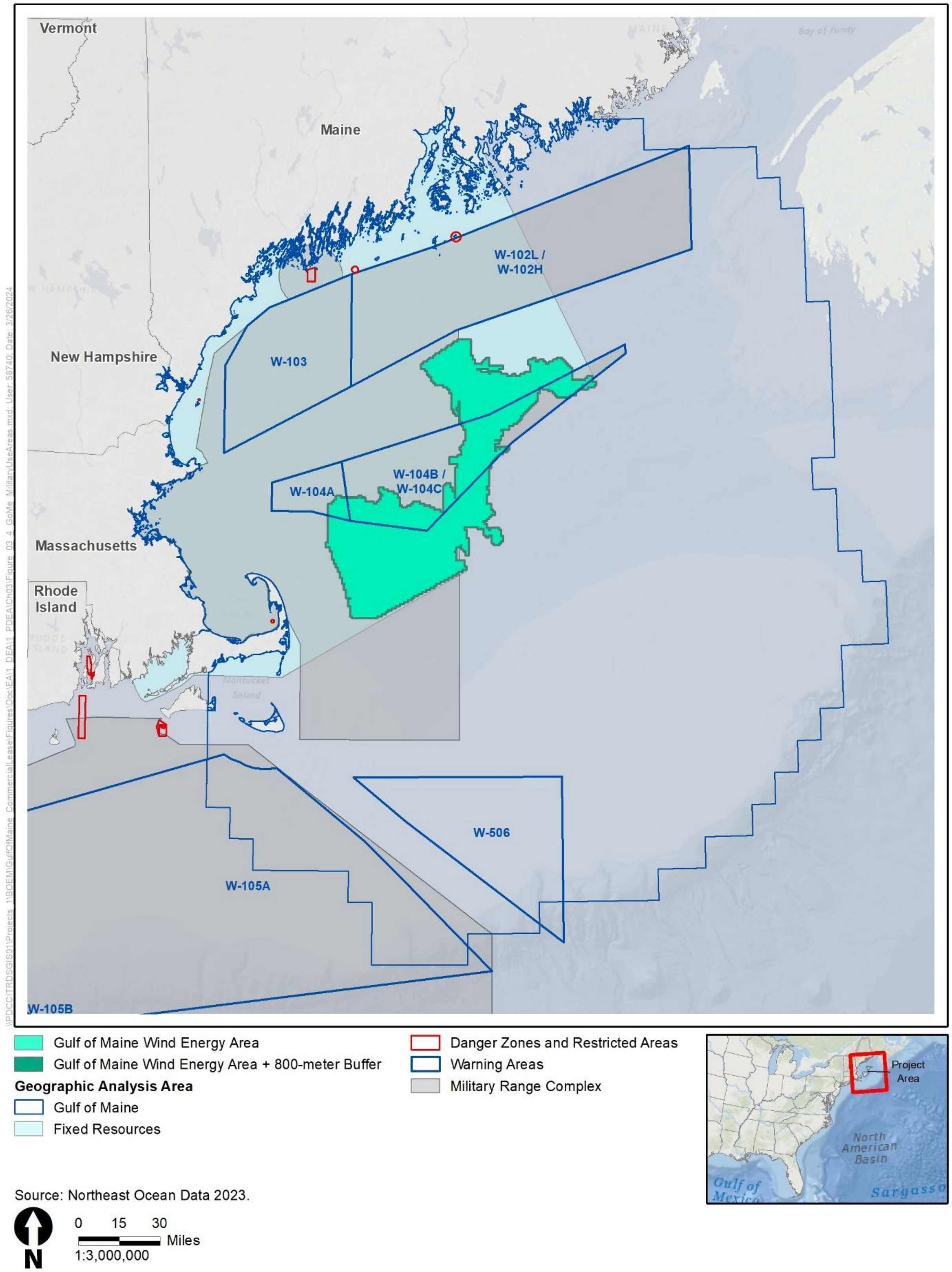

Figure B-2. Military use areas in the vicinity of the Gulf of Maine Wind Energy Area

B.3.5 Recreation and Tourism

Although many recreational and tourism opportunities exist in the inland portions of the coastal counties in Maine, Massachusetts, and New Hampshire, the assessment for this EA focuses on recreation along the shoreline and offshore that may depend on the ocean setting. Popular recreational activities in and along the Gulf of Maine include wildlife viewing tours, scuba diving, boating, sailing, sea kayaking, surfing, and beach going, including nearshore swimming and scenic enjoyment. Given the regional importance and unique attributes of recreational fishing compared to the other types of recreation and tourism, recreational fishing is discussed as part of the analysis in EA **Chapter 3, Section 3.3.6**.

While the majority of boating activities occur within approximately 20 miles (32 km) of the coast with an increasingly higher density of activities closer to shore, certain recreational activities such as sailing and whale watching can extend farther offshore (Northeast Regional Planning Body 2016). Multiple open ocean regattas occur in the Gulf of Maine on a recurring basis including the Annual Castine Classic Yacht Race from Castine, Maine to Camden, Maine; the yearly Maine Rocks from Rockland Harbor, Maine to Matinicus Rock, Maine; the biannual Corinthians race from Stonington, Connecticut to Boothbay Harbor, Maine; the yearly Beringer Bowl Overnight Ocean Race from Marblehead, Massachusetts to Provincetown, Massachusetts; and the biannual Marblehead to Halifax race from Marblehead, Massachusetts to Halifax, Nova Scotia (Point 97 et al. 2015).

Whale-watching excursions are an important component of the recreational sector operating offshore with more than 22 companies operating in Maine, New Hampshire, and Massachusetts. Trips can range from semi-private charters conducting single-day trips for six passengers to larger charters out of hubs like Bar Harbor, Maine that can accommodate up to 400 passengers on three to five trips daily and serve thousands of patrons daily during the July and August season (Point 97 et al. 2015). The most popular whale-watching destination in the geographic analysis area is Stellwagen Bank National Marine Sanctuary, 25 miles offshore Boston, Massachusetts, which accounts for approximately 80 percent of whale watching in the region and results in $24 million per year in revenue for whale-watching operators (Schwarzmann and Shea 2020).

The most recent data available from NOAA on ocean-related jobs linked to recreation and tourism are provided in **Table B-1** for the coastal communities near the WEA. The recreation and tourism activities described in this section are anticipated to continue with no discernible change in trends for the timeframe of the Proposed Action.

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

County/State	Percentage of Ocean-Related Economy Recreation and Tourism Jobs
Maine	**56**
Cumberland	79.9
Hancock	76.7
Knox	74.2
Lincoln	73.2

County/State	Percentage of Ocean-Related Economy Recreation and Tourism Jobs
Waldo	67.4
Washington	47.6
York	51.8
New Hampshire	**41.7**
Rockingham	78.8
Massachusetts	**74.2**
Barnstable	93.2
Dukes	100
Essex	89.4
Nantucket	100
Norfolk	66.1
Plymouth	87.9
Suffolk	85.6

Source: NOAA 2021. Note: No data were reported for Sagadahoc County, Maine or Strafford County, New Hampshire.

B.3.6 Cultural, Historical, and Archaeological Resources

Several documents report on the potential for submerged cultural resources along the Atlantic Seaboard, including the Gulf of Maine. The findings of these reports are incorporated herein by reference and inform the discussion of archaeological potential and sensitivity below (BOEM 2012b, 2016, 2021; NYSERDA 2017; TRC 2012). Submerged historic properties that may be within the WEA include shipwrecks and ancient submerged landform features (ASLFs) (TRC 2012). ASLFs on the OCS have the potential to contain Native American archaeological sites inundated and buried as sea levels rose at the end of the last Ice Age.

In addition to their archaeological potential, ASLFs may be considered traditional cultural properties or Tribal resources to Native American tribes in the region, representing places where their ancestors lived. As such, ASLFs are assumed to be cultural resources. Although no submerged pre-Contact era archaeological sites have been identified in the WEA, such sites are theorized to exist in waters fewer than 197 feet (60 meters) deep (**Figure B-3**). Portions of the OCS offshore Maine were subaerial before sea levels began to rise following the Last Glacial Maximum, approximately 20,000 years before present. The exposed landscape would have supported human populations from the Paleoindian through Early Archaic periods before sea levels submerged these areas approximately 10,000 years before present (BOEM 2016). Portions of the OCS closer to shore were submerged later and, thus, would have supported more recent populations.

The TRC (2012) study determined that portions of the seabed with depths shallower than 197 feet (60 meters) are in an area considered to possess high sensitivity for containing submerged indigenous archaeological sites. No areas with depths less than 60 meters are present in the WEA.

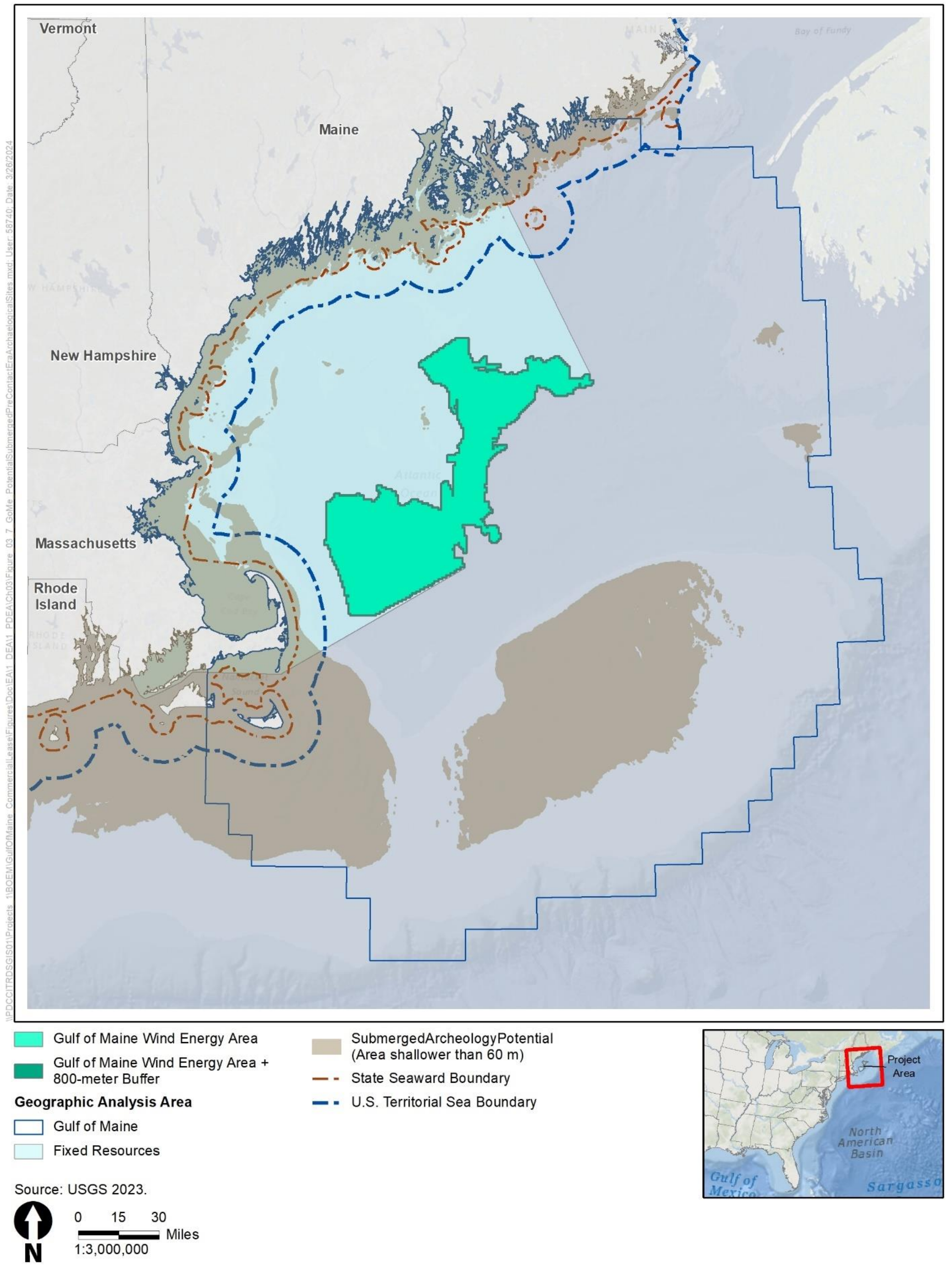

Figure B-3. Areas with potential for submerged pre-Contact era archaeological sites

Since the advent of colonial expansion into North America, northern New England has been the host for commercial fishing and shipping activity. Numerous vessels have plied the waters offshore Massachusetts, New Hampshire, and Maine and, consequently, shipwrecks are a type of historic submerged cultural resource expected to be found within the Gulf of Maine and navigation routes that filter vessel traffic to the ports of New England. Two shipwreck databases (i.e., Automated Wreck and Obstruction Information System [AWOIS], and Electronic Navigation Charts) were consulted to assess the number of shipwrecks in the Gulf of Maine; the number of reported wrecks range from roughly 200 to 300. The frequency of shipwrecks increases dramatically in nearshore areas. The shipwreck databases indicate there are nine shipwrecks reported within the WEA. Of these nine resources within the WEA, five are shipwrecks with documented vessel names, and documented dates for sinking. Based on the AWOIS database, there are at least 535 marine archaeological resources, or potential marine archaeological resources, reported outside of the WEA but within the geographic analysis area, including 379 reported shipwrecks and 156 navigational obstructions. Examples of other historic-era submerged cultural resources that may be encountered within the WEA and nearshore are downed aircraft, subsea cables, and other infrastructure (BOEM 2016, 2021; 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 WEA and nearshore. The affected environment for onshore historic properties could include portions of the Maine, New Hampshire, and Massachusetts coastline roughly between Blue Hill, Maine and New Bedford, Massachusetts. Coastal properties with ocean views are potentially within the viewshed of site characterization and site assessment activities. Local topography varies from relatively flat beach areas to high cliffs. Development along the coast is generally limited to one- to three-story buildings, and ocean views are generally limited to the first developed block along the coast. Beyond this area, views are blocked by intervening development but may be extended in areas with more relief. 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.

B.4 Alternative B – Proposed Action

B.4.1 Air Quality and Greenhouse Gas Emissions

The primary source of air pollutant and GHG emissions resulting from the Proposed Action would be vessel trips for site assessment and site characterization activities. These activities would occur at different locations throughout the WEA, meaning air quality impacts would shift spatially and temporally across the geographic analysis area. The largest combined air quality impacts would occur during overlapping site assessment and characterization activities for Phases 1 and 2.

Vessel traffic due to site characterization surveys and site assessment activities would add to current vessel traffic in the Gulf of Maine and at the existing ports used by the survey vessels. The additional vessel activity would be temporary and negligible when compared with existing vessel traffic in the region (EA **Chapter 3, Section 3.4.4**). Impacts from criteria pollutant emissions associated with vessels would be localized in the geographic analysis area and in the vicinity of vessel activity. Estimated potential criteria pollutant emissions and GHG emissions for vessel operations were calculated and the results are provided in **Appendix C**. Estimated annual emissions for Years 1 through 10 are summarized in **Appendix C**. The vessel trip parameters and emissions calculations, along with the assumptions used to complete the calculations, are also provided in **Appendix C**. Air pollutant emissions from onshore activities are assumed to be negligible in comparison with the existing activities because existing port facilities would be used, and no expansion would be needed for these facilities to accommodate the Proposed Action.

Major source thresholds[1] for the counties closest to the WEA 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

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

Annual criteria pollutant and GHG emissions from the Proposed Action are shown in **Appendix C**. The main impact drivers for air pollutant emissions stem from vessel trips for site assessment and site characterization activities to support the construction of planned future wind projects. Though emissions of NO_X are expected to exceed the major source thresholds (**Appendix C**), air pollutant concentrations associated with the Proposed Action are not expected to lead to any violation of the NAAQS, as discussed below.

Air pollutant and GHG emissions resulting from site assessment and site characterization activities would disperse substantially throughout a large geographic area including the 1,200,000-acre WEA and the vessel routes to and from existing ports. Most air pollutant emissions would occur within or near the WEA, much of which located more than 20 to 80 nm (37 to 148 km) offshore, with the emissions plumes remaining offshore for some distance due to the westerly prevailing winds. Although air quality offshore is subject to the NAAQS in federal waters and the OCS permit area, human exposure to offshore emissions is typically very low. Moreover, emissions would be spread out over 11 years, with Phase 1 beginning in 2024 and Phase 2 beginning in 2028. Because emissions would be spread out over an 11-year period and would disperse over a large geographic area, air pollutant concentrations associated with the Proposed Action are not expected to lead to any violation of the NAAQS.

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[1] Major source thresholds are defined in the Clean Air Act for purposes of permitting stationary emissions sources on land. The major source thresholds do not apply to the Proposed Action but are used here as screening levels for assessing potential air quality impacts.

Although the emissions estimates from the Proposed Action are measurable, they would not be distinguishable from other air emissions onshore or offshore; therefore, impacts of criteria pollutant emissions (**Appendix C**) associated with the Proposed Action are expected to be **negligible**.

Impacts on air quality from non-routine events are expected to be **negligible**, as they would be infrequent and temporary.

Cumulative Impacts: The incremental impacts from the Proposed Action in combination with ongoing and reasonably foreseeable planned activities, resulting from individual IPFs would range from **negligible** to **minor** for air quality. Wind energy development activities for the Proposed Action could overlap with ongoing and reasonably foreseeable planned activities, resulting in higher levels of impacts. Still, these effects would be temporary in nature, as the overlap in the geographic analysis area would be limited in duration.

B.4.2 Water Quality

The routine activities associated with the Proposed Action that could affect coastal and marine water quality include vessel discharges (including bilge and ballast water and sanitary waste), geotechnical and benthic sampling and other seafloor disturbances that could generate suspended sediment, and installation and removal of the met buoy.

Impacts on coastal and marine waters from vessel discharges would likely be of short duration and have little to no effect on water quality in the geographic analysis area with adherence to regulations governing discharges. These undetectable changes in water quality would not contribute to changes in water quality classifications of marine and estuarine waters in the Gulf of Maine. The Proposed Action would have no effects on runoff or onshore discharge into harbors, waterways, coastal areas, or the ocean environment. Most site characterization and site assessment activities would be covered by USACE Maine General Permit Numbers 13, 17, and 18, 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 geotechnical investigations, benthic sampling, installation of the met buoy, and vessel anchoring would temporarily increase local turbidity from localized sediment disturbances, which individually are not anticipated to exceed approximately 32 square feet (ft^2) (3 square meters [m^2]). These impacts would be short term and are not anticipated to result in any detectable impact on water quality within the WEA or other areas surveyed for potential export cable routes and wet storage.

Non-Routine Events

Non-routine events include the recovery of lost survey equipment and spills. The recovery of lost survey equipment may disturb sediment, similar to the Proposed Action. Sediment disturbance and resultant turbidity associated with recovering lost equipment would be temporary and localized.

Impacts may also occur from spills of petroleum products. However, as mentioned in EA **Chapter 2, Section 2.4.5** based on the size of a typical spill, it would be expected to dissipate very rapidly and then evaporate and biodegrade within a day or two (at most), limiting the potential impacts to a localized area for a short duration. Additionally, any spills related to oil are required to be cleaned up pursuant to the Clean Water Act, the Oil Pollution Act, and the National Oil and Hazardous Substances Pollution Contingency Plan.

Conclusion

Impacts on coastal and marine water quality from routine vessel discharges and sediment disturbance from sampling and anchoring, as well as non-routine activities such as recovery of lost equipment and spills, would be **negligible** even without mitigation because any changes to water quality would be small in magnitude, highly localized, and transient.

Impacts on water quality from non-routine events are expected to be **negligible**, as they would be infrequent, temporary, and localized.

Cumulative Impacts: The incremental impacts from the Proposed Action in combination with ongoing and reasonably foreseeable planned activities, resulting from individual IPFs would range from **negligible** to **minor** for water quality. Wind energy development activities for the Proposed Action could overlap with ongoing and reasonably foreseeable planned activities, resulting in higher levels of impacts. However, these effects would be temporary in nature, as the overlap in the water quality geographic analysis area would be limited in duration.

B.4.3 Finfish, Invertebrates, and Essential Fish Habitat

Previous lease issuance EAs (BOEM 2021a, 2024a) and the Atlantic G&G Final PEIS (BOEM 2014) identified potential impacts on fish resources and EFH that could occur in wind lease areas during site characterization and site assessment. While just one of these previous documents specifically addresses the Gulf of Maine (BOEM 2024a), many species occur across all areas and therefore information presented in those analyses is summarized and incorporated by reference in this EA.

For reasons summarized below and with consideration of the previous EAs (BOEM 2021a, 2024a) and the Atlantic G&G Final PEIS, these IPFs are not discussed further in this analysis:

- Impacts from acoustic sound sources from HRG surveys and geotechnical exploration are expected to range from negligible to minor. Of the sources that may be used in geophysical surveys for offshore wind, only a handful (e.g., boomers, sparkers) emit sounds at frequencies that are within the hearing range of most fishes and invertebrates. This means that the high-frequency sub-bottom profilers utilized under the Proposed Action would not be audible, and thus would not affect these taxa. For the sources that are audible (i.e., the medium-penetration seismic imager included under the Proposed Action), it is important to consider other factors such as source level, beamwidth, and duty cycle (Ruppel et al. 2022). Boomers, sparkers, and hull-mounted sub-bottom profilers have source levels close to the threshold for injury for pressure-sensitive fishes, so unless a fish was within a few meters of the source, injury is highly unlikely (Crocker and Fratantonio 2016; Popper et al. 2014). Behavioral impacts could occur over slightly larger spatial scales. For example, if one assumes an SPL threshold of 150 dB re 1 µPa for behavioral disturbance (Greater Atlantic Regional Fisheries Office 2020), sounds with source levels of 190 dB re µPa meter would fall below this threshold several hundred meters from the source (assuming 15 × log[R] propagation loss). This means that the lowest-powered sparkers, boomers, and bubble guns would not result in behavioral disturbance beyond this distance, and this range would be even smaller for slightly quieter sources like towed sub-bottom profilers (Crocker and Fratantonio 2016). It should be noted that these numbers are reported in terms of acoustic pressure because there are currently no behavioral disturbance thresholds for particle motion. Lack of evidence for any source due to extreme difficulty of measuring particle motion and determining fishes' sensitivity to particle motion renders establishment of any guidelines or thresholds for particle motion exposure currently impossible (Popper and Hawkins 2018; Popper et al. 2014). However, particle motion is expected to be dominant only within short ranges (i.e., within 33 feet [10 meters]) around the source (Harding and Cousins 2022; Mickle and Higgs 2022), outside of which sound pressure effects would dominate. It is therefore expected that behavioral impact ranges would be even smaller for particle motion-sensitive species, including invertebrates, as particle motion would dominate the sound field within only a few meters from the source. Because most HRG sources are typically "on" for short periods with silence in between, only a few "pings" emitted from a moving vessel towing an active acoustic source would reach fish or invertebrates below, so behavioral effects would be intermittent and temporary. Impacts would result in temporary and spatially limited changes in behavior and displacement, particularly for 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 traffic and concomitant noise are expected to be negligible. Noise from vessels and equipment (other than the site assessment- and site characterization-related equipment discussed in this section) would be temporary and spatially limited from the estimated 3,669 vessel roundtrips over an approximately 9-year period, which includes installation of 30 met buoys and later subsequent removal from the WEA. Any potential impacts could result in behavioral changes. Vessel and equipment noise associated with the Proposed Action would be inconsequential relative to existing vessel noise in the geographic analysis area.

Installation of the clump anchors associated with the 30 met buoys may cause a punctuated initial increase in local suspended sediments and displacement of demersal finfish and invertebrates and the EFH of managed species within the footprint of the clump anchors and related anchor chain sweeps. These impacts would be limited to the immediate surrounding area and short in duration.

Installation of clump anchors and associated mooring chain also may result in the direct mortality of benthic invertebrates and the loss of benthic habitat. Based on the assumptions in Section 2.4, a spar-type met buoy is estimated to disturb a maximum of 118 square meters 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 square meters (BOEM 2014; Fugro Marine GeoServices Inc. 2017). Disturbance from installation of a met buoy could result in a maximum impact area of 34,398 square meters, inclusive of anchor chain sweep, per buoy. Any infaunal invertebrates or burrowing finfish (flatfish or sand lances) within the impact footprint of the anchors may experience direct mortality and loss of benthic habitat during the deployment period. Impacts related to the anchor chain sweeps would be repeated throughout the buoy deployments as the anchor chains move with the effects of currents and wind on the connected buoys. Sessile (immobile) marine invertebrates, including molluscan shellfish, would be lost (buried or crushed) in the footprint of the anchors and/or displaced and injured by the anchor chains. Although the EFH managed species Atlantic sea scallops are mobile shellfish, it is conservatively assumed they would not be able to avoid sudden deployment of an anchor; as such, for this analysis, they are considered to be sessile. The amount of habitat temporarily displaced or lost in the area would be small compared to the amount of habitat available in the surrounding WEAs, 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 benthic community.

Fish and mobile invertebrates are expected to move to the surrounding areas of the met buoys during installation. The clump anchors and associated anchor chain sweep could adversely affect EFH. The impact from the anchor footprints and anchor sweeps is not expected to significantly affect the quality or quantity of EFH within the WEAs. The impacts related to anchor installation and presence during the 9-year operation of the met buoy systems would be temporary and the seafloor affected could potentially return to pre-existing conditions without mitigation once the buoys and anchoring systems are removed (Dernie et al. 2003). Therefore, impacts from habitat loss due to installation, operation, and decommissioning (i.e., removal) of 30 met buoys for an 9-year duration on finfish, invertebrates, and EFH would be localized and short term.

The installation of met buoy clump anchors on soft substrates would introduce hard substrate to the WEAs that could be colonized by benthic invertebrates. Fish species that prefer hard-bottom or complex habitats would likely be attracted to anchors, potentially increasing local fish abundance. Additionally, the buoys and anchor arrays themselves may provide habitat for pelagic species such as king mackerel and some schooling species (e.g., herrings, anchovies, Atlantic mackerel). Changes in species composition and community assemblage are expected only at the localized areas surrounding the anchors and buoys; no population-level effects on finfish, invertebrate populations, or EFH are expected because only 30 buoy systems would be installed.

BOEM has concluded that fisheries surveys that may be conducted in association with Gulf of Maine lease issuance are not “effects of the action” as defined in 50 CFR 402.02. While an individual Gulf of Maine lessee may opt to carry out such biological surveys to characterize resources in its lease area to inform its COP development, there is not an affirmative requirement to carry out any biological surveys, nor are fisheries survey plans yet developed; thus any such surveys are not reasonably certain, to occur and effects at this time are unknowable. Therefore, entanglement risk associated with fisheries surveys is not considered in this EA. A condition of the proposed lease would require appropriate consultation prior to carrying out any such fisheries surveys.

Geotechnical and biological benthic sampling may affect the Cashes Ledge, Jeffreys Ledge/Stellwagen Bank, summer flounder, and inshore juvenile Atlantic cod HAPCs (**Figure B-1**) within the geographic analysis area. In addition, the Eastern Maine, Jeffreys Bank, Ammen Rock, Fippennies Ledge HMAs, and the Cod Protection Closures HMAs and the Western Gulf of Maine HMA/Closure Area within the geographic analysis area may also be affected. These designated areas (nearshore and offshore habitats [structurally complex, i.e., eelgrass, algae, rocky benthic habitats])) could be affected during G&G and biological survey efforts used to identify and characterize potential future export cable corridors and an inshore wet storage area. The level of potential adverse effects on these HAPCs (**Figure B-1**) cannot be quantified in relation to the implementation of the Gulf of Maine commercial leases and concomitant activities (geotechnical and biological benthic sampling) since the total number of geotechnical/benthic samples that would be taken within these areas (if any) by the lessee for site characterization would be determined at a later date. However, geotechnical and benthic sampling that could occur within inshore areas (including within inshore juvenile cod, Great South Channel juvenile cod, and summer flounder

HAPCs) associated with the potential transmission cable routes would be a small number of samples (fewer than 15 to 20 benthic grab or geotechnical cores) within a very narrow corridor of approximately 98 feet (30 meters). The physical bottom-sampling footprint for each collection is dependent upon the sampling device but as an example the Smith McIntyre benthic grab collects a surface sediment sample of approximately 1.07 square feet (0.1 square meters). During benthic sampling activities there would be an initial small sediment plume that would occur during the initial contact with the seafloor, release of the benthic grab jaw, and when the grab is retrieved from the seafloor. During this activity, the turbidity generated by this process is unmeasurable and negligible in relation to the impacts it would have on the HAPCs, HMAs, and EFH of summer flounder, juvenile Atlantic cod, or any other egg or larvae utilizing the benthic/demersal habitat being sampled. The loss and modification of the benthic habitat would result in a small grab indentation within the potential future project easements for export cables and wet storage areas. This modification of the seafloor is not expected to result in a measurable loss of any ecosystem function within the HAPCs or HMAs. As outlined in EA **Chapter 3, Section 3.3.2**, the 0.2 acre (809 m^2) of benthic habitat expected to be disturbed during vibracore and biological benthic sampling would be less than 0.000 percent of the 68,320 acres (276 km^2) of the WEA. In addition, the recovery of potentially affected benthic communities would vary based on habitat and the degree of impact. Per the BOEM BA, live bottom features such as the sensitive bottom habitats, including submerged aquatic vegetation and deep-sea corals, would be avoided to reduce the risk of adverse effects (BOEM 2024b).

Vessels to be utilized for the site assessment and characterization activities are required to adhere to existing state and federal regulations related to ballast and bilge water discharge, including USCG ballast discharge regulations (33 CFR 151.2025) and USEPA National Pollutant Discharge Elimination System Vessel General Permit standards, both of which aim to prevent the release of contaminated water discharges. Vessel operations related to the WEA and associated survey and transit areas are estimated to require total of 3,996 vessel roundtrips (**Appendix A**). This volume of vessel traffic would only slightly increase the routine vessel discharges within the WEA and potential future project easements (EA **Chapter 3, Section 3.4.4**). As such, routine releases from WEA site assessment and characterization activities related to the Proposed Action would not be expected to contribute appreciably to overall impacts on finfish, invertebrates, and EFH of managed within the geographic analysis area.

Non-Routine Events

Non-routine events that could potentially have impacts on finfish and invertebrate populations and EFH include recovery of lost survey equipment. As described in EA **Chapter 2, Section 2.4.5**, recovery of lost equipment could be carried out in a variety of ways and depends on the type of equipment lost. The extent of impacts would depend on the type of lost equipment and the method and chance of recovery. The larger the equipment lost or the more costly it would be to replace would dictate the number of attempts made at recovery, affecting the size of the resultant impact area and time spent searching. Additionally, where the equipment is lost would dictate 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. The potential for entanglement resulting from the recovery of lost equipment is very low and would be minimized through project design criteria and best management practices but is not nonexistent. Lost survey gear would be reported within 24 hours to BSEE and NMFS. See EA **Chapter 2, Section 2.4.5** and **Appendix D** for additional details.

Conclusion

Overall, impacts from site characterization and site assessment activities on finfish and shellfish populations and EFH in the geographic analysis area are expected to be **negligible** because primary impacts on this resource are disturbance related and no population-level effects are anticipated for the associated finfish and invertebrates or their EFH and on any ESA-listed species due to the relatively small and localized areas that could be disturbed in the course of geotechnical investigations, benthic sampling, installation and removal of the met buoys, and vessel anchoring. The recovery of potentially affected EFH would vary based on habitat and the degree of impact. Per the BOEM BA, live bottom features such as the sensitive bottom habitats, including submerged aquatic vegetation and deep-sea corals, would be avoided to reduce the risk of adverse effects (BOEM 2024b). Furthermore, implementation of SOCs and mitigation measures (EA **Chapter 4** and **Appendix H**) would minimize potential impacts on finfish and shellfish populations.

Impacts on finfish, invertebrates, and EFH from non-routine events are expected to be **negligible** and would be minimized through project design criteria and best management practices.

Cumulative Impacts: The incremental impacts from the Proposed Action in combination with ongoing and reasonably foreseeable planned activities, resulting from individual IPFs, are expected to be **negligible** to **minor** for finfish, invertebrates, and EFH. Once the survey activities are complete, impacts associated with the Proposed Action will cease, and the EFH and the managed species that utilize the habitats within the geographic analysis area are expected to return to pre-survey conditions in a few months to a few years.

B.4.4 Military Use

Vessels associated with the Proposed Action could interact with military aircraft and vessels during site characterization and site assessment survey or monitoring activities. As described in EA **Chapter 3, Section 3.4.4**, the Proposed Action would add to existing vessel traffic within the region with an estimated 2,664 vessel roundtrips for routine activities during Phase 1, and 1,332 vessel roundtrips for routine activities during Phase 2 (**Appendix A**). Additional traffic in this area due to site characterization surveys or met buoy installation and preventive maintenance could result in space-use conflicts with existing military activities because the Wind Energy Area overlaps with the Boston Range Complex and Airspace Warning Areas W104B/W-104C and W-104A where military activity takes place. Space-use conflicts may also occur as survey activities take place along potential offshore export cable corridors and could conflict with activities in Airspace Warning Areas W-103, W-102L/W-102H, W-105A and W-506. The increase in vessel traffic could also lead to an increase in port congestion, which would affect military use of those ports. Additionally, vessels associated with the Proposed Action traveling to and from ports could overlap with the U.S. Navy sea trials of new Arleigh Burke-class destroyers that take place in port and in waters nearshore in the vicinity of Bath, Maine. Although less predictable, Proposed Action vessels may also encounter activities associated with USCG search and rescue and Marine Environmental Protection missions.

Offshore structures associated with the Proposed Action include up to two met buoys per lease area for a total of up to 30 met buoys within the Gulf of Maine Wind Energy Area. Because of the limited number of these structures, no conflicts with existing and planned military uses are anticipated, as they would not significantly change navigational patterns or add to the navigational complexity of the region.

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.

Non-Routine Events

Non-routine events that could have impacts on military use include the 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 or the replacement cost would dictate the number of attempts made at recovery. The number of recovery attempts could affect the size of the resultant impact area and time spent searching. The potential for recovery operations to interact with military use activities is low given that recovery operations would typically involve one vessel for a short period of time.

Conclusion

Overall, BOEM anticipates that the impacts on military use as a result of site characterization and site assessment activities for the Proposed Action would be **negligible** because vessel activity associated with the Proposed Action and the installation and maintenance of up to 30 met buoys are not expected to lead to significant space-use conflicts with existing military activities in the region. The overall effect would be small, and the resource would be expected to return to a condition with no measurable effects without mitigation.

Impacts on military use from non-routine events are anticipated to be **negligible** as they are not expected to disrupt routine military activities in the geographic analysis area.

Cumulative Impacts: The incremental impacts resulting from individual IPFs from the Proposed Action in combination with ongoing and reasonably foreseeable planned activities would be **negligible** for military use.

B.4.5 Recreation and Tourism

A 2012 BOEM study identified that the coastal Maine and Massachusetts counties within the geographic analysis area are susceptible to impacts on their recreation and tourism economies and employment as a result of offshore wind development (BOEM 2012a). Potential recreational impacts of the Proposed Action could include the risk of recreational vessel allision with in-water structures, increased navigational complexity, vessel traffic congestion, and space-use conflicts.

Vessels associated with the Proposed Action could interact with recreational vessels during site characterization and site assessment surveys or monitoring activities. As described in EA **Chapter 3, Section 3.4.4**, the Proposed Action would add to existing vessel traffic within the region with an estimated 2,664 vessel roundtrips for routine activities during Phase 1, and 1,332 vessel roundtrips for routine activities during Phase 2 (**Appendix A**). The majority of recreational boating activity occurs within approximately 20 miles (32 km) of the coast; as such, impacts associated with survey activities in the WEA would be limited to recreational activities that extend farther offshore, such as whale-watching expeditions and sailing regattas (Northeast Regional Planning Body 2016). While many popular whale-watching sites are located in the Gulf of Maine, none directly overlap with the WEA (Northeast Regional Ocean Council 2009). Two biannual regattas overlap the WEA: the Corinthians race from Stonington, Connecticut to Boothbay Harbor, Maine and the biannual Marblehead to Halifax race from Marblehead, Massachusetts to Halifax, Nova Scotia (Point 97 et al. 2015). Potential space-use conflicts between recreational vessels and vessels associated with the Proposed Action would be limited to survey vessels conducting cable route corridor surveys and vessels coming from and going to ports. Although the Proposed Action would add to existing vessel traffic in the region, the vessel activity associated with the Proposed Action is expected to be relatively small compared to existing vessel traffic at the ports, in the WEA, and between the shore and the WEA.

Offshore structures associated with the Proposed Action would include up to two met buoys per lease area for a total of up to 30 met buoys in the Gulf of Maine Wind Energy Area. Offshore routes for recreational boaters, sailing regattas, and sightseeing boats may need to be altered to avoid allision risks with the in-water structures. However, because of the limited number of structures, no substantial or long-term conflicts with existing and planned recreation and tourism uses are anticipated. The met buoys associated with the Proposed Action are not expected to significantly change navigation patterns or add to the navigational complexity of the WEA.

Non-Routine Events

Non-routine events that could have impacts on recreation and tourism include the 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 or the replacement cost would dictate the number of attempts made at recovery. The number of recovery attempts could affect the size of the resultant impact area and time spent searching. The potential for recovery operations to interact with recreation and tourism activities is unlikely given that recovery operations would typically involve one vessel for a short period of time.

Conclusion

Overall, BOEM anticipates that the impacts on recreation and tourism as a result of site characterization and site assessment activities for the Proposed Action would be **negligible** because transient and negligible vessel activity (compared to existing vessel traffic levels) associated with the Proposed Action and the installation and maintenance of up to 30 met buoys is not expected to lead to significant space-use conflicts with existing recreational activities in the region. The overall effect would be small, and the resource would be expected to return to a condition with no measurable effects without mitigation.

Impacts on recreation and tourism from non-routine events are anticipated to be **negligible** as they are not expected to disrupt existing activities in the geographic analysis area.

Cumulative Impacts: The incremental impacts from the Proposed Action, in combination with ongoing and reasonably foreseeable planned activities, resulting from individual IPFs would be **negligible** for recreation and tourism.

B.4.6 Cultural, Historical, and Archaeological Resources

Geophysical surveys and most biological surveys and monitoring would not create bottom disturbance; therefore, no impacts would be expected on submerged cultural resources during routine surveys of these types. Subsurface geotechnical investigations, benthic sampling, installation of met buoys, and vessel anchoring would result in small, localized disturbances of the seabed. BOEM’s Guidelines for

Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585 state that a qualified marine archaeologist should design and interpret the results of geophysical surveys before bottom disturbance occurs (BOEM 2020). Consequently, submerged cultural resources would be avoided during site assessment and site characterization activities. Accordingly, previous NEPA documentation developed for site characterization and site assessment campaigns has determined that the potential to affect historic properties is expected to be negligible (BOEM 2013, 2014, 2016, 2021).

Temporary placement of met buoys and vessels conducting site characterization surveys have the potential to affect the viewshed of onshore historic properties with open views in the direction of the WEA. The met buoys and vessel traffic associated with surveys may fall within the viewshed of these onshore properties. The presence of the met buoys is expected to result in negligible impacts on onshore historic properties because their visibility from onshore locations would be temporary (lasting approximately 5 years for each lease) and indistinguishable from lighted vessel traffic if visible from distances at least 20 nm (37 km) away. 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 existing vessel traffic over the approximately 9-year span of activities. The vessel traffic would be both temporary and indistinguishable from existing vessel traffic in the geographic analysis area; therefore, it is expected not to be noticed from onshore historic properties.

Non-Routine Events

The retrieval of lost equipment could result in seafloor disturbance that could affect historic properties. As described in EA **Chapter 2, Section 2.4.5**, recovery of lost equipment could be carried out in various ways and depends on the type of equipment lost. A common method to locate and retrieve lost equipment is dragging anchors or some other form of grapnel tool across the seafloor. Such activities could affect submerged cultural resources by disturbing the bottom during search and retrieval. Potential impacts could be lessened or avoided if potential historic properties that have already been identified are avoided during retrieval, or, if geophysical data exist for the area, it could be reviewed to identify potential resources. Additionally, other recovery methods that minimize disturbance of the seafloor may be required after mandatory reporting of lost survey gear to BOEM, BSEE, and NMFS, as described in EA **Chapter 2, Section 2.4.5** and **Appendix H**. Regardless, the potential for recovery operations to interact with submerged cultural resources is extremely unlikely given the expanse of the WEA and other potential locations of site characterization activities and the limited area affected by recovery operations.

Conclusion

Overall, impacts on cultural, historical, and archaeological resources from the Proposed Action are expected to be **negligible** due to the relatively small and localized areas of disturbance and with implementation of SOCs to identify and avoid submerged historic properties. Impacts on submerged historic properties from site characterization activities are expected to be **negligible** given the geophysical surveying and interpretation requirements discussed above. Impacts on submerged historic properties from installation of the met buoys are expected to be **negligible**, because avoidance would be required by BOEM. If avoidance of potential historic properties is not feasible, BOEM would continue its Section 106 consultation as described in EA **Chapter 5, Section 5.2.5** to resolve adverse effects.

Vessel traffic associated with the Proposed Action would be temporary and indistinguishable from existing vessel traffic. Therefore, impacts on onshore historic properties from site characterization activities are expected to be **negligible**.

Impacts on historic properties from non-routine events are expected to be **negligible.**

Cumulative Impacts: While the impacts associated with the Proposed Action are expected to be negligible, the incremental impacts from ongoing and reasonably foreseeable planned activities with IPFs that overlap both spatially and temporally with IPFs from the Proposed Action would range from negligible to major due to the extent of potential permanent and irreversible impacts on marine cultural resources and long-term impacts on historic aboveground resources. The presence of wind energy structures from future potential leases in the Gulf of Maine, and from existing leases associated with other BOEM wind energy projects could have long-term, continuous, widespread, visual impacts on historic resources.

BOEM has determined that views and vistas of the Atlantic Ocean, free of modern visual elements, are contributing elements to the NRHP eligibility of some historic properties. Potential adverse physical impacts on marine cultural resources and terrestrial cultural resources are possible, depending on the location of future seafloor and ground disturbing activities. Implementation of existing federal and state cultural resource laws and regulations would reduce the severity of potential impacts in the majority of cases, resulting in overall **moderate** impacts on cultural resources.

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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-10** provides a summary of hazardous air pollutant emissions from site characterization and site assessment activities.

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 (BOEM 2016), available at https://www.boem.gov/renewable-energy/state-activities/lease-ocs-0512.

Assumptions, data, table footnotes, and references—range of lease activity, port locations, etc.—are taken from Chapter 2. This appendix assumes site assessment and site characterization activities for Phase 1 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; site assessment and site characterization activities for Phase 2 would take place equally over Years 5-9 and the meteorological buoys would be installed in Year 6, operate in Years 6–10, and be decommissioned in Year 11.

Table C-1. Summary of annual emissions by activity

Action Alternative	Year	Activity/Year	Emissions (tons/year) CO	NO_x	VOC	$PM_{2.5}$	PM_{10}	SO_x	Emissions (metric tons/year) CO_2	N_2O	CH_4	CO_{2e}
A	No Action	No Action			No Action and, therefore, no emissions							
B	Year 1	Phase 1: Site Characterization	15.18	96.76	2.78	2.36	2.44	0.06	5,801.21	0.17	0.77	5,871.31
	Year 2	Phase 1: Site Characterization Phase 1: Site Assessment: Meteorological Buoy Installation Phase 1: Site Assessment: Meteorological Buoy Operations	16.66	106.22	3.05	2.59	2.67	0.06	6.368.41	0.19	0.84	6,445.36
	Year 3	Phase 1: Site Characterization Phase 1: Site Assessment: Meteorological Buoy Operations	16.17	103.07	2.96	2.52	2.60	0.06	6,179.35	0.18	0.82	6,254.01
	Year 4	Phase 1: Site Characterization Phase 1: Site Assessment: Meteorological Buoy Operations	16.17	103.07	2.96	2.52	2.60	0.06	6,179.35	0.18	0.82	6,254.01
	Year 5	Phase 1: Site Characterization Phase 1: Site Assessment: Meteorological Buoy Operations Phase 2: Site Characterization	23.75	151.45	4.35	3.70	3.81	0.09	9,079.95	0.27	1.20	9,189.67
	Year 6	Phase 1: Site Assessment: Meteorological Buoy Operations Phase 2: Site Characterization Phase 2: Site Assessment: Meteorological Buoy Installations Phase 2: Sites Assessment: Meteorological Buoy Operations	9.32	59.42	1.71	1.45	1.50	0.04	3,562.34	0.10	0.47	3,605.38
	Year 7	Phase 1: Site Assessment: Meteorological Buoy Decommissioning Phase 2: Site Characterization Phase 2: Site Assessment Meteorological Buoy Operations	8.58	54.69	1.57	1.34	1.38	0.03	3,278.74	0.10	0.43	3,318.36
	Year 8	Phase 2: Site Characterization Phase 2: Site Assessment Meteorological Buoy Operations	8.08	51.54	1.48	1.26	1.30	0.03	3,089.67	0.09	0.41	3,127.01
	Year 9	Phase 2: Site Characterization Phase 2: Site Assessment Meteorological Buoy Operations	8.08	51.54	1.48	1.26	1.30	0.03	3,089.67	0.09	0.41	3,127.01
	Year 10	Phase 2: Site Assessment: Meteorological Buoy Operations	0.49	3.15	0.09	0.08	0.08	0.00	189.07	0.01	0.03	191.35
	Year 11	Phase 2: Site Assessment: Meteorological Buoy Decommissioning	0.25	1.58	0.05	0.04	0.04	0.00	94.53	0.00	0.01	95.68

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.

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

Emissions Summary for Average Year – Proposed Action[1]

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	10.00	63.78	1.83	1.56	1.61	0.04	3,824.08	0.11	0.51	3,870.28
Vessel Travel – Geotech and Benthic	5.80	36.95	1.06	0.90	0.93	0.02	2,215.22	0.07	0.29	2,241.99
Vessel Travel – Biological	6.97	44.41	1.28	1.08	1.12	0.03	2,662.52	0.08	0.35	2,694.69
Site Characterization—Per Year from Years 1–5	**22.77**	**145.14**	**4.17**	**3.55**	**3.65**	**0.09**	**8,701.82**	**0.26**	**1.15**	**8,806.96**
Meteorological Buoys										
Site Assessment—Installation										
Vessel Travel	0.74	4.73	0.14	0.12	0.12	0.00	283.60	0.01	0.04	287.03
Site Assessment—Installation Year 2	**0.74**	**4.73**	**0.14**	**0.12**	**0.12**	**0.00**	**283.60**	**0.01**	**0.04**	**287.03**
Site Assessment—Offshore O&M										
Vessel Travel	1.48	9.46	0.27	0.23	0.24	0.01	567.20	0.02	0.08	574.05
Site Assessment—O&M per Year from Years 2–6	**1.48**	**9.46**	**0.27**	**0.23**	**0.24**	**0.01**	**567.20**	**0.02**	**0.08**	**574.05**
Site Assessment—Offshore Decommissioning[2]										
Vessel Travel	0.74	4.73	0.14	0.12	0.12	0.00	283.60	0.01	0.04	287.03
SUBTOTAL Decommissioning—Year 7	**0.74**	**4.73**	**0.14**	**0.12**	**0.12**	**0.00**	**283.60**	**0.01**	**0.04**	**287.03**

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] Maximum range of leases assessed for this EA is 15 leases.

[2] 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	Proposed Action Total Number of Vessel Round Trips	Duration of Survey Task (years)	Number of Vessel Round Trips (per year)[3]	Average Miles per Round Trip (nautical miles)	Total (nautical miles/year)[5]	Activity (hours/year)[6, 7]
HRG Survey—Export Cable Routes[1]	Crew Boat	-	5	-	-	27,224	6,050
HRG Surveys—Lease Areas[1]	Crew Boat	-	5	-	-	41,386	9,197
Geotechnical Sampling[2]	Small Tug Boat	-	5	-	-	-	4,701
Avian Surveys[3]	Crew Boat	540	5	108	130	13,996	1,400
Fish Surveys[4]	Crew Boat	-	5	-	-	28,570	9,216

HRG = high-resolution geophysical.

[1] HRG survey activity hours calculated based on total vessel kilometers and hours from Table A-1.

[2] Geotechnical sampling activity hours calculated based on total vessel days from Table A-2. 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.

[3] Avian survey activity hours calculated based on total vessel roundtrips and roundtrip distance from Table A-5 Assumes all avian surveys completed by boat to obtain maximum case scenario. Assumes avian and fish surveys occur over 5 years over all lease areas.

[4] Fish survey activity hours calculated based on total vessel days from Table A-4.

[5] Round trips per year estimated by dividing total round trips per task by the number of years over which the surveys will be conducted.

[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)

[7] No time for the vessels spent at idle was captured in this calculation.

0.53996 nautical miles/kilometer

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]	Load Factor (%)[2]	Emission Factors (g/kW-hr)[3]								
				CO	NO_x	VOC	$PM_{2.5}$	PM_{10}	SO_X	CO_2	N_2O[4]	CH_4[4]
Crew Boat	1,000	746	45%	1.6	10.3	0.3	0.25	0.26	0.006	679	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 factors based on Table 3-4 of USEPA 2009. Table 3-1 describes both crew boats and tugboats as Harbor Vessels; therefore, load factors are for Harbor Vessels.

[3] Emission factors based on Table 5 of USEPA 2022a. Tier 0 factors were used for both types of boats, providing a conservative assumption for pollutants for which the areas are in non-attainment.

[4] Emission factors based on Table 3-8 of USEPA 2009. 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 always within that category, and it provides a conservative assumption for pollutants for which the areas are in non-attainment.

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]
Proposed Action	Crew Boat – Export Cable Routes	3.97	25.31	0.73	0.62	0.64	0.02	1,517.39	0.04	0.20	1,535.72
	Crew Boat – Lease Area	6.03	38.48	1.11	0.94	0.97	0.02	2,306.69	0.07	0.31	2,334.56
	TOTAL	**10.00**	**63.78**	**1.83**	**1.56**	**1.61**	**0.04**	**3,824.08**	**0.11**	**0.51**	**3,870.28**

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 harbor tug to account for auxiliary engines based on Table 3-10 of USEPA 2009.

[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

				Emission Factors (g/kW-hr)[3]								
Vessel Type	Engine Size (hp)	Engine Power (kW)[1]	Load Factor (%)[2]	CO	NO_x	VOC	$PM_{2.5}$	PM_{10}	SO_X	CO_2	N_2O[4]	CH_4[4]
Small Tug Boat	2,000	1,491	31%	1.6	10.3	0.3	0.25	0.26	0.006	679	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 factors based on Table 3-4 of USEPA 2009. Table 3-1 describes both crew boats and tug boats as Harbor Vessels; therefore, load factors are for Harbor Vessels.

[3] Emission factors based on Table 5 of USEPA 2022a. Tier 0 factors were used for both types of boats, providing a conservative assumption for pollutants for which the areas are in non-attainment.

[4] Emission factors based on Table 3-8 of USEPA 2009. 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.

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]
Proposed Action	Small Tug Boat	5.80	39.95	1.06	0.90	0.93	0.02	2,215.22	0.07	0.29	2,241.99
	TOTAL	**5.80**	**39.95**	**1.06**	**0.90**	**0.93**	**0.02**	**2,215.22**	**0.07**	**0.29**	**2,241.99**

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 1.5 was assumed for a harbor tug to account for auxiliary engines based on Table 3-10 of USEPA 2009.

[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

				Emission Factors (g/kW-hr)[3]								
Vessel Type	Engine Size (hp)	Engine Power (kW)[1]	Load Factor (%)[2]	CO	NO_X	VOC	$PM_{2.5}$	PM_{10}	SO_X	CO_2	N_2O[4]	CH_4[4]
Crew Boat	1,000	746	45%	1.6	10.3	0.3	0.25	0.26	0.006	679	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 factors based on Table 3-4 of USEPA 2009. Table 3-1 describes both crew boats and tug boats as Harbor Vessels; therefore, load factors are for Harbor Vessels.

[3] Emission factors based on Table 5 of USEPA 2022a. Tier 0 factors were used for both types of boats, providing a conservative assumption for pollutants for which the areas are in non-attainment.

[4] Emission factors based on Table 3-8 of USEPA 2009. 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.

Emissions from Vessels – Average Year Over 5 Years

		Emissions (tons/year, metric tons/year for GHG pollutants)[1,2]									
Alternative	Vessel Type	CO	NO_X	VOC	$PM_{2.5}$	PM_{10}	SO_X	CO_2	N_2O	CH_4	CO_2e[3]
Proposed Action	Crew Boat – Avian Surveys	0.92	5.86	0.17	0.14	0.15	0.00	351.03	0.01	0.05	355.27
	Crew Boat – Fish Surveys	6.05	38.56	1.11	0.94	0.97	0.02	2,311.49	0.07	0.31	2,339.42
	TOTAL	**6.97**	**44.41**	**1.28**	**1.08**	**1.12**	**0.03**	**2,662.52**	**0.08**	**0.35**	**2,694.69**

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 harbor tug to account for auxiliary engines based on Table 3-10 of USEPA 2009.

[3] 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 Number of Vessel Round Trips/Year[1]	Average Miles per Round Trip (nautical miles)	Total (nautical miles/year)[3]	Activity (hours/year)[4, 5, 6]
Crew Boat	60	226	13,569	1131

[1] Assumes two trip/buoy, two buoys/lease area, 15 lease areas.

[2] Assumes "high" estimate of roundtrips per buoy to provide a conservative estimate.

[3] Roundtrip distance from worksheet titled "Trip Distances."

[4] Assumes an average speed of 12 knots for the crew boat.

[5] Activity hours based upon total nautical miles traveled.

[6] No time for the vessels spent at idle at the buoys was captured in this calculation.

0.53996 nautical miles/kilometer

Vessel Details for Operation and Maintenance of Buoys

Vessel Type	Total Number of Vessel Round Trips/Year[1]	Average Miles per Round Trip (nautical miles)	Total (nautical miles/year)[3]	Activity (hours/year)[4, 5, 6, 7]
Crew Boat	180	226	40,706	2,261

[1] Assumes one trip/buoy pair, 12 times per year, 15 lease areas.

[2] Assumes monthly maintenance instead of quarterly to provide a conservative estimate.

[3] Roundtrip distance from worksheet titled "Trip Distances."

[4] Assumes an average speed of 18 knots for the crew boat.

[5] Activity hours based upon total nautical miles traveled.

[6] No time for the vessels spent at idle at the buoys was captured in this calculation.

[7] 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]	Load Factor (%)[3]	Emission Factors (g/kW-hr)[4]								
				CO	NO_X	VOC	$PM_{2.5}$	PM_{10}	SO_X	CO_2	N_2O [5]	CH_4 [5]
Crew Boat[1]	1,000	746	45	1.6	10.3	0.3	0.25	0.26	0.006	679	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 crew boat emission factors listed in Table 3-4 of USEPA 2009.

[2] Engine power (kW) estimated by dividing horsepower by a factor of 1.341.

[3] Load factors based on Table 3-4 of USEPA 2009. Table 3-1 describes both crew boats and tug boats as Harbor Vessels; therefore, load factors are for Harbor Vessels.

[4] Emission factors based on Table 5 of USEPA 2022a. Tier 0 factors were used for both types of boats, providing a conservative assumption for pollutants for which the areas are in non-attainment.

[5] Emission factors based on Table 3-8 of USEPA 2009. 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.

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	0.74	4.73	0.14	0.12	0.12	0.00	283.60	0.01	0.04	287.03
TOTAL	**0.74**	**4.73**	**0.14**	**0.12**	**0.12**	**0.00**	**283.60**	**0.01**	**0.04**	**287.03**

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 harbor tug to account for auxiliary engines based on Table 3-10 of USEPA 2009.

[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

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	CO_2	N_2O[4]	CH_4[4]
Crew Boat	1,000	746	45	1.6	10.3	0.3	0.25	0.26	0.006	679	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 factors based on Table 3-4 of USEPA 2009. Table 3-1 describes both crew boats and tugboats as Harbor Vessels; therefore, load factors are for Harbor Vessels.

[3] Emission factors based on Table 5 of USEPA 2022a. Tier 0 factors were used for both types of boats, providing a conservative assumption for pollutants for which the areas are in non-attainment.

[4] Emission factors based on Table 3-8 of USEPA 2009. 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.

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	1.48	9.46	0.27	0.23	0.24	0.01	567.20	0.02	0.08	574.05
TOTAL	**1.48**	**9.46**	**0.27**	**0.23**	**0.24**	**0.01**	**567.20**	**0.02**	**0.08**	**574.05**

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 harbor tug to account for auxiliary engines based on Table 3-10 of USEPA 2009.

[3] Global Warming Potential: CO_2 = 1; N_2O = 298; CH_4 = 25 (USEPA 40 CFR 98 Table A-1 [5/19]).

Table C-10. Annual emissions of hazardous air pollutants from site characterization and site assessment activities

Pollutant	Pollutant Code	Basis	Fraction[1]	Survey HRG	Survey Geotechnical & Benthic	Survey Biological	Buoy Installation	Buoy O&M
1,3-Butadiene	106990	VOC	1.01E-03	1.86E-03	1.08E-03	1.29E-03	1.38E-04	2.76E-04
2,2,4-Trimethylpentane	540841	VOC	7.12E-03	1.31E-02	7.56E-03	9.09E-03	9.68E-04	1.94E-03
Acenaphthene	83329	VOC	5.09E-05	9.33E-05	5.41E-05	6.50E-05	6.92E-06	1.38E-05
Acenaphthylene	208968	VOC	1.18E-04	2.16E-04	1.25E-04	1.51E-04	1.60E-05	3.21E-05
Acetaldehyde	75070	VOC	9.78E-03	1.79E-02	1.04E-02	1.25E-02	1.33E-03	2.66E-03
Acrolein	107028	VOC	1.85E-03	3.39E-03	1.96E-03	2.36E-03	2.51E-04	5.03E-04
Ammonia	NH_3	$PM_{2.5}$	1.92E-02	3.00E-02	1.74E-02	2.09E-02	2.22E-03	4.45E-03
Anthracene	120127	VOC	3.44E-04	6.31E-04	3.65E-04	4.39E-04	4.68E-05	9.36E-05
Antimony	7440360	$PM_{2.5}$	6.15E-04	9.58E-04	5.55E-04	6.67E-04	7.11E-05	1.42E-04
Arsenic	7440382	$PM_{2.5}$	2.59E-05	4.04E-05	2.34E-05	2.81E-05	2.99E-06	5.99E-06
Benz[a]Anthracene	56553	$PM_{2.5}$	8.82E-06	1.37E-05	7.96E-06	9.57E-06	1.02E-06	2.04E-06
Benzene	71432	VOC	4.74E-03	8.69E-03	5.03E-03	6.05E-03	6.45E-04	1.29E-03
Benzo[a]Pyrene	50328	$PM_{2.5}$	4.18E-06	6.51E-06	3.77E-06	4.53E-06	4.83E-07	9.66E-07
Benzo[b]Fluoranthene	205992	$PM_{2.5}$	8.35E-06	1.30E-05	7.54E-06	9.06E-06	9.65E-07	1.93E-06
Benzo[k]Fluoranthene	207089	$PM_{2.5}$	4.18E-06	6.51E-06	3.77E-06	4.53E-06	4.83E-07	9.66E-07
Benzo(g,h,i)Perylene	203123	$PM_{2.5}$	1.32E-04	2.06E-04	1.19E-04	1.43E-04	1.53E-05	3.05E-05
Cadmium	7440439	$PM_{2.5}$	2.36E-04	3.68E-04	2.13E-04	2.56E-04	2.73E-05	5.45E-05
Chrysene	218019	$PM_{2.5}$	1.63E-05	2.54E-05	1.47E-05	1.77E-05	1.88E-06	3.77E-06
Chromium (VI)	18540299	$PM_{2.5}$	7.24E-09	1.13E-08	6.53E-09	7.85E-09	8.37E-10	1.67E-09
Dibenzo[a,h]anthracene	53703	$PM_{2.5}$	8.65E-06	1.35E-05	7.81E-06	9.38E-06	9.99E-07	2.00E-06
Ethyl Benzene	100414	VOC	4.39E-04	8.05E-04	4.66E-04	5.61E-04	5.97E-05	1.19E-04
Fluoranthene	206440	$PM_{2.5}$	8.97E-05	1.40E-04	8.10E-05	9.73E-05	1.04E-05	2.07E-05
Fluorene	86737	VOC	1.64E-04	3.01E-04	1.74E-04	2.09E-04	2.23E-05	4.46E-05
Formaldehyde	50000	VOC	4.27E-02	7.83E-02	4.54E-02	5.45E-02	5.81E-03	1.16E-02
Indeno[1,2,3-c,d]Pyrene	193395	$PM_{2.5}$	8.35E-06	1.30E-05	7.54E-06	9.06E-06	9.65E-07	1.93E-06

Pollutant	Pollutant Code	Basis	Fraction[1]	Survey HRG	Survey Geotechnical & Benthic	Survey Biological	Buoy Installation	Buoy O&M
Lead	7439921	$PM_{2.5}$	1.25E-04	1.95E-04	1.13E-04	1.36E-04	1.44E-05	2.89E-05
Manganese	7439965	$PM_{2.5}$	3.22E-06	5.02E-06	2.91E-06	3.49E-06	3.72E-07	7.44E-07
Mercury	7439976	$PM_{2.5}$	4.18E-08	6.51E-08	3.77E-08	4.53E-08	4.83E-09	9.66E-09
Naphthalene	91203	VOC	3.13E-02	5.74E-02	3.33E-02	4.00E-02	4.26E-03	8.52E-03
Hexane	110543	VOC	2.79E-03	5.12E-03	2.96E-03	3.56E-03	3.79E-04	7.59E-04
Nickel	7440020	$PM_{2.5}$	6.87E-04	1.07E-03	6.20E-04	7.45E-04	7.94E-05	1.59E-04
Polychlorinated Biphenyls	1336363	$PM_{2.5}$	4.18E-07	6.51E-07	3.77E-07	4.53E-07	4.83E-08	9.66E-08
Phenanthrene	85018	VOC	1.36E-03	2.49E-03	1.44E-03	1.73E-03	1.84E-04	3.69E-04
Propionaldehyde	123386	VOC	1.52E-03	2.78E-03	1.61E-03	1.94E-03	2.06E-04	4.13E-04
Pyrene	129000	$PM_{2.5}$	3.37E-05	5.25E-05	4.74E-05	5.14E-05	5.94E-06	1.37E-06
Selenium	7782492	$PM_{2.5}$	4.38E-08	6.82E-08	3.95E-08	4.75E-08	5.06E-09	1.01E-08
Toluene	108883	VOC	2.04E-03	3.73E-03	2.16E-03	2.60E-03	2.77E-04	5.54E-04
Xylenes (Mixed Isomers)	1330207	VOC	1.42E-03	2.61E-03	1.51E-03	1.82E-03	1.93E-04	3.87E-04
o-Xylene	95476	VOC	5.13E-04	9.41E-04	5.45E-04	6.55E-04	6.98E-05	1.40E-04
HAP Totals				**0.2335**	**0.1353**	**0.1626**	**0.0173**	**0.0346**

HAP = hazardous air pollutants; O&M = operations and maintenance; $PM_{2.5}$ = particulate matter with aerodynamic diameters of 2.5 microns or less; VOC = volatile organic compounds.

[1] USEPA 2022b.

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Appendix D: Planned Action Scenario and IPFs

D.1 Introduction

This appendix discusses resource-specific ongoing and reasonably foreseeable planned actions that could occur and for which impacts from the Proposed Action could occur in the same location and timeframe as impacts from these other actions. The Proposed Action is issuance of commercial wind energy leases within the Wind Energy Area (WEA) that the Bureau of Ocean Energy Management (BOEM) has designated on the Outer Continental Shelf (OCS) in the Gulf of Maine 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 Gulf of Maine proposed lease areas (e.g., water quality). This scope includes potential activities that would occur on the Atlantic OCS offshore Maine, Massachusetts, and New Hampshire, as well as activities that would take place in state waters. However, the geographic boundaries for the analysis for marine mammals, sea turtles, fish/fishing, and birds include the entire Gulf of Maine.

BOEM has concluded that the equipment and vessels performing these activities would be indistinguishable from existing lighted vessel traffic for an observer onshore, and therefore BOEM has not included any onshore areas as part of the study area. 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 2024 and the completion of decommissioning of meteorological (met) buoys by 2032, depending on when the leases are issued.

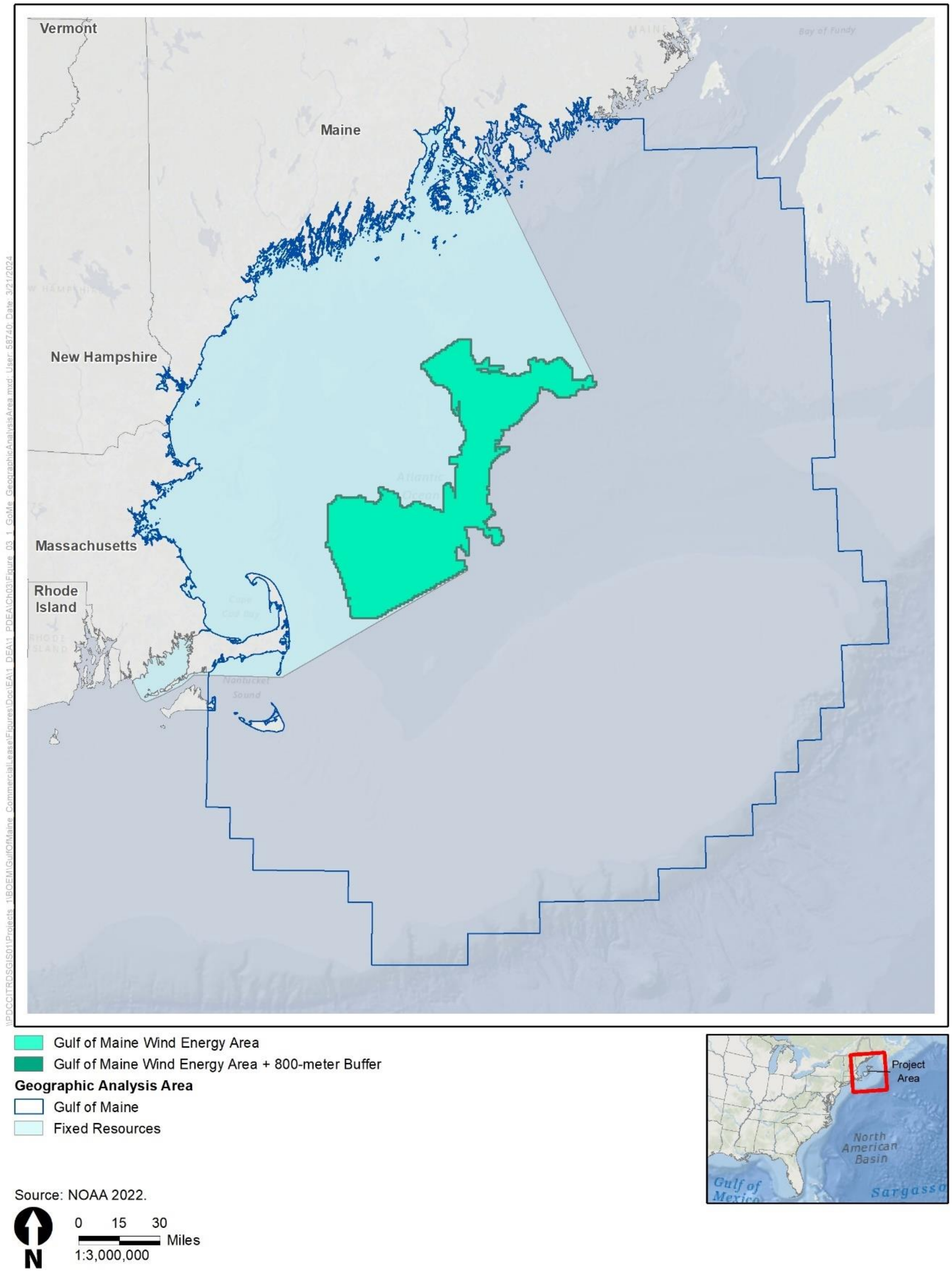

Figure D-1. Gulf of Maine Wind Energy Area shown with the geographic analysis areas

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, (1) other wind energy development activities, such as site characterization surveys; (2) commercial fisheries; (3) military use; (4) marine transportation; (5) undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); (6) marine minerals use and ocean-dredged material disposal; (7) surveys and monitoring activities; and (8) global climate change.

BOEM 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). 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.

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/seabed 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 (Avanti Corporation and Industrial Economics Inc. 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 (2024–2032). **Table D-1** provides a list of these Gulf of Maine offshore wind development projects.

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
Gulf of Maine	RFCI	State of Maine Research Lease	Site assessment and characterization	TBD (RAP not yet submitted to BOEM)
Gulf of Maine	N/A[a]	New England Aqua Ventus (NEAV)	Funding	TBD

RAP = Research Activities Plan, RFCI = Request for competitive interest.

[a] NEAV is a demonstration project planned for deployment in state waters, off the southern coast of Monhegan Island, in about 2025 (UMaine News 2020 and Musial 2023). BOEM's jurisdiction applies to the Outer Continental Shelf (OCS) which is defined [43 U.S.C. §1331(a)] as "all submerged lands lying seaward and outside of the area of lands beneath navigable waters." Therefore, the lease process for NEAV is outside of BOEM's jurisdiction.

D.2.2 Commercial Fisheries

NMFS implements regulations to manage commercial and recreational fisheries in federal waters, including those within which the Proposed Action would primarily be located. The Gulf of Maine is within the management area of NEFMC, which includes Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut. The council manages species with many Fishery Management Plans that are frequently updated, revised, and amended and coordinates internally and with interested parties and the public to jointly manage species across jurisdictional boundaries. Many of the fisheries managed by NEFMC are fished for in state waters or outside of the New England region, so NEFMC 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. ASMFC's *Amendment 3 to the Interstate Fishery Management Plan for American Lobster* cooperatively manages the American lobster resource and fishery with the states and NMFS (Lockhart and Estrella 1997). NMFS also manages highly migratory species, such as tuna and sharks, which can travel long distances and cross maritime boundaries.

The Fishery Management Plans were established, in part, to manage fisheries to avoid overfishing. They accomplish this through an array of management measures, including annual catch quotas, minimum size limits, and closed areas. These various measures can further reduce (or increase) the size of landings of commercial fisheries in the New England region. Major fisheries in the Gulf of Maine include groundfish, herring, lobster, scallop, soft-shell clam, and tuna (Gulf of Maine Council on the Marine Environment 2013).

D.2.3 Military Use

Military activities in the region can include various vessel training exercises, submarine and anti-submarine training, and U.S. Air Force exercises. The Boston Range Complex is a surface and subsurface operating area off the Maine, New Hampshire, and Massachusetts coast used for fleet training and testing activities, and consists of associated special use airspace. The Narragansett Bay Complex is located in waters adjacent to the Rhode Island and Long Island, New York coasts and is used as an exercise and operating area. Airspace Warning Areas W-103 and W-104B/W-104C overlap with the Gulf of Maine Wind Energy Area (U.S. Department of the Navy 2013). Airspace Warning Areas W-103 and W-102L/W-102H are present off the coast of Maine and W-105A and W-506 are located offshore Massachusetts and Rhode Island. The U.S. Navy, U.S. Army, U.S. Coast Guard (USCG), and U.S. Air Force have major and minor military installations along the Gulf of Maine. Ongoing onshore and offshore activities are anticipated to continue. Ongoing USCG activities in the region include search and rescue missions and response to oil discharges and hazardous substance releases into the navigable waters under the agency's Marine Environmental Protection mission.

D.2.4 Marine Transportation

Marine transportation in the region is diverse and sourced from many ports and private harbors. Commercial vessel traffic in the region includes research, tug/barge, cargo, tanker, charter and cruise ships, smaller passenger vessels, and commercial fishing vessels. Recreational vessel traffic includes private motorboats, fishing boats, and sailboats. Most vessel traffic, excluding recreational vessels, tends to travel within established vessel traffic routes (USCG 2023). As shown on **Figure D-2**, USCG has proposed the addition of six shipping safety fairways within the Gulf of Maine to preserve the unobstructed transit of vessels in conjunction with planned or potential offshore development, changes in fishery management and species distribution, and port expansions (USCG 2023). The proposed Portland Eastern Approach Fairway extends from the terminus of the existing Portland Eastern Approach TSS and would overlap with the majority of the Research Lease Area before connecting with the proposed Gulf of Maine Fairway (USCG 2023).[1] Also, the proposed Gulf of Maine Fairway intersects the northwestern most tip of the WEA which would prevent the installation of any structures within the fairway.[2] These recommended fairways will preserve unobstructed transit of densely traveled routes and port approaches and may be utilized by mariners but are not mandatory for any specific class of vessel.)

The State of Maine released an Offshore Wind Roadmap in 2023 (Governor’s Energy Office 2023) challenging municipal officials, neighboring states, and private sector companies to work together in offshore wind planning and development. Studies by BOEM, the National Renewable Energy Laboratory (NREL), and the Maine Department of Transportation have indicated that major port development will be required for cost effective harnessing of wind power. Moreover, ports in the study area are taking the initiative to identify funding for upgrades to maintain competitive and safe as commercial vessels increase in size. This Environmental Assessment identifies six ports within the study area that are expected to facilitate survey and buoy placement activities most likely to follow the Gulf of Maine wind lease auction (Searsport and Portland, Maine; Portsmouth, New Hampshire; Salem, Boston, and New Bedford Harbors, Massachusetts). The discussion below identifies latest decisions about and/or anticipated improvements at these ports.

- The Maine governor has announced Sears Island as the site for an offshore wind port. Funding for site development is pending (Maine Governor 2024).
- The Port of Portland was awarded $14 Million by the U.S. Department of Transportation, Maritime Administration (MARAD) (awarded in late 2023) to modernize a refrigerated cargo facility (MARAD 2023).
- The City of Portland has obtained sufficient funding from the State of Maine and other sources to dredge along 47 properties along Portland Harbor’s waterfront including the Portland commercial barge landing and disposal of the dredged material within a Portland Harbor Confined Aquatic Disposal (CAD) site (Dredging Today 2024).
- In 2022 the USACE, New England District, completed dredging of the Portsmouth Harbor upper turning basin in the river new Newington, New Hampshire although eelgrass mitigation has continued into 2024 (USACE 2023a). This work was completed in 2023.
- Additional disaster relief funding ($1.68 million) was earmarked by the USACE, New England District, in 2022 for surveys in and dredging of Portsmouth Harbor and the Piscataqua River (USACE 2022).

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[1] Since the establishment of a fairway prevents the construction of an artificial island or structure the capacity of the research lease area would be reduced by the Portland Eastern Approach Fairway proposed in the USCG Maine, New Hampshire, and Massachusetts Port Access Route Studies (USCG 2023). The Coast Guard Navigation Center recently completed an analysis of three alternative ship routing measure scenarios to maximize the available lease area for the construction of permanent or temporary floating offshore wind structures (USCG 2024).

[2] A shipping safety fairway or fairway means a lane or corridor in which no artificial island or fixed structure, whether temporary or permanent, will be permitted (33 CFR 166.105).

- USACE, New England District, completed a Deep Draft Navigation Improvement Project in Boston Harbor in 2022. The project resulted in navigation improvements to Boston Harbor allowing larger container ships and tankers to access the various terminals (USACE 2023b).
- The Port of New Bedford received $24 million through the MARAD grant program (awarded in late 2023) which includes funding for berth dredging to accommodate deeper draft vessels. The project also includes rebuilding and extending Leonard’s Wharf and surface dredging to remove contaminated sediments for disposal in a local Confined Aquatic Disposal (CAD) (MARAD 2023; USEPA 2024).
- The USACE, New England District earmarked $2.95 million of disaster relief funding in early 2022 for dredging and surveys in Salem Harbor. These maintenance activities will assist with the accommodation of larger passenger vessels and offshore wind industry vessels (USACE 2022; Salem Mayor’s Office 2022).

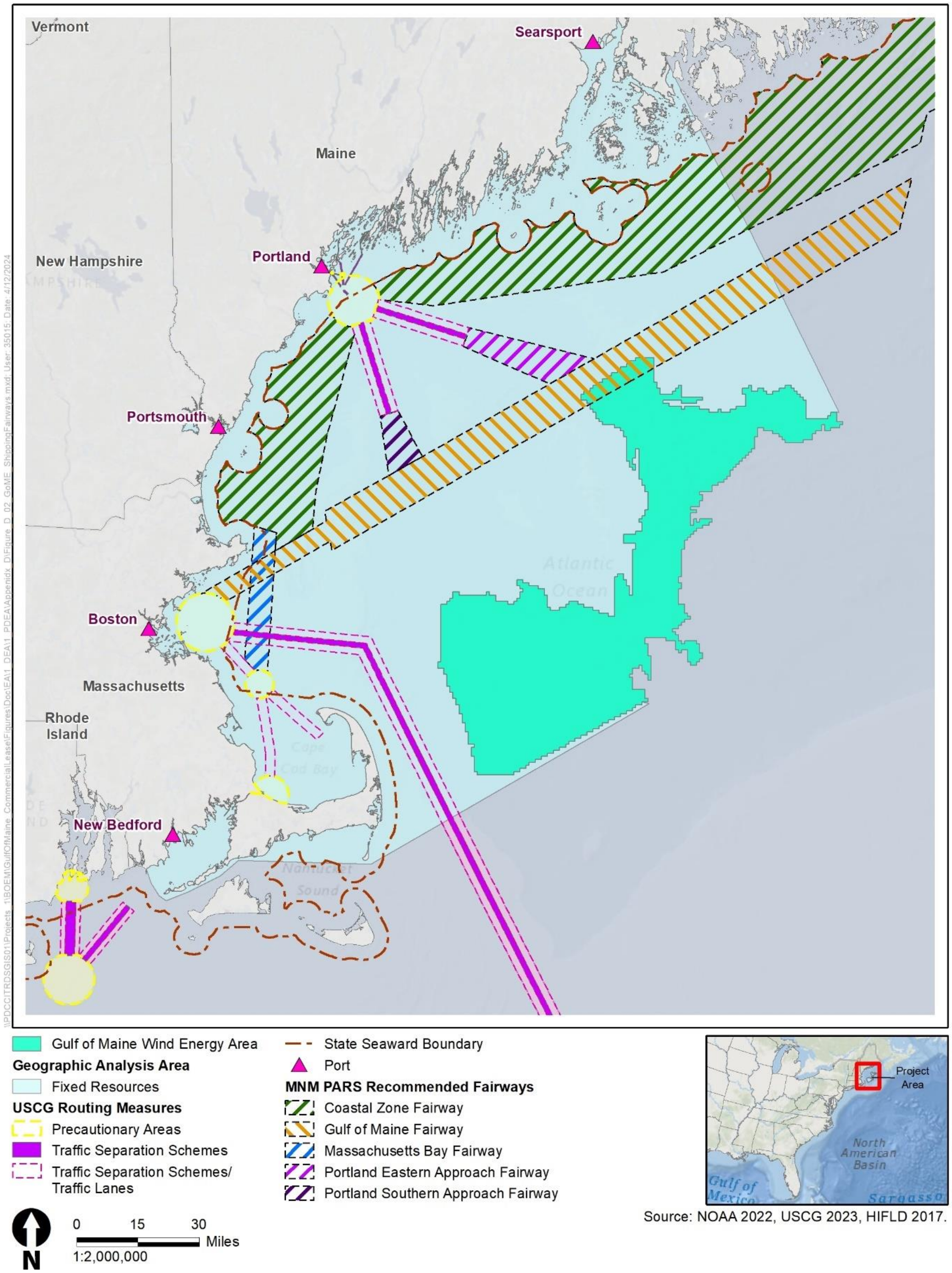

Figure D-2. Approaches to Maine, New Hampshire, and Massachusetts Port Access Route Study Recommended Fairways

D.2.5 Undersea Transmission Lines, Gas Pipelines, and Other Submarine Cables

Two undersea telecommunication cables, one existing and one planned, are present within the Gulf of Maine. To the south of the WEA, the EXA System, formerly Hibernia Atlantic, connects Massachusetts, Canada, Ireland, and the United Kingdom (NASCA 2021). The Amitié submarine cable was recently installed and connects Massachusetts, France, and the United Kingdom (Orange.com 2023). No gas pipelines are present within the Gulf of Maine. BOEM has not identified any additional publicly noticed plans for planned submarine cables or pipelines within the WEA.

D.2.6 Marine Minerals Use and Ocean Dredged Material Disposal

BOEM's Marine Minerals Program currently has no active OCS lease areas for sand borrow areas within the Gulf of Maine (BOEM 2024a). Three BOEM sand resource areas are present offshore New Hampshire in the Gulf of Maine and six sand resource aliquots are present to the north offshore Maine (BOEM 2024). Survey efforts are ongoing off the coast of Maine to characterize the seafloor habitat to identify additional marine mineral resources necessary to support beach renourishment projects (Benson and Enterline 2021).

EPA Region 1 is responsible for designating and managing ocean disposal sites for materials offshore in the Gulf of Maine. The U.S. Environmental Protection Agency has designated three currently active ocean disposal sites in the Gulf of Maine: the Portland Disposal Site, the Isles of Shoals North Disposal Site, and the Massachusetts Bay Disposal Site. USACE issues permits for the transport of dredged material for placement at these ocean disposal sites under Section 103 of the Marine Protection, Research, and Sanctuaries Act. Under Section 404 of the Clean Water Act, USACE regulates the placement of dredged material at two other active designated disposal sites in the Gulf of Maine: the Cape Cod Bay Disposal Site and the Rockland Disposal Site.

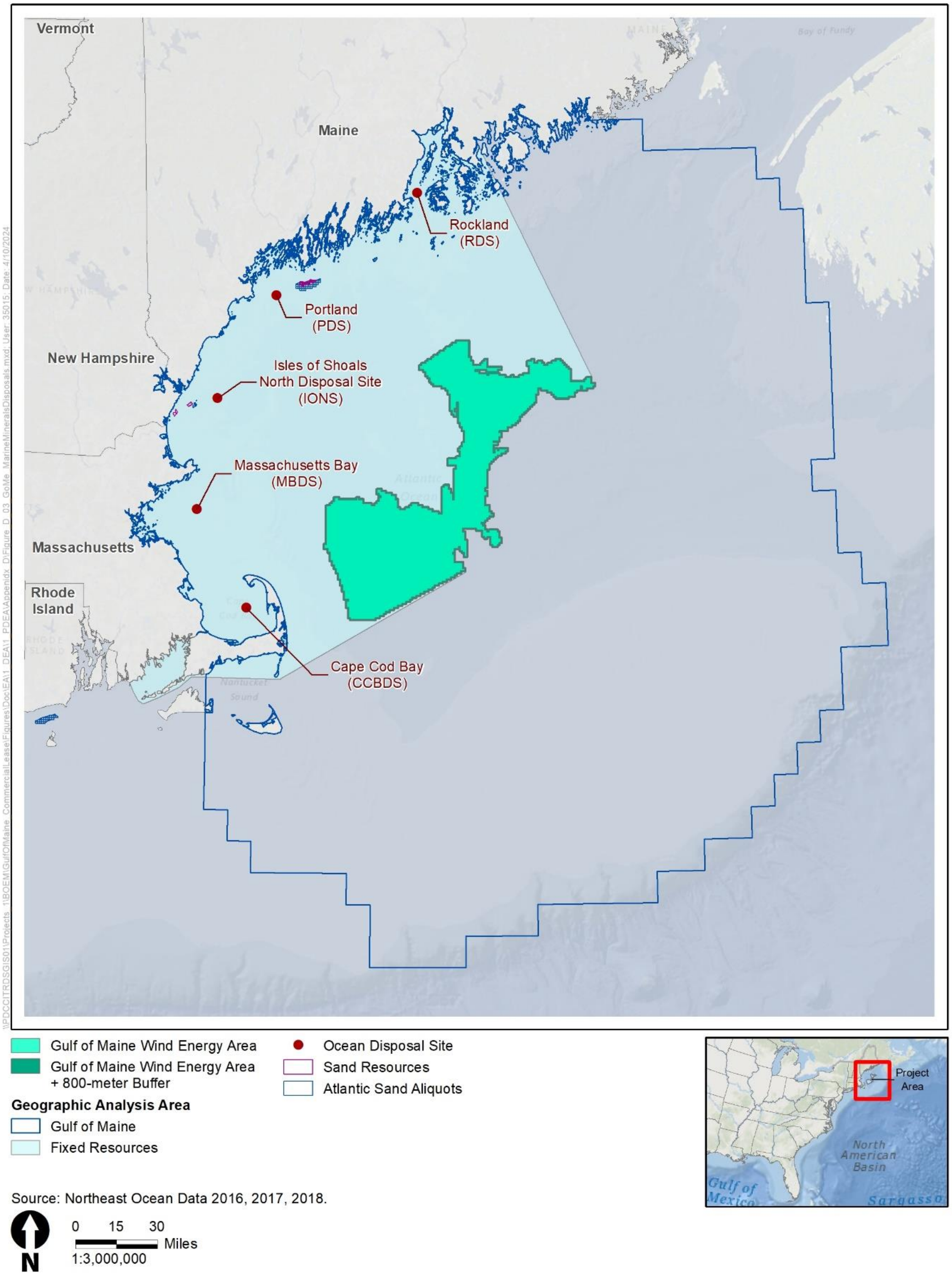

Figure D-3. Marine mineral and ocean disposal sites in the vicinity of the WEA within the Gulf of Maine

D.2.7 Surveys and Monitoring Activity

Several regional NOAA scientific surveys are conducted within the Gulf of Maine including the Autumn and Spring Bottom Trawl Survey, Ecosystem Monitoring Survey, Marine Mammal and Sea Turtle Aerial Survey, North Atlantic Right Whale Aerial Surveys, Atlantic Surfclam Survey, Ocean Quahog Survey, and Atlantic Sea Scallop Survey (Hare et al. 2022).

Passive acoustic monitoring devices are temporarily moored or deployed within the Research Lease Area through the NOAA Northeast Fisheries Science Center, Passive Acoustic Research Program and its partner organizations. Monitoring devices include temporary bottom-mounted moorings, surface buoys, and glider deployments (NEFSC 2024).

D.2.8 Global Climate Change

Although climate change is not an activity, it could contribute to cumulative impacts when combined with the incremental impacts of the Proposed Action by altering baseline environmental conditions and putting stress on natural ecosystems. Climate change results primarily from the increasing concentration of GHG emissions in the atmosphere, which causes planet-wide physical, chemical, and biological changes, substantially affecting the world's oceans and lands. Changes include increases in global atmospheric and oceanic temperature, shifting weather patterns, rising sea levels, and changes in atmospheric and oceanic chemistry (Blunden and Arndt 2020).

The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. IPCC released its Sixth Assessment Report in 2023, summarizing the state of knowledge of climate change, its widespread impacts and risks, and climate change mitigation and adaptation (IPCC 2023). The report found that, under the current nationally determined contributions of mitigation from each country until 2030, average global temperature is expected to rise to approximately 3 degrees Celsius (°C) by 2100 and continue rising afterward (IPCC 2023). Evidence of long-term changes in climate over the 20th century includes the following (IPCC 2023):

- An increase of 1.09 °C (degrees Fahrenheit [°F]) in the Earth's global average surface temperature from 1850–1900 to 2011–2020
- An increase of 0.2 meters (7.9 inches) in the global average sea level
- Decreases in the extent and volume of mountain glaciers and snow cover
- An overall decrease in growth of global agricultural productivity
- More frequent weather extremes, such as droughts, floods, severe storms, and heat waves

Current and future impacts of climate change and the way in which they overlap with renewable energy development are described 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 *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Activities on the Outer Continental Shelf* (MMS 2007) also assesses potential cumulative effects of global climate change in combination with renewable energy development. These documents are incorporated by reference. Primary impacts from global climate change on resources that could be aggravated by the incremental impacts of the Proposed Action include:

- Potential for algal blooms that deplete the water of oxygen and increase stresses on seagrasses, fish, shellfish, and benthic communities.
- Increasing ocean temperatures, acidification, and salinity resulting in suboptimal conditions for most marine organisms by 2050 in both the surface and bottom conditions (Siedlecki et al. 2021). The Gulf of Maine sea surface water temperatures have been increasing faster than most waters around the world (Seidov et al. 2021), rising an average 0.026°C per year since 1982, accelerating to 0.26°C after 2004 (Mills et al. 2013). Regional studies on the decadal warming of the Gulf of Maine have shown to be unique to normal variability and may signal a shift of the thermal regime (Seidov et al. 2021). The waters of the Scotian Shelf and slope waters have been warming at a higher rate than the Gulf of Maine recently (Seidov et al. 2021). This issue is multifaceted and will continue to require further studies to better understand the ecological implications.
- Changes in primary production levels in the ocean affecting fish stock productivity, increasing stress on fish populations, including those harvested by commercial and recreational fishing. Many fish and invertebrate species in the Northeast U.S. Shelf are highly or very highly vulnerable to climate change and climate variability (Hare et al. 2016). Sustained monitoring of zooplankton populations in the western Gulf of Maine from 2005 to 2022 indicates a substantial decline in abundance of the energy-rich stages of the planktonic copepod, *Calanus finmarchicus*, in the Gulf of Maine in summer and fall, during critical feeding times for forage fish and NARW (BOEM 2023).
- Impacts on the survival, health, migration, and distribution of marine mammals and sea turtles through impacts on their food supply and breeding habitats.
- Poleward shifts in distribution of marine populations with increasing water temperatures.

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Appendix E: Finding of No Historic Properties Affected for the Issuance of a Commercial Lease within the Gulf of Maine on the Atlantic Outer Continental Shelf Offshore Maine

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Finding of No Historic Properties Affected
for the
Issuance of a Commercial Lease within the Gulf of Maine
on the Atlantic Outer Continental Shelf Offshore Maine

June 21, 2024

Finding

The Bureau of Ocean Energy Management (BOEM) made a Finding of No Historic Properties Affected (Finding) for this undertaking, pursuant to Section 106 of the National Historic Preservation Act (NHPA) (54 U.S. Code [USC] 306108) and 36 Code of Federal Regulations (CFR) § 800.4(d)(l) of the Section 106 regulations, "Protection of Historic Places." The Finding will be met through BOEM's inclusion of lease stipulations, requiring the Lessee to identify any potential historic properties identified through their high-resolution geophysical (HRG) surveys and, if identified, avoid such areas during bottom-disturbing activities associated with site assessment and characterization activities.

Documentation in Support of the Finding

I. Description of the Undertaking

Summary

This document describes BOEM's compliance with Section 106 of the NHPA and documents the agency's Finding for the undertaking of issuing a commercial lease within the Gulf of Maine. BOEM has prepared this documentation in support of the Finding, following the standards outlined in 36 CFR § 800.11(d) (Documentation Standards). This Finding and supporting documentation has been provided to the entities that have agreed to be consulting parties for the undertaking (see the *Consultation with Appropriate Parties and the Public* section below). This Finding and supporting documentation was made available for public inspection by placement on BOEM's public website prior to the bureau approving the undertaking.

Federal Involvement

The Energy Policy Act of 2005, Pub. L. No. 109-58, added Section 8(p)(l)(C) to the Outer Continental Shelf (OCS) Lands Act (OCSLA). This new section authorized the Secretary of the Interior to issue leases, easements, or rights-of-way on the OCS for the purpose of renewable energy development, including wind energy development (see 43 USC § 1337[p][l][C]). The secretary delegated this authority to the former Minerals Management Service, now BOEM. Final regulations implementing the authority for renewable energy leasing under the OCSLA (30 CFR Part 585) were promulgated on April 22, 2009.

On March 18, 2024, BOEM announced the publication of the Gulf of Maine's Notice of Intent to prepare an Environmental Assessment (EA) for a wind energy commercial lease on the Atlantic OCS offshore Maine, pursuant to 30 CFR § 585.211(a) (Appendix A). BOEM has determined that the issuance of this commercial lease and resulting site assessment and characterization activities in and around the lease area, and between the lease area and the shoreline, constitute an undertaking subject to Section 106 of the NHPA (54 USC § 306101) (NHPA Section 106) and its implementing regulations (36 CFR 800). BOEM will serve as the lead federal agency for the NHPA Section 106 review.

Description of the Commercial Lease Area

The commercial lease area consists of one Wind Energy Area (WEA) designated within the Gulf of Maine (Figure 1). The WEA covers a total of 2,001,902 acres (8101 square kilometers) located approximately 20 nautical miles (37.0 kilometers) from the nearest shoreline.

The Undertaking

The undertaking is the issuance of a wind energy commercial lease in support of wind energy development in the Gulf of Maine and associated site assessment activities and site characterization activities. Within the commercial lease area, BOEM would issue up to 15 commercial leases not to exceed 80,000 acres each (323.8 square kilometers). The commercial lease would not authorize any construction activities on the U.S. OCS but would result in site assessment activities (i.e., placement of meteorological (met) buoys) within the WEA and site characterization activities (i.e., geophysical and geotechnical, biological, and archaeological surveys and monitoring activities) within and around the lease area and potential future project easements. A Lessee must submit the results of site characterization surveys with their plans (e.g., 30 CFR § 585.610, § 585.626, and § 585.645). Although BOEM does not issue permits or approvals for these site characterization activities, it will not consider approving a Lessee's plan if the required survey information is not included.

Site characterization activities include both HRG surveys, which do not involve seafloor-disturbing activities, and geotechnical investigations, benthic sampling, and bottom and lobster trawl surveys which may include seafloor-disturbing activities. Retrieval of lost equipment may occur, as necessary. The purpose of the HRG survey is to acquire shallow hazards data, identify potential archaeological resources, characterize seafloor conditions, and conduct bathymetric charting. BOEM anticipates that the HRG surveys would be conducted using the following equipment: multibeam echosounder, side-scan sonar, parametric sub-bottom profiler, magnetometer, and ultrahigh-resolution seismic imaging systems. This equipment does not come in contact with the seafloor and is typically towed from a moving survey vessel that does not require anchoring. BOEM does not consider the HRG survey to be an activity that has the potential to cause effects on historic properties. This activity is not considered further in this Finding.

Geophysical surveys and most biological surveys and monitoring would not create bottom disturbance, and therefore no impacts would be expected on submerged cultural resources during routine surveys of these types. Subsurface geotechnical investigations, benthic sampling, bottom and lobster trawl surveys, installation of met buoys, and vessel anchoring would result in small, localized disturbances of the seabed. BOEM's Guidelines for Providing Archaeological and Historic Property Information Pursuant to 30 CFR Part 585 state that a qualified marine archaeologist should design and interpret the results of geophysical surveys before bottom disturbance occurs (BOEM 2020). Consequently, submerged cultural resources would be avoided during site assessment and site characterization activities. The undertaking does not, however, include cable installation or a connection to shore-based facilities or consideration of commercial-scale wind energy facilities.

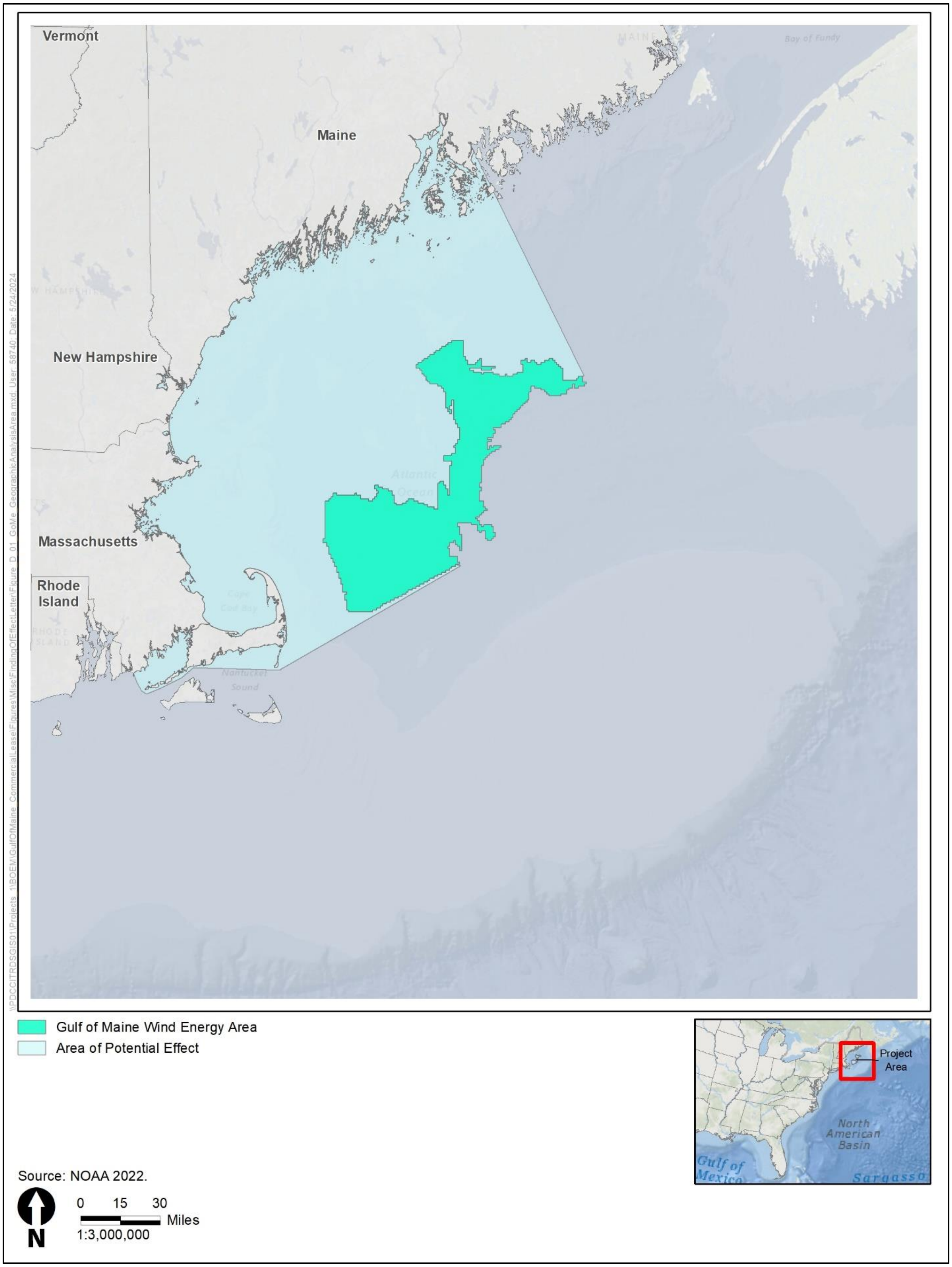

Figure 1. The Gulf of Maine Commercial Lease Area

Area of Potential Effects

As defined in the Section 106 regulations (36 CFR § 800.16[d]), the Area of Potential Effects (APE) is the geographic area, or areas, within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The dimensions of the APE are influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

The APE for this undertaking is defined as the depth and breadth of the seabed that could be affected by seafloor-/ground-disturbing activities associated with site assessment and characterization activities. The APE for site assessment and characterization activities includes the discrete horizontal and vertical areas of the seafloor that may directly affect historic properties on or below the seafloor, if present. These activities include subsurface geotechnical investigations, benthic sampling, bottom and lobster trawl surveys, installation of met buoys, and vessel anchoring.

Site assessment activities may include the temporary placement (i.e., deployment, maintenance, and decommissioning) of met buoys within the commercial lease area. Site characterization activities could occur within the commercial lease area and within potential future project easements between the lease and the shoreline to evaluate potentially suitable locations for future installation of submarine export cables and wet storage of wind turbine generators prior to installation. The locations of potential future project easements are unknown at this time and would be informed by information gathered through site characterization surveys.

The presence of met buoys is expected to result in negligible impacts on onshore historic properties because its visibility from onshore locations would be temporary (lasting approximately 4 years) and indistinguishable from lighted vessel traffic if visible from distances at least 19 nm (35 km) away. 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 existing vessel traffic over the approximately 9-year span of activities. Therefore, BOEM has not defined, as part of the APE, onshore areas from which the site characterization activities would be visible. In addition, there is no indication that the issuance of a commercial lease and subsequent site characterization will involve expansion of existing port infrastructure. Consequently, the APE for this specific undertaking does not include onshore areas.

Consultation with Consulting Parties and Public Involvement

On August 19, 2022, BOEM published a Request for Competitive Interest for the Gulf of Maine in the *Federal Register* for a 45-day public comment period. On April 25, 2023, BOEM announced the publication of the Gulf of Maine's Call for Information and Nominations. On October 19, 2023, BOEM announced a Draft Wind Energy Area (Draft WEA) in the Gulf of Maine and an accompanying a 30-day public comment period. On March 15, 2024, BOEM announced the designation of a Final Wind Energy Area (Final WEA) in the Gulf of Maine. On March 18, 2024, BOEM released a Notice of Intent to prepare an EA for a wind energy commercial lease on the Atlantic OCS offshore Maine in the *Federal Register*. The publication opened a 30-day public comment period, which closed on April 17, 2024. On June 21, 2024, the Notice of Availability for the Draft EA for the proposed Gulf of Maine commercial lease was published in the *Federal Register*. BOEM will be engaging with stakeholders through virtual public meetings held on July 8 and 10, 2024. The public comment period for the Draft EA will close on July 20, 2024.

BOEM received a letter from the Passamaquoddy Tribe dated May 13, 2024, providing comments on BOEM's Notice of Intent to Prepare an Environmental Assessment for Commercial Wind Lease Issuance, Site Characterization Activities, and Site Assessment Activities on the Atlantic Outer Continental Shelf in the Gulf of Maine Offshore the States of Maine, New Hampshire, and the Commonwealth of Massachusetts. The letter indicates "Wind energy development in the Gulf of Maine potentially threatens our fisheries and our viewsheds. As such, it implicates the Tribe's cultural wellbeing and livelihood. For these reasons, the Tribe has a significant interest in BOEM's decision-making processes with respect to offshore wind development in the WEA."

The letter concludes with the statement "The Tribe appreciates the opportunity to provide comments to BOEM. We urge BOEM to reconsider its approach and to begin developing an EIS which fully evaluates the environmental impacts of offshore wind development in the WEA. Absent that, BOEM must ensure that the WEA EA meets the standards required under NEPA and incorporates all of the recommendations described in these comments."

"The Tribe is considering becoming a cooperating agency for BOEM's NEPA process. The Notice of Intent states that "[u]pon request, BOEM will provide potential cooperating Tribal governments and agencies with a draft memorandum of agreement that includes a schedule with critical action dates and milestones, mutual responsibilities, designated points of contact, and expectations for handling pre-decision information." The Tribe had made two written requests for such information (March 29 and April 25, 2024) but has not yet received a draft memorandum of agreement with a schedule. The Tribe expects that BOEM will not move forward with this NEPA process until it has provided any requesting Tribal governments or agencies with such information and provided sufficient time (a minimum of thirty days) to review the agreement and schedule to assess internal capacity to participate as a cooperating agency."

BOEM initiated Section 106 consultation for the undertaking of issuing a commercial lease within the Gulf of Maine by sending an invitation letter on March 24, 2024, and email, including an electronic copy of the letter to the Maine State Historic Preservation Commission, the New Hampshire Division of Historical Resources, and the Massachusetts Historical Commission. BOEM sent a combined Section 106 and NEPA consultation letter on May 6, 2024, and an email with an electronic copy of the letter on May 7, 2024 to the following federally recognized Tribes: Houlton Band of Maliseet Indians, Mi'kmaq Nation, Passamaquoddy Tribe of Indians-Indian Township Reservation, Passamaquoddy Tribe of Indians-Pleasant Point Reservation, Penobscot Indian Nation, Wampanoag Tribe of Gay Head (Aquinnah), Narragansett Indian Tribe, Mashantucket (Western) Pequot Tribal Nation, Shinnecock Indian Nation, Mohegan Tribe of Connecticut, and Mashpee Wampanoag Tribe.

A list of potential Section 106 consulting parties for the undertaking was developed that included certified local governments, historical preservation societies, museums, and State-recognized Tribes. A Section 106 consultation invitation letter was sent on March 24, 2024, to 114 individuals on the list of potential Section 106 consulting parties, informing them about the undertaking and inviting them to be an NHPA Section 106 consulting party to the project (Appendix A). An email with an electronic copy of the letter was sent to the consulting parties on March 25, 2024. These letters, in part, solicited consulting party comment and input regarding the identification of historic properties as well as the potential effects on historic properties from leasing and site assessment activities for the purpose of obtaining public input for the Section 106 review (36 CFR § 800.2[d][3]) and determining their interest in participating as a consulting party (Appendix A).

BOEM received requests to become consulting parties from 20 entities. BOEM shared this Finding in draft form with the consulting parties on June 21, 2024, for a 30-calendar day review period. Further, BOEM posted this draft Finding on BOEM's webpage and the agency did not receive any public comments.

II. Description of the Steps Taken to Identify Historic Properties

BOEM has determined that separate Section 106 consultations including the identification and evaluation of historic properties, assessment of effects, and, if necessary, the resolution of adverse effects will be conducted at different stages of this lease. These Section 106 consultations will occur prior to issuing this lease and prior to approval/approval with conditions or disapproval of a Site Assessment Plan (SAP) and Construction and Operations Plan (COP).

Based on the nature and scale of this undertaking (issuing a commercial lease) with no or minimal potential to affect historic properties, BOEM has determined that the agency will meet the reasonable and good faith effort requirements for the identification and evaluation of historic properties through the evaluation of existing databases and reports identifying potential or non-potential historic properties and consultation with the federally recognized Tribes, the Maine, New Hampshire, and Massachusetts SHPOs, and consulting parties. BOEM has reviewed existing and available information regarding historic properties that may be present within the APE, including any data concerning possible historic properties not yet identified. Sources of this information include consultation with the appropriate parties, including the Maine, New Hampshire, and Massachusetts SHPOs, and information gathered through BOEM-funded studies.

Relevant BOEM studies include a review of reported shipwrecks in BOEM's Atlantic Shipwreck Database (BOEM 2021). The study compiles information on reported shipwrecks in the Atlantic Shipwreck Database and, additionally, models the potential for pre-European contact sites, based on reconstruction of sea-level rise, human settlement patterns, and site formation and preservation conditions. BOEM's Atlantic Shipwreck Database does not represent a complete listing of all potential shipwrecks on the Atlantic OCS but, rather, serves as a baseline source of existing and available information for the purposes of corroborating and supporting identification efforts.

To date, the commercial lease area has not been subjected to a complete and comprehensive archaeological identification survey.

<u>Pre-contact Historic Properties</u>

Approximately 12,500 years ago, sea-levels were about 60 m below present, the lowest sea-levels during human habitation of the Gulf of Maine (Kelley et al. 2012). The WEA location is deeper than 60 m and would have been completely submerged throughout human habitation.

Based on the present understanding of the archaeological record, early human populations developed distinct cultures and lifeways, corresponding with three broadly construed periods defined by archaeologists as Paleoindian (circa 14,500 to 10,000 B.P.), Archaic (10,000 to 3000 B.P.), and Woodland (3000 B.P. to 400 B.P.). Paleoindian society was semi-nomadic within a defined territory (TRC 2012), using a broad spectrum of plants and animals for subsistence. The Paleoindian period was a time of slowly moderating climate, with cooler temperatures, increased precipitation, and rapid sea-level rise. Several episodes of melting occurred (up to 11,000 B.P.) as a result of the North American ice sheet collapsing (TRC 2012). As the sea level rose and isostatic rebound occurred, smaller drainages were captured, and deeply incised drainages formed across portions of the OCS. These drainages formed highly localized, productive estuarine environments that would have been utilized for food procurement, fresh water sources, and habitation as the marine transgression continued moving shoreward across the OCS. The enhanced sediment flows in these drainages associated with catastrophic flooding and increased precipitation would have provided localized burial of possible Paleoindian sites, if present, below the transgressive sediment reworking. Known Paleoindian sites in New England are found onshore in upland locations, including the Vail Site and the Michaud Site in Maine, the Whortleberry Site in New Hampshire. Coastal sites with Paleoindian components are found at the Hedden, Spiller Farm, and Neal Garrison Sites in Maine, and Neponset and Bull-Brook Sites in Massachusetts. Three lanceolate bifaces (potentially from the between the Paleoindian to very early Archaic) were recovered during scallop dragging on the OCS off the tip of Black Island, Maine (Crock et al. 1993; TRC 2012; Price and Spiess 2013).

By the Early Archaic Period (10,000 B.P.), the climate had become warmer, with less precipitation. In the Gulf of Maine, the sea level had risen to less than 20 meters below present-day levels (Kelley et al. 2012). Near Blue Hill Bay, Paleosols from the Archaic period were discovered in a submerged context, with associated artifacts, in nearshore waters (Kelley et al. 2010; Price and Spiess 2007). Fishing activity, and later excavation, also yielded Archaic submerged artifacts in Jericho Bay (Bourque and Cox 1985; Stright 1990). Several other discoveries of Archaic period artifacts have been documented in the Gulf of Maine, including those recovered during commercial fishing activity at various depths (Price 2013; Price and Spiess 2013). With the exception of a lone Archaic biface, all of the artifacts from submerged contexts in the Gulf of Maine were recovered from locations that would have been subaerial at lowstand. This artifact is likely an indicator of fishing activity, and was discovered near Grumpy Ledge, Maine, in over 90 m of water, five miles from Isle au Haut.

According to sea-level curves, the Gulf of Maine WEA would have no potential for the presence of inundated pre-contact archaeological sites. Outside of the WEA, precontact inundated archaeological sites are possible within the APE in areas of less than 60 m depth.

Historic-period Historic Properties

The first known European exploration of North America was made by Norse peoples somewhere around 1,000 A.D. Evidence of these early visitations was discovered in Newfoundland, but it is not certain if Viking ships came as far south as the Gulf of Maine. Modern exploration of the Atlantic coast of North America began shortly after the first voyage of Columbus in 1492. John Cabot explored the Canadian coast in 1497 and set out to explore farther south into what is now New England in 1498, but that expedition failed to return to England. Colonization of the northeastern seaboard began in the seventeenth century, and with it an increase in vessel traffic in the waters of New England. New settlements were formed in New England, beginning with Plymouth in 1620, Massachusetts Bay in 1628, Providence in 1630, and Hartford in 1635 (TRC 2012). Fish stations spread up into the Gulf of Maine, established as far as Winter Harbor by the early seventeenth century (Rowe 1948).

By the late seventeenth century, New England had become a center of the commercial whaling industry, and was becoming an established shipbuilding region, with Boston turning out up to 15 ships per year. Maine, having vast forests, quickly became a source of wood and naval stores for the burgeoning industry. During the eighteenth century, many of the New England coastal towns began to develop shipyards, with the larger urban centers like Boston producing larger ships, and smaller ports producing boats for fishing and coastal trade. By the beginning of the American Revolution, merchant vessels built in colonial shipyards made up 30 percent of the British merchant fleet. Maine, which had been a part of Massachusetts, became a state in 1820. Within ten years Maine was producing more vessels than any other state in the Union. The Maine shipbuilding industry was dominant throughout the nineteenth century, until steel hulls became the standard in the latter part of the century (Duncan 1992; Rowe 1948).

The shipbuilding industry in New England helped support the expanding shipping industry throughout the region. International trade and demand for American raw materials helped make Boston and New York major commercial shipping centers. By the mid-nineteenth century, New York was second to London in number of ships registered to the port. American shipbuilding included the development of the American Schooner, a dependable ocean-going vessel used to move goods up and down the Atlantic seaboard throughout the nineteenth century. Over the course of the nineteenth century, steam power as a means of propulsion was improved, and steel hull construction replaced wood. In the twentieth century, steel hulls and gas-powered propulsion became the dominant features of the shipbuilding industry (TRC 2012).

Maritime traffic, whether shipping, fishing, military, or recreational, at various geographic scales, from local to international, has been a hallmark of the New England seaboard for centuries (Albion et al. 1972; Paine 2000; Rowe 1948). Consequently, shipwrecks are expected to be found within the Gulf of Maine APE, concentrated nearer the coasts and ports, and should reflect a variety of vessel types. Two shipwreck databases (i.e., Automated Wreck and Obstruction Information System (AWOIS), and Electronic Navigation Charts) were consulted to assess the number of shipwrecks in the APE. The shipwreck databases indicate there are nine shipwrecks reported within the WEA. Of these nine resources within the WEA, five are shipwrecks with documented vessel names, and documented dates for sinking. Based on the AWOIS database, there are at least 535 marine archaeological resources, or potential marine archaeological resources, reported outside of the WEA but within the APE, including 379 reported shipwrecks and 156 navigational obstructions. Examples of other historic-era submerged cultural resources that may be encountered within the commercial lease area and nearshore are downed aircraft, subsea cables, and other infrastructure.

While the Gulf of Maine WEA has negligible potential for the presence of inundated precontact landscapes, there is moderate to high potential for inundated precontact landscapes within the APE, between the WEA and the shore. There is moderate to high potential for the presence of submerged historic sites, consisting of shipwrecks, downed aircraft, or other cultural resources within the APE. Lease stipulations will require the avoidance during ground-disturbing activities of any potential historic properties identified through HRG surveys.

III. Required Elements in the Lease

Where practicable, BOEM will require avoidance of potential historic properties through lease stipulations, resulting in BOEM recording a Finding of No Historic Properties Affected, consistent with 36 CFR § 800.4(d)(1). Inclusion of the elements outlined below in the lease will ensure the identification and avoidance of historic properties; their inclusion is a requirement of this Finding.

The following elements, designed to avoid impacts on offshore historic properties from ground-disturbing activities associated with site characterization surveys, would be included in the commercial lease issued within the Gulf of Maine:

- In no case may the Lessee knowingly impact a potential archaeological resource without the Lessor's prior approval.
- The Lessee must provide the results of an archaeological survey with its plans.
- 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.
- 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:
    - Houlton Band of Maliseet Indians;
    - Mashantucket (Western) Pequot Tribal Nation;
    - Mashpee Wampanoag Tribe;
    - Mi'kmaq Nation;
    - Mohegan Tribe of Indians of Connecticut;
    - Narragansett Indian Tribe;
    - Passamaquoddy Tribe of Indians - Indian Township Reservation;
    - Passamaquoddy Tribe of Indians - Pleasant Point Reservation;
    - Penobscot Indian Nation;
    - 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.
- 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 4.6.2, the geotechnical exploration activities must avoid potential archaeological resources by a minimum of 50

meters (164 feet), 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.

- 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.

In addition, BOEM would require that the Lessee observe the "unanticipated finds" requirements at 30 CFR 585.802. The following elements would be included in the commercial lease issued within the Gulf of Maine:

- 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:
    - Immediately halt seafloor-disturbing activities in the area of discovery,
    - Notify the Lessor within 24 hours of discovery,
    - Notify the Lessor in writing by report within 72 hours of its discovery,
    - Keep the location of the discovery confidential and take no action that may adversely affect the archaeological resource until the Lessor has made an evaluation and instructs the applicant on how to proceed, and
    - 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)).

IV. The Basis for the Determination of No Historic Properties Affected

This Finding is based on a review of existing and available information conducted by BOEM, consultation with interested and affected parties, avoidance stipulations outlined in the required elements of a lease, and conclusions drawn from this information. The proposed undertaking includes the issuance of a commercial lease within the Gulf of Maine and takes into account the execution of associated site assessment and characterization activities.

The required identification and avoidance measures that will be included in the lease will ensure that the proposed undertaking will not affect historic properties. Therefore, no historic properties will be affected for the undertaking of issuing a commercial lease within the Gulf of Maine, consistent with 36 CFR § 800.4(d).

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VI. Appendices

Appendix A: Potential Consulting Parties List for Gulf of Maine Commercial Lease Environmental Assessment

Appendix A: Potential Consulting Parties List for Gulf of Maine Commercial Lease Environmental Assessment

Agency/Organization	Potential Consulting Party[a]
Federal Government	
Bureau of Safety and Environmental Enforcement	**W. Shawn Arnold***
	Berry Bleichner*
	Jordan Creed
	Daniel Leedy
U.S. Coast Guard	
Boothbay Harbor Station	
Rockland Station	
Sector Northern New England	Amy Florentino
U.S. Environmental Protection Agency–Region 1	David Cash
	Ken Moraff
	Timothy L. Timmermann
U.S. Fish and Wildlife Service	**Amanda Cross***
	Amy Wood*
	Virginia Rettig*
	Stephanie Vail-Muse*
	Karl Stromayer
U.S. National Park Service–Region 1	Mary Krueger
	Kathy Schlegel*
	Kristin Andel*
	Jonathan Meade*
	Gay Vietzke
Underwater Archaeology Branch– Naval History and Heritage Command	**Bradley Krueger***
	Alexis Catsambis*
U.S. Army Corps of Engineers	Heather Stukas
	Chris Veinotte
	Ruthann Brien*
Acadia National Park	Kevin Schneider
Federally Recognized Tribes	
Houlton Band of Maliseet Indians	Clarissa Sabattis
	Issac St. John
Mashantucket Pequot Tribal Nation	Rodney Butler
	Michael Johnson
	Crystal Whipple
	Stormy Hay
Mashpee Wampanoag Tribe	Brian Weeden
	David Weeden
	Carlton Hendricks
	Jason Steiding
	Rebekah Salguero

Agency/Organization	Potential Consulting Party[a]
Mi'kmaq Nation	Edward Peter-Paul
	Jennifer Pictou
	Jenny Gaenzle
	John Dennis
	Julia A. Miller
	Richard Silliboy
	Shannon Hill
Mohegan Tribe of Indians of Connecticut	James Gessner
	James Quinn
	Jean McInnis
Narragansett Indian Tribe	Anthony Dean Stanton
	John Brown
	Dinalyn Spears
Passamaquoddy Tribe of Indians– Indian Township Reservation	**William Nicholas***
	Donald Soctomah*
	Joseph Socobasin
Passamaquoddy Tribe of Indians– Pleasant Point Reservation	**Pos Bassett***
	Donald Soctomah*
	Ernest Neptune
Penobscot Indian Nation	Kirk Francis
	Chris Sockalexis
	Mark Sockbeson
Shinnecock Indian Nation	Bryan Polite
	Jason Cofield
	Lance Gumbs
	Shavonne Smith
	Lisa Goree
	Rachel Valdez-Costillo
	T. Rainbow Chavis
Wampanoag Tribe of Gay Head (Aquinnah)	Cheryl Andrews-Maltais
	Bettina Washington
	Al Clark
	Kevin Devine
	Lael Echo-hawk
Local Government	
Barnstable County-Cape Cod Regional Government	Elizabeth Albert
City of Gloucester	**Al Cottone***
Community of Cushing Maine	**Bill Aboud***
Knox County Administrative Office	Andrew L. Hart
Lincoln County Regional Planning	Emily Rabbe
Matinicus Isle Plantation	George Tarkleson
Sagadahoc County Administration Office	Amber Jones
Town of Barnstable	Mark S. Ells

Agency/Organization	Potential Consulting Party[a]
Town of Boothbay	Daniel G. Bryer Jr.
Town of Bremen-Select Board	Wendy Pieh
Town of Brewster	Peter Lombardi
Town of Bristol-Planning Board	**Rachel Bizarro***
Town of Chatham	**Kathleen Donovan***
	Gregory Berman*
Town of Dennis	Elizabeth Sullivan
Town of Duxbury	Rene J. Read
Town of Eastham	Jacqueline Beebe
Town of Friendship-Select Board	Arthur Thompson
Town of Harwich	Joseph F. Powers
Town of Isle au Haut-Select Board	Peggi Stevens
Town of Marshfield	**Michael A. Maresco***
Town of Monhegan Island Plantation	Carley Feibusch
Town of Nantucket	Elizabeth C. Gibson
	Lauren Sinatra*
Town of Nantucket, Massachusetts (Nantucket Historic District Commission)	Diane Coombs
Town of Nantucket, Massachusetts (Nantucket Historical Commission)	Tom Montgomery
Town of Nantucket, Massachusetts (Nantucket Planning & Economic Development Commission)	**Holly Backus***
Town of Orleans	Kimberly Newman
Town of Plymouth	Derek Brindisi
Town of Provincetown	Alexander Morse
	Melyssa Millett
Town of Rockport	Mitchell R. Vieira
Town of South Bristol	Margy Moremen
Town of St. George-Select Board	Steve Cartwright
Town of Thomaston	Kara George
Town of Truro	**Darrin Tangerman***
Town of Wellfleet	**Tom Guerino***
Town of Yarmouth	Robert L. Whritenour
Town Office of Vinalhaven-Select Board	Thomas Anthony
Non-Federally Recognized Tribes	
Chappaquiddick Tribe of Wampanoag Nation	Alexis Moreis
	Penny Gamble-Williams
Other Potentially Interested Parties	
Alliance to Protect Nantucket Sound (APNS)	**Audra Parker***
	Sandy Taylor*
College of the Atlantic	Darron Collins
Maria Mitchell Association	**Jascin Finger***
	Joanna Roche*
Nantucket Preservation Trust	**Mary Bergman***

Agency/Organization	Potential Consulting Party[a]
	Rita Carr
Preservation Organization	
American Lighthouse Foundation	
Bath Historical Society	Lisa Holley
Boothbay Region Historical Society	Kathy Goldner
Cape Cod Commission	**Sarah Korjeff*** **Heather McElroy***
Chebeague Island Historical Society	Donna Damon
Georgetown Historical Society	
Harpswell Historical Society	
Historic New England	
Maine Archaeological Society	
Maine Lighthouse Museum	Dot Black
Maine Preservation	**Brad Miller***
Marshall Point Lighthouse and Museum	
National Trust for Historic Preservation	
Rockland Historical Society	
Sagadahoc Preservation, Inc.	Alicia Romac
South Bristol Historical Society	
The Fishermen's Museum	
Vinalhaven Historical Society	
State Government	
Bureau of Parks and Land, Maine Dept of Agriculture, Conservation and Forestry	Andy Cutko
Maine Dept of Agriculture, Conservation and Forestry- Land Use Planning Commission	Stacie R. Beyer
Maine Dept of Environmental Protection	Melanie Loyzim
Maine Dept of Inland Fisheries and Wildlife	Judy A. Camuso
Maine Dept of Marine Resources	Patrick Keliher
Maine State Parks, Bureau of Parks and Lands-Southern Parks Region Office	
Massachusetts Board of Underwater Archaeological Resources	David Robinson
Massachusetts Commission on Indian Affairs	John Peters
State of Maine, Governor's Office of Policy Innovation and	Anthony Ronzio

Agency/Organization	Potential Consulting Party[a]
the Future	
Submerged Lands Program, Bureau of Parks and Lands, Maine Department of Agriculture, Conservation & Forestry	**John Noll***
Submerged Lands Program, Bureau of Parks and Lands, Maine Department of Agriculture, Conservation & Forestry	**Karen Foust***
University of Southern Maine-Casco Bay Estuary Partnership	Curtis Bohlen
Maine Historic Preservation Commission	Kirk Mohney
	Megan Rideout
Massachusetts Historical Commission	Brona Simon
	Ed Bell
New Hampshire Division of Historical Resources	Benjamin Wilson
	Elizabeth Schneible*
	Nadine Miller*

a. Accepting parties are indicated in bold/with an asterisk.

Appendix B: Concurrence Letters from the State Historic Preservation Offices

Appendix F: Literature Cited

This appendix provides the literature cited in the Executive Summary and the main Environmental Assessment (Sections 1–6). References for individual appendices are listed in each appendix.

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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 intent to prepare an Environmental Assessment (EA), the Bureau of Ocean Energy Management (BOEM) took the following action.

1. On March 18, 2024, BOEM issued a Notice of Intent (NOI) to prepare an Environmental Assessment (EA) to consider the potential environmental impacts associated with possible wind energy-related leasing, site assessment, and site characterization activities on the U.S. Atlantic Outer Continental Shelf (OCS) offshore Maine, Massachusetts, and New Hampshire, and granting of rights-of-way (ROWs) and rights-of-use and easement (RUEs) in the region. The NOI initiated a 30-day public comment period, which closed April 17, 2024.

BOEM impartially assessed and considered all comments received during the comment period for the NOI in preparation of this Draft EA. 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** lists 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-2024-0020. Some comment letters received were submitted with attachments; attachments submitted with comment letters are included in the EA administrative record but are not covered herein if not directly relevant to the proposed Gulf of Maine Auction.

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

Commenter Name	Type of Organization	Organization/Affiliation
Anonymous[a]	Individual	N/A
Kaci Bieu	Individual	N/A
Natalie Borzi	Individual	N/A
Kiara C	Individual	N/A
Zoe Ferris	Individual	N/A
David and Ellen Goethel	Individual	N/A
Mia Meister	Individual	N/A
Hunter Redmond	Individual	N/A
Samantha Ryea	Individual	N/A
Willis M Spear Jr	Individual	N/A
Brian W. Vahey	NGO	American Waterways Operators
No name provided	Business/Labor Interest	Avangrid Renewables
Jason Walsh	NGO	BlueGreen Alliance
Aubrey Church	NGO	Cape Cod Commercial Fishermen's Alliance

Commenter Name	Type of Organization	Organization/Affiliation
Japricot Valdez	NGO	Community Compass
Priscilla Brooks	NGO	Conservation Law Foundation
Daniel McKiernan	NGO	Massachusetts Division of Marine Fisheries
Tyler Soleau	State Agency	Massachusetts Office of Coastal Zone Management
Jonathan Meade	Federal Agency	National Park Service
Shayna Steingard, J. Christopher Haney, Peter Nichols, Kelt Wilska, Sarah Haggerty, Jack Shapiro, Heidi Ricci, Priscilla Brooks, Isabella DeFrancesco, David Mizrahi, and William Rossiter	NGO	National Wildlife Federation, Southern Environmental Law Center, Natural Resources Defense Council, et al.
Jerry Leeman and Dustin W. Delano	NGO	New England Fishermen's Stewardship Association
Cate O'Keefe	NGO	New England Fishery Management Counsil
Kelt Wilska	NGO	New England for Offshore Wind
Erik Anderson	Individual	New Hampshire Commercial Fishermen's Association
Cheri Patterson	State Agency	New Hampshire Fish and Game Department
Michael Pentony	Federal Agency	NOAA National Marine Fisheries Service
Michael Brown	Business/Labor Interest	Ocean Winds North America LLC
Pos Bassett and William Nicholas	Tribe	Passamaquoddy Tribe Joint Tribal Council
Ron Huber	NGO	Penobscot Bay Watch
Lane Johnston	NGO	Responsible Offshore Development Alliance
Tricia K. Jedele	NGO	The Nature Conservancy
Michael J. D'Amico	NGO	The Rewilding Institute
No name provided	NGO	University of New England
No name provided	Individual	WhoPoo App
No name provided	NGO	World Shipping Council

N/A = not applicable; NGO = nongovernmental organization; NOAA = National Oceanic Atmospheric Administration; LLC = limited liability corporation.
[a] Two anonymous comments were received.

G.1.1 Comment Review and Response Protocol

BOEM reviewed and systematically categorized all comments in the same manner and entered each individual comment document (submission) into a comment database as a unique submission. A total of 36 unique comment submissions were received during the public comment period; no form letters were submitted. 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 or changes to the Draft EA. BOEM identified 36 unique comment letters; divided the letters into categories based on the contents of the Draft EA; modified the Draft EA, as necessary; and provided responses to public comments below.

G.2 SUMMARY OF COMMENTS

This section summarizes the comments presented in the comment letters; it 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 Proposed Action

Comment Summary

BOEM received many comments requesting the Wind Energy Area (WEA) be adjusted for reasons such as adding more buffer between the leases within the WEA and the Stellwagen Bank National Marine Sanctuary, reducing the potential for cluster wakes, and leases being 150,000 acres or more each to allow for more energy. Commenters also suggested excluding Secondary Areas A, B, and C from the final WEA.

Commenters stated that the EA should examine a broad range of impacts from cable corridors in individual leases. Similarly, a commenter suggested that fixed-bottom reactive power compensation platforms or high-voltage direct current (HVDC) platforms be analyzed for installation along export cable corridors.

A group of commenters mentioned that the purpose of the leasing process is to develop commercial wind projects, and that the identification of the WEA and issuance are tied to ongoing and reasonably foreseeable activities.

The National Marine Fisheries Service (NMFS) requested that the preferred alternative align with the goals and objectives outlined in the BOEM and NMFS North Atlantic right whale (NARW) and Offshore Wind Strategy. NMFS also requested the EA contain thorough analysis of the effects on sensitive habitats and benthic features in the WEA and where surveys are to occur.

One commenter questioned how impacts on the sanctuary and surrounding waters will be minimized.

BOEM Response to Comments

BOEM published the final WEA on March 15, 2024. Portions of the final WEA may not be a part of leases issued by BOEM in the future. In addition, portions of future leases may be excluded from construction and operation activities as a part of the National Environmental Policy Act (NEPA) alternative analysis of individual lessee's Construction and Operations Plan (COP). The Secondary Areas were excluded from the Final WEA.

Site-specific project analyses, such as impacts from cable corridors and potential fixed-bottom power structures, will be analyzed once a lease has been issued and the location of specific project components are identified. BOEM's renewable energy program occurs in four distinct phases: planning, leasing, site assessment, and construction and operations. The identification of the WEA for environmental analysis and leasing consideration does not constitute a final leasing decision. This EA does not consider whether a site is suitable for commercial development; a future lessee would make that determination before submitting a COP for BOEM's review. BOEM's EA incorporates the best available science and as much detail as is feasible.

The EA follows the National Oceanic Atmospheric Administration's (NOAA's) requirements for NARW such as vessel speed restrictions, protected species observers, shutdown zones, and more. These specifics, as well as the analysis of sensitive habitats and features are discussed and analyzed in multiple sections of the EA such as **Section 3.4.3**, **Section 3.4.4**, and **Section 3.4.5**, as well as the NMFS BA.

Impacts on the sanctuary and surrounding waters will be minimized through analysis and impact minimization and mitigation measures.

G.2.2 Alternatives

Comment Summary

Multiple commenters suggested that BOEM include alternatives that address navigation and vessel traffic concerns; phased leasing; impacts on commercial fisherman; impacts on socioeconomics; and safe transit during meteorological (met) buoy deployment.

One commenter requested that BOEM consider additional alternatives including, but not limited to, issuance of fewer leases, issuance of leases in only portions of the WEA, subsea cable placement variations, and a range of methods used for site characterization and assessment activities.

BOEM Response to Comments

This EA specifically analyzes the reasonably foreseeable effects of site characterization and site assessment activities, such as the temporary placement of met buoys and oceanographic devices. The suggested alternatives may be analyzed as part of a COP NEPA review (not necessarily as an alternative, but as a resource), once a lease is leased to a developer and once turbine locations, as well as other offshore/onshore project components are identified.

Section 2.4 of the EA describes the phased approach for lease issuance. For each lease, site characterization surveys would occur in a phased approach for up to 5 years prior to a submittal of a Site Assessment Plan (SAP) and COP to BOEM.

G.2.3 Purpose and Need for Action

Comment Summary

One commenter stated that comparisons and assumptions from other East Coast offshore wind projects with different turbine types are not appropriate for this EA, because it is anticipated that the Gulf of Maine will use floating instead of fixed wind turbine generators.

One commenter suggested that BOEM should acknowledge the need for mapping and site characterization prior to the submission of COPs.

One commenter stated that there was not sufficient evidence that offshore wind was needed to meet clean power needs in the Gulf of Maine region.

BOEM Response to Comments

Appendix A of the EA describes the assumptions that BOEM used to analyze impacts. BOEM developed assumptions based on the best available information about anticipated floating offshore wind technology and relevant site characterization and survey activities. Other offshore wind projects along the East Coast are compared in this EA because of the cumulative impact of offshore wind projects along the coast. Some resources may be affected along the entire coast, not specific to the turbine type and, therefore, need to be compared and discussed cumulatively.

Section 2.1.2 of the EA describes the site characterization and site assessment activities (such as hallow hazards and geological, geotechnical, archaeological, and biological surveys) that would occur once a lease is issued in the WEA. These site characterization and site assessment activities will be used to develop mapping and site characterization reports included in lessee COP submittals to BOEM.

Massachusetts and Maine submitted state offshore wind goals in letters to BOEM commenting on the Gulf of Maine Draft Wind Energy Areas (Docket Number BOEM-2023-0054) totaling 18 GW of offshore wind in the next couple of decades. BOEM took these targets into account during the Gulf of Maine WEA ID process.

G.2.4 NEPA/Public Involvement Process

Comment Summary

Several commenters recommended that BOEM require consistency, coordination, communication, and outreach between the public, stakeholder groups, and lessees regarding surveys, such as site assessment and site characterization surveys and requested that BOEM make raw data from site assessment and characterization activities publicly available. Commenters stated that decisions are made at the local, state, and business levels prior to environmental review and requested that BOEM develop a comprehensive planning process that removes segmentation that marginalizes fisheries.

Multiple commenters stated that this project may be better suited for an Environmental Impact Statement (EIS) or a Programmatic EIS (PEIS), which would allow for a more comprehensive cumulative impact analysis and would advise BOEM and other stakeholders and lessees as to what concerns may emerge once all stages of development are considered, in addition to an EIS or PEIS having a more robust analysis of potential impacts and alternatives. Commenters also requested that wind farms complete a COP.

One commenter questioned how BOEM would be able to satisfy NEPA requirements in a document limited to 75 pages.

One commenter suggested incorporating socioeconomics into the EA analysis by analyzing job training; access to jobs regardless of language or education; maximum creation of manufacturing and construction jobs; job creation for direct, indirect, induced, and full-time equivalent jobs; and project labor agreements (PLAs), community workforce agreements (CWAs), and community benefit agreements (CBAs).

One commenter opposed the current process.

One commenter recommended BOEM consider the planning efforts underway at the Stellwagen Bank National Marine Sanctuary to identify cable easements.

One commenter requested BOEM note the potential for turbines to be affected by environmental disasters.

Commenters suggested developers test new anchoring technologies during site characterization prior to COP approval, and that the tradeoffs between different technologies and designs be evaluated as they relate to the fishing industry.

One commenter believes Maine should collaborate with Rhode Island to review changes in the ecosystem since the installation of Rhode Island's wind farm in 2016.

Commenters recommended that BOEM work with federal and state agencies to discuss or incentivize developers to use existing right-of-way pathways that may be useable for onshore components. Commenters also recommended BOEM work with states to determine the best landfall and corridor locations.

A commenter noted that the final WEA overlaps with critical habitat for the NARW and states they will submit further comments at the proposed sale notice.

A commenter requested that BOEM conduct an essential fish habitat (EFH) assessment separate from the EA.

The National Park Service (NPS) stated that many NPS resources could be affected by the actions following this EA and activities within the WEA or connected onshore activities could affect NPS locations, viewsheds, and landmarks. NPS requested that BOEM consult with NPS early in the EA process.

A commenter requested the use of quieter foundations during offshore wind installation.

One commenter requested that BOEM update this EA on a regular basis to account for new and emerging technologies.

A commenter stated that BOEM should address the cooling station component of the WEA.

One commenter requested the analysis include information about the material quality, standards, and certifications needed to obtain a supplier contract and include information regarding which components will be manufactured outside of the United States.

BOEM Response to Comments

BOEM has conducted several Gulf of Maine Task Force Meetings and meetings with fishing communities prior to the release of the NOI. The purpose of these meetings was to meet with government agencies and local fishermen to gather information to inform decisions regarding offshore wind activities; discuss the leasing process, engagement activities, and area development; and reduce industry segmentation. The public will have an opportunity to comment on this EA (an EA for Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf in the Gulf of Maine Offshore the States of Maine, New Hampshire, and Massachusetts) once the Draft EA is published.

This EA is being prepared to determine whether the issuance of leases in the WEA would lead to reasonably foreseeable significant impacts on the environment, which would ultimately lead to an EIS or PEIS prior to any lease issuance. Cumulative impacts are considered, analyzed, and discussed in the EA, and would be thoroughly discussed and analyzed as part of an EIS or PEIS if an EIS or PEIS is found to be necessary prior to lease issuance. COPs will be developed after lease issuance by a developer.

To comply with the page limits of 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 based on comments received during the public scoping period and the potential for greater than negligible incremental impacts from the Proposed Action and has moved to **Appendix B** the analysis of other resources. Other appendices provide additional supporting material, including vessel and survey assumptions and air emissions calculations.

The creation of jobs is not expected with issuance of leases; therefore, socioeconomics is not analyzed in this EA. Creation of jobs and the suggested various subsequent analyses, would occur during the COP NEPA review once manufacturing, construction, and a general number of expected jobs was known. Individual developers will be responsible for implementing PLAs, CWAs, and CBAs.

BOEM notes opposition to the current process.

The Stellwagen Bank National Marine Sanctuary is discussed throughout the EA and will be taken into consideration during the identification of cable corridors.

The impact on turbines will be evaluated as part of the COP NEPA stage once turbine specifics are known and can be analyzed.

BOEM acknowledges the suggestion that developers test new anchoring technologies.

BOEM notes that Maine may want to discuss ecological impacts from Rhode Island’s wind farm.

Existing right-of-way will likely be used for onshore project components. BOEM will work with the state as applicable to determine landing and corridor locations once project-specific components are determined.

BOEM will review comments received on the proposed sale notice in the future.

BOEM confirms that there is a separate EFH assessment in addition to this EA.

NPS will have opportunities to discuss with BOEM the potential impact on its resources. Regarding viewshed, visual simulations (blue sky and potentially dark sky simulations) may be developed as part of the COP NEPA stage once the number or turbines is known, and once turbine layouts are known and scenic and visual impacts can be determined.

Foundation types will be analyzed at the COP NEPA stage.

BOEM notes the suggestion to periodically update this EA with new and emerging technologies.

The issuance of a lease by BOEM to the lessee conveys no right to proceed with development of a wind energy facility. As such, cooling systems are not applicable to the Proposed Action and were not analyzed in this EA.

Information about the material quality, standards, and certifications needed to obtain a supplier contract and which components will be manufactured outside of the United States are typically found within a COP.

G.2.5 Planned Activities Scenario/Cumulative Impacts

Comment Summary

A commenter requested BOEM provide additional information on its cumulative effects review process and implement a regional planning process. Commenters requested that BOEM include a cumulative analysis including commercial-scale leasing in the ongoing and planned activities scenario. Analysis should account for activities planned along the East Coast. A commenter specifically stated that regional air and water quality impacts from potential manufacturing, port activities, construction, operation, and maintenance be included in the cumulative effects analysis.

Commenters requested that BOEM consider individual project and cumulative impacts as they relate to commercial fishing including impacts on benthic habitat, increased pressure and conflicts with recreational users, displacement of fishing activity, and impacts from concentrated vessel traffic.

A commenter stated that cumulative effects analysis should include all project stages as well as transmission and not separate site characterization surveys from construction, operations, and decommissioning.

BOEM Response to Comments

Cumulative impacts are referred to as planned actions in this EA, and several types of planned actions are considered in the analysis. Planned actions considered in analysis are (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. Planned actions are described in **Appendix D** of the EA.

Impacts of planned actions are carefully considered, analyzed, and addressed throughout the EA and for each resource identified as being potentially affected. BOEM considered in this EA individual project and cumulative impacts as they relate to life stages of fish, habitats, and fisheries. The EA addresses how resources, ecosystems, and communities could be affected by cumulative impacts of planned activities. Cumulative effects regarding construction, operation, and decommissioning will occur at the COP NEPA stage.

G.2.6 Analysis Scope, Methods, and Assumptions

Comment Summary

Commenters stated that given the unstudied use of floating structures on the East Coast and the potential for long distances for transmitting power to shore, the analysis should be robust and provide justification for effects. Commenters noted that evaluation should be data-driven and use research to understand potential impacts that could occur as a result of the Proposed Action. Commenters emphasized the importance of comprehensive baseline monitoring and data. Commenters specifically noted the need to evaluate effects on the following.

- Complex habitat and bottom in the Gulf of Maine
- EFH
- Inshore juvenile cod Habitat Area of Particular Concern (HAPC)
- Potential coral and hardbottom habitat
- Viewsheds and visual resources
- Marine mammals
- Endangered Species Act (ESA)-listed species

A different commenter also requested the EA identify the types of site assessments and surveys that would be required specifically for floating offshore wind projects. Commenters recommended BOEM communicate with developers to ensure the best available information is used to anticipate site assessment tools and activities. The EA should assess a broad suite of pre-construction sampling activities that could be used post-construction within a floating offshore wind array, as well as the hydrodynamic impacts of floating offshore wind infrastructure.

A commenter recommended BOEM coordinate with Regional Wildlife Science Collaborative's Habitat Subcommittee, NOAA Fisheries division, NOAA's Northeast Fisheries Science Center (NEFSC), the Responsible Offshore Development Alliance, U.S. Fish and Wildlife Service (USFWS), and other experts to determine best analysis methods and technology. One commenter stated that analysis data and spatial information should be published in standardized repositories and available to the public. The commenter also recommended that BOEM prepare a Data Management Plan prior to assessment activities.

Several commenters also recommended BOEM consider a framework to facilitate future needs to amend or supplement the EA to account for advances in technology and research. One commenter specifically noted the importance of this flexibility since offshore wind development in the Gulf of Maine is among the first to use newer floating foundation technology for wind turbines and there may be a higher level of data collection required during the site assessment and characterization phase compared to fixed foundations.

One commenter recommended BOEM exclude from leasing the ecologically important habitat area east of Parker Ridge encompassing the entirety of block 5D and the western half of block 5E. Several commenters also expressed concern with the presence of NARWs and recommended BOEM delay the lease of Secondary Area C to provide more time to collect data necessary for adequate effects analysis. Another commenter emphasized the need for thorough analysis of potential impacts on NARW and the implementation of safeguards to protect the species.

Another commenter recommended BOEM consider the fluctuation in water depth in lease areas when designating final Gulf of Maine lease areas. Leasing areas which contain consistent depth would allow for single mooring technology types within each area.

A commenter stated that BOEM’s data were flawed, stating several NOAA datasets were inadequate to assess effects of the Proposed Action. Commenters stated that BOEM should use a variety of local and regional data sources to ensure effects are adequately assessed. Another commenter stated that Historic Northeast Fisheries Science Center data can be used to inform the development of site characterization surveys.

Commenters also provided additional recommendations for analysis. One commenter encouraged BOEM to simulate near-shore transmission equipment platforms as separate scenarios under BOEM's viewshed impact studies. Several commenters requested BOEM prepare a visual simulation to reduce impacts on viewsheds. Another commenter recommended BOEM consider the use of direct-drive turbines to reduce noise levels. A commenter encouraged BOEM to evaluate potential effects related to harbors and the construction and maintenance of turbines in harbors.

One commenter stated that the Notice of Intent does not confirm whether granting easements and grants for subsea cable corridors will authorize site characterization and assessment activities in those regions or whether those activities will not be permitted until plans are submitted by a developer. The commenter has specific concerns regarding the placement of subsea cables and notes BOEM has not provided technical specifications on these cables.

BOEM Response to Comments

Floating structures may potentially be used due to the depths of the ocean off the coast of Maine, but this has not yet been determined. This EA is evaluating the potential effects of site assessment and site characterization activities such as the temporary placement of met buoys and oceanographic devices. Activities do not include the installation of met towers, because met buoys have become the preferred metocean data-collection platform for developers. Site characterization activities would most likely include geophysical, geotechnical, and biological surveys.

BOEM will coordinate with organizations and agencies throughout the EA process through task force meetings and public meetings and will accept additional comments and concerns during the Draft EA public comment period.

BOEM notes the recommendation to amend or supplement this EA in the future with new technological or research data.

Biological surveys are part of the site assessment and site characterization activities. The biological assessment (BA) will evaluate the effects of survey and data-collection activities associated with renewable energy on the Atlantic OCS. The biological surveys are listed in EA **Section 2**, **Table 2-7**. Species-specific impacts will be analyzed in this EA, and the NMFS BA.

Simulations for analysis, such as a viewshed analysis, are typically prepared by a developer once a lease has been granted. BOEM notes other recommendations such as the use of direct-drive turbines and the construction and maintenance of turbines in harbors.

The issuance of a lease by BOEM to the lessee conveys no right to proceed with development of a wind energy facility, including easements and grants for subsea cable corridors, and therefore the EA does not consider those actions.

G.2.7 Mitigation and Monitoring

Comment Summary

Multiple commenters emphasized the importance of using the best available science to examine all environmental issues within the purview of the EA. Commenters also urged BOEM to characterize the impacts expected to occur as a result of the Proposed Action, as well as the plans for avoidance, minimization, and mitigation. Specific references to best available science included:

- The incorporation of the Gulf of Maine Integrated Ecosystem Assessment that is currently under development.
- The importance of making all data available and accessible to the public.
- Completion of additional fine-scale and high-resolution habitat characterization before any site characterization and assessment survey activities, or any development or submission of COPs begin.
- The importance for BOEM to continue to gather new information in the activity area, especially for any leasing activity that is deferred to ensure best available science is up to date.
- A description of standard monitoring protocols across the lease area, as well as descriptions of how BOEM is incorporating lessons learned from earlier project designs and mitigation measures.
- The inclusion of observation-level statistics from long-time locals who frequent the Gulf of Maine, such as population-scale impacts after periods of offshore wind survey vessel activity.
- The allocation of sufficient resources to support long-term studies within the region.

Multiple commenters expressed concern over impacts on the ecosystem from construction, specifically from noise, entanglement, and increased vessels in the area. Commenters noted that multiple marine species have been observed to have strong behavioral reactions to noise and urged BOEM to request new guidelines from NMFS. Multiple commenters expressed concern over the potential for entanglement from cables associated with the floating structures, specifically on the critically endangered NARWs. Several commenters were concerned that mitigation measures for the impacts from vessels would not be enough to protect marine mammals from either the impacts from noise or direct strike. Commenters asked for specific mitigation measures during all stages of development to reduce impacts.

Commenters suggested BOEM consider sharing monitoring efforts with other projects in the area, because separate efforts miss the opportunity to detect, mitigate, and adaptively manage impacts across the ecosystem. Commenters stated that sharing data, especially baseline data, is critical for analysis, understanding, and minimization of impacts from offshore wind development.

Many commenters suggested the following specific mitigation measures and strategies.

- Evaluating alternative fish survey methods to adapt for safe and effective operation and data collection around floating wind turbines.
- Prohibiting cooling systems in future construction plans, stating any action that warms and chlorinates the ocean environment should not be permitted in any future lease agreement.
- Requesting that BOEM establish buffers around deep-sea corals that prohibit any leasing or cable easements.
- Requesting additional research on aircraft detection lighting systems (ADLS) and protection of nighttime skies within the lease area.
- Recommending a phased survey approach to minimize impacts on fragile ecosystems.
- Monitoring potential contamination of lands or waters within environmental justice communities.

Commenters recommended BOEM evaluate a broad array of activities supporting the adoption of technology that minimizes impacts and suggested site characterization work should include technology testing of anchoring and mooring systems.

Multiple commenters expressed concern over how the Proposed Action would affect the commercial fishing industry, and asked BOEM for details on mitigating this important economic aspect of the region. Commenters encouraged a comprehensive outreach plan and further clarification on important fishing grounds still within the final WEA.

Other commenters expressed concern that there is no comprehensive plan for how to avoid, minimize, and mitigate effects of commercial development in this critical habitat and would like details on how BOEM will not adversely affect habitat and at-risk species. Multiple commenters were concerned for the large amount of complex seafloor and requested details on how the Proposed Action would minimize interaction with the complex environment, stating that the ecosystem on the seafloor is the backbone of the food web, which in turn, nurtures the productivity of the entire Gulf of Maine.

BOEM Response to Comments

Mitigation and monitoring measures are described in **Section 4** and **Appendix H** of the EA.

In June 2022, BOEM released draft Guidelines for Mitigating Impacts to Commercial and Recreational Fisheries on the Outer Continental Shelf Pursuant to 30 CFR Part 585 (BOEM 2022). In this draft guidance, BOEM states that lessees are required to submit information regarding social and environmental impacts, such as recreational and commercial fishing, that could be affected by the lessee's proposed activities within their SAP (per 30 Code of Federal Regulations [CFR] 585.611(b)(7)), within their COP (per 30 CFR 585.627(a)(7)) or within their General Activities Plan (GAP) (per 30 CFR 585.646(b)(7)). Additionally, 30 CFR 585.610(a)(8) and 585.626(b)(15) require that the SAP and COP include project-specific information, which includes the proposal of mitigation measures for avoiding, minimizing, reducing, eliminating, and monitoring environmental impacts.

Other mitigation and monitoring measures will also be proposed by a lessee in addition to those that may be proposed by BOEM, any joint signatories, cooperating agencies, or consulting agencies/parties. Mitigation and monitoring measures will be available in each EIS prepared for each proposed offshore wind project as an appendix and incorporated and analyzed in detail in each resource section (such as the *Commercial Fisheries and For-Hire Recreational Fishing* section) and will continue to evolve as the environmental review progresses. Mitigation and monitoring measures will be available for public review as part of each EIS during the Notice of Availability (for draft and final EIS) periods. Mitigation and monitoring are discussed generally in an EA; however, site- and project-specific mitigation and monitoring measures are discussed in detail in an EIS. When an area is leased within the WEA, mitigation and monitoring measures will be proposed in the lessee's SAP/COP/GAP as part of the environmental review and incorporated into that lease area's EIS.

G.2.8 Air Quality and Greenhouse Gas Emissions

Comment Summary

One commenter expressed support of the project as a way to deploy new renewable energy projects that will reduce greenhouse gas (GHG) emissions and move the United States closer to its climate targets.

Another commenter was concerned that the construction of offshore wind turbines would result in increased quantities of pollutant emissions from the equipment required to construct, deploy, and operate the turbines.

BOEM Response to Comments

As described in **Section 3.4.1** of the EA, impacts on air quality from the Proposed Action would shift spatially and temporally across the analysis area, with most of the impacts overlapping during site assessment and characterization activities due to increased vessel traffic. Impacts from these activities are projected to be temporary and **negligible** in comparison to existing vessel traffic in the region. Estimated potential criteria pollutant emissions and GHG emissions for vessel operations were calculated and the results provided in **Appendix C** of the EA. In addition, air pollutant emissions from onshore activities are assumed to be **negligible** in comparison with the existing activities because existing port facilities would be used, and no expansion would be needed for these facilities to accommodate the Proposed Action.

G.2.9 Water Quality

Comment Summary

One commenter stated that a component of offshore wind energy involves a cooling process prior to the transmission of electricity to shore. The cooling process uses chlorinated seawater that is later released back into the ocean. This water is warmer and chlorinated; therefore, its disposal into the surrounding waters would create negative impacts on water quality and marine species.

BOEM Response to Comments

As described in **Section 1** of the EA, the Proposed Action is to issue commercial leases within the WEA and to grant ROWs and RUEs in the region of the Gulf of Maine OCS. Issuance of a lease by BOEM to the lessee conveys no right to proceed with development of a wind energy facility. As such, cooling systems are not applicable to the Proposed Action, and were not analyzed in this EA. A description of potential impacts on water quality is available in **Section 3.4.2** of the EA. Assessment of potential impacts on water quality would be conducted by lessees in support of the EIS that would be prepared for each proposed offshore wind installation project.

G.2.10 Benthic Resources

Comment Summary

Several commenters stated that the Gulf of Maine has a unique, complex, hard-bottom habitat containing emergent epifauna and benthic macroinvertebrates that support important fish species and associated fisheries, including an HAPC for juvenile cod. Impacts that are not minimal should be offset through methods such as habitat restoration.

Several commenters requested the EA demonstrate how interactions with sensitive coral and sponge hard-bottom habitats would be minimized to mitigate impacts from cables or moorings.

One commenter recommended that the EA analyze impacts from geophysical surveys and benthic sampling in the regions between the WEA and the coast in preparation for the establishment of cable corridors that could potentially interfere with non-related resource assessment survey operations.

One commenter advocated for a higher resolution level of benthic sampling in comparison to other WEAs along the East Coast due to the unique nature of the hard-bottom habitat in the Gulf of Maine.

One commenter requested that the impacts of construction on seafloor ecosystems be considered.

One commenter stated that the WEA overlaps with the southern portion of Jordan Basin and in proximity to sensitive habitats associated with the Hague Line. Additionally, the commenter mentioned that the WEA substantially overlaps with Jeffreys Bank and the northern and eastern edge of Cashes Ledge where there is known ecologically important hard-bottom habitat. The southwestern portion of the WEA overlaps with known coral and sponge habitat and might be particularly vulnerable to site assessment and characterization activities such as met buoy placement.

One commenter requested implementation of buffers around deep-sea corals where leasing and cable easements be prohibited.

BOEM Response to Comments

Biological surveys are necessary to characterize the biological resources that could be affected by the proposed activity. 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 EA **Chapter 2**, **Table 2-7**. Detailed benthic surveys and assessment of potential impacts on benthic resources would be conducted by lessees in support of the EIS that would be prepared for each proposed offshore wind COP submitted to BOEM.

G.2.11 Finfish, Invertebrates, and Essential Fish Habitat

Comment Summary

One commenter expressed concern regarding entanglement of monkfish egg masses in cable lines and requested this issue be addressed in the EA.

One commenter expressed concern about the coasts of Maine, New Hampshire, and Massachusetts being HAPCs for juvenile cod.

Several commenters requested review and inclusion of Atlantic States Marine Fisheries Commission-managed species in the EA, with specific mention of impacts on lobster migration in the Gulf of Maine and the region between the Gulf of Maine and Georges Bank.

One commenter requested that lease areas not be established in Marine Protected Areas.

Several commenters mentioned the impacts of turbine sound and vibration on marine species.

Many commenters expressed concern about electromagnetic fields (EMFs) from electricity transportation affecting communication, spawning, mating, and distribution of marine species including crustaceans, elasmobranch, and fish.

One commenter expressed concern about the increase in plumes and suspended particulate matter resulting from turbines and the impact of increased turbidity on fish populations such as haddock.

Several commenters mentioned the necessity for high-resolution surveys in EFH in proposed lease areas and regions of site characterization and met buoy placement with the additional mention of impacts being included in the EA.

BOEM Response to Comments

The Proposed Action (WEA) would not necessarily result in any installation of wind turbine structures, and installation of any proposed wind turbine projects would depend on (1) whether BOEM receives and accepts bids from lessees; and (2) whether BOEM issues approval of lessee submittals. An EIS would be prepared for any proposed wind turbine installation within any of the leases in the Gulf of Maine WEA; an EIS would assess potential impacts of the installation on marine ecosystems.

The purpose of the Proposed Action is to issue commercial leases within the WEA, and grant ROWs and RUEs in the region of the Atlantic OCS. The EA does not consider construction and operation of any commercial wind power facilities, which would be evaluated if a lessee submits a COP.

Cashes Ledge, Jeffreys Ledge/Stellwagen Bank, Summer Flounder, and Inshore Juvenile Atlantic Cod have been identified as HAPCs within the geographic analysis area and are described in **Sections 3.3.4** and **3.4.4** of the EA. In addition, the Eastern Maine, Jeffreys Bank, Ammen Rock, Fippennies Ledge Habitat Management Areas, and the Cod Protection Closures HMAs and the Western Gulf of Maine HMA/Closure Area within the geographic analysis area may also be affected. However, only a small number of geotechnical and benthic samples would be taken within inshore areas (including within HAPCs) associated with the potential transmission cable routes, and sampling would be subject to state-specific permit conditions relative to the undetermined transmission cable route (EA **Section 3.4.4**).

The Proposed Action would not result in generation of EMFs affecting the seabed. Potential impacts of EMFs on the seabed and marine species for proposed wind energy installations would be assessed in the EIS prepared for each proposed wind energy installation.

Documents and consultations pertaining to Section 7 of the ESA are included in the EA (e.g., Anderson 2021; Baker and Howson 2021; NMFS 2020, 2023).

Biological surveys are necessary to characterize the biological resources that could be affected by the proposed activity or could affect activities in a proposed project. 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 EA **Chapter 2**, **Table 2-7**. Detailed marine fauna surveys and assessment of potential impacts on marine fauna would be conducted by lessees in support of the EIS that would be prepared for each proposed offshore wind installation project.

G.2.12 Marine Mammals

Comment Summary

Many commenters expressed concern regarding the risk of entanglement and vessel strikes on marine mammals in the WEA.

Multiple commenters requested BOEM use the most recent scientific data on population densities and distribution of NARWs and other marine mammals to best assess risk of vessel strike and take avoidance measures during site characterization surveys.

Multiple commenters requested consideration of full impacts on NARW and inclusion of avoidance, mitigation, and monitoring plans for the NARW in the EA.

One commenter requested removal of the northern portion of the WEA due to preferred lobster and NARW habitat.

One commenter requested that BOEM consider the *North Atlantic Right Whale and Offshore Wind Strategy* when identifying lease areas, and ensure preferred alternatives identified in the EA aligns with goals and objectives outlined in the Strategy.

Multiple commenters requested authorization of an Incidental Take Permit from NMFS to account for potential harassment of marine mammals during site characterization surveys.

One commenter stated that the WEA includes critical habitat for the NARW, as well as habitat for ESA-listed species.

BOEM Response to Comments

The purpose of the Proposed Action is to issue commercial leases within the WEA and grant ROWs and RUEs in the region of the Gulf of Maine in the Atlantic OCS. The EA does not consider construction and operation of any commercial wind power facilities, which would be evaluated if a lessee submits a COP.

Discussion of site assessment surveys and potential impacts on NARW and other marine mammals, including ESA-listed species is available in **Section 3.4.5** of the EA. BOEM has performed a detailed analysis of vessel trips associated with site characterization activities, which is available in **Appendix A** of the EA. For biological surveys, BOEM assumes that all vessels associated with the Proposed Action would be required to abide by the Standard Operating Conditions (SOCs) (**Appendix H** of the EA). NMFS may require additional measures from the lessee to comply with the Marine Mammal Protection Act or the ESA.

BOEM acknowledges reference to the NARW Strategy and confirms that the Strategy was followed to the fullest extent possible during identification of the final Wind Energy Area and lease areas.

BOEM's analyses are based on annual NMFS marine mammal stock assessment reports and the Atlantic Marine Assessment Program for Protected Species, as described in **Section 3.3.6** of the EA.

BOEM is in the process of consultation and submission of a BA to NMFS. The required marine mammal mitigation measures will be developed collaboratively with NMFS, BOEM, and others to avoid impacts to the greatest degree practicable and to provide protections against the most severe types of impacts.

G.2.13 Bats and Avian Species

Comment Summary

A commenter recommended BOEM consult with local, state, and federal agencies including the Massachusetts Division of Marine Fisheries to identify best available data and determine whether vessel speed, time-of-year, and other restrictions should be put in place to protect vulnerable species. A commenter also stated that BOEM should consider the impacts of increased vessel traffic associated with site assessment and characterization surveys on avian species. The commenter requested BOEM disclose the analysis of potential effects and provide SOCs for avoiding and minimizing impacts in its NEPA analyses. Species mentioned by commenters for effects analysis included piping plover, rufa red knot, listed species, and migratory birds. A commenter recommended that BOEM evaluate potential cumulative effects on protected species during the process of delineating Call Areas, while considering cumulative impacts of other offshore wind projects on the East Coast.

BOEM Response to Comments

BOEM is conducting ongoing consultation with USFWS to assess impacts of lease issuance on birds and bats, and other species located in the Proposed Action area that are covered under ESA Section 7. The EA does not consider construction and operation of any commercial wind power facilities, which would be evaluated if a lessee submits a COP. Additionally, bats and avian species are analyzed in the USFWS BA.

G.2.14 Sea Turtles

Comment Summary

A commenter expressed concern for data gaps regarding the impacts of offshore wind energy development on sea turtles and requests for best scientific information to be considered.

BOEM Response to Comments

BOEM is in the process of consulting with and submitting a BA to NMFS.

A NMFS Geological and Geophysical (G&G) Biological Opinion (NMFS 2013) analysis 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 distinct population segment loggerhead sea turtles surviving and recovering in the wild (NMFS 2013).

G.2.15 Military Use

Comment Summary

No substantive comments received.

BOEM Response to Comments

Not applicable.

G.2.16 Navigation and Vessel Traffic

Comment Summary

Many commenters expressed concern over navigational safety within the WEA for all vessels, stating that prioritizing this protects against environmental disasters and plays a vital role in ensuring offshore wind energy initiatives can safely coexist with existing and traditional uses of the Gulf of Maine. Commenters were concerned over the overlap of the WEA with existing fairways and requested a 2-nautical-mile buffer between a fairway and the nearest fixed or permanent structure. One commenter was specifically concerned about the inclusion of Secondary Area C, noting that it is almost completely within the Gulf of Maine Fairway and could create navigation hazards and affect the supply chain. Commenters supported the removal of any areas in the WEA that are within vessel safety fairways.

Commenters asked for a full accounting of any transit lanes and fishing grounds used by offshore fisheries that will be included in the Proposed Action area, and requested BOEM examine impacts on areas around the WEA that may see increased vessel traffic, because those areas that are not designated as leases will face varying levels of impacts. In addition, commenters requested an accurate accounting of the total vessel trips required for site assessment and characterization activities. If navigational lanes are temporarily diverted during construction, the commenter requested clarification on the impact on the region.

Several commenters requested BOEM require offshore wind projects adhere to a blanket 10-knot vessel speed restriction on all project vessels at all times. Commenters also requested the project schedule be adapted to occur when NARW are least likely to be in the area and an assurance that project activities will not negatively affect whale patterns, suggesting incorporating near real-time monitoring technologies to mitigate vessel strike risk with whales.

BOEM Response to Comments

BOEM maintains continuous lines of communication with the U.S. Coast Guard (USCG) and is following their recent Port Access Route Study processes as USCG works to designate shipping safety fairways through the Gulf of Maine. BOEM anticipates that impacts on navigation and vessel traffic from site characterization and installation, maintenance, and decommissioning of met buoys and oceanographic devices are expected to be **negligible** to **minor** depending on the location selected for installation of the buoys and USCG's final rulemaking for the recommended Gulf of Maine Fairway.

If installation of a met buoy and survey vessel traffic occurs within the recommended Gulf of Maine Fairway, **minor** impacts could result from space-use conflicts with shipping vessel traffic. These space-use conflicts are anticipated to be uncommon based on the relatively low volume of existing vessel traffic, notification requirements, and buoy lighting but could occur in complex navigational scenarios. Should the execution of commercial leases and associated site assessment and site characterization activities occur outside of the recommended Gulf of Maine Fairway, impacts are expected to be **negligible** because areas outside of the fairway are less likely to be used for maneuvering shipping vessels. In either scenario, the overall effect would be small, and the resource would be expected to return to a condition with no measurable effects without any mitigation.

Vessel traffic studies that include a transit pattern analysis are a required step in the development of offshore wind projects and contribute significantly to grid layout decisions. The EA does not consider construction and operation of any commercial wind power facilities, which would be evaluated if a lessee submits a COP for proposed development in any of the leases in the WEA.

G.2.17 Commercial and Recreational Fishing

Comment Summary

Multiple commenters expressed concern over increased restrictions on commercial fishing, noting restrictions are causing an increased need in local fishing communities. Commenters are concerned increased restrictions due to the Proposed Action will exponentially affect these communities. Commenters were concerned that because of commercial wind leases, competition for increasingly scarce resources could negatively affect the economic viability of the region and increase safety risks.

One commenter recommends that BOEM conduct pre-assessment and multi-year fish studies.

Multiple commenters expressed concern over the overlap between the final WEA and important fishing and transit lines.

One commenter requested BOEM consider how in-water structures may displace fisheries and how they will assess and mitigate overcrowding conflicts both in and surrounding the WEA.

Commenters concerned about impacts on commercial and recreational fishing requested that BOEM take the following actions.

- Increase transparency and communication with the fishing industry, because their collective knowledge of the area and cumulative impacts is important to maintaining economic stability in the region.
- Explore the potential spatial and temporal impacts from lessee site assessment and characterization activities on fishery surveys that overlap with lessee activities.
- Quantify leasing and site assessment and characterization activities on lobster fisheries data.

- Use best available technology to assess impacts on commercial and recreational fishing because traditional survey methodology will not be possible.
- Analyze the impacts on current ocean users, dependent coastal communities, the fishing industry and port availability, marine habitats and ecosystems, ecosystem functions, and marine life resulting from the issuance of leases in the WEA.
- Prepare an EIS if any findings on impacts are considered significant.

BOEM Response to Comments

The EA analyzes potential effects on prominent fisheries in the Gulf of Maine but is not intended to be a comprehensive list of all managed fisheries in the region. **Section 4.2.9** of the EA includes descriptions of the commercial and recreational fishery resources. The issuance of a lease by BOEM to the lessee conveys no right to proceed with development of a wind energy facility. Therefore, this EA does not consider construction and operation of any commercial wind power facilities. Construction and operations would be evaluated if a lessee submits a COP for proposed development in any of the leases within the WEA.

Impacts on commercial and recreational fishing under the Proposed Action are expected to be **negligible** to **minor** 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 Acoustic Doppler Current Profilers or met buoys would be installed over a large geographic area, the relatively small spatial area and limited duration of sound produced from routine activities and events, and resource recovery without mitigation or remedial action. Communication and coordination between a lessee and affected anglers could greatly reduce the potential for conflict during vessel movement and buoy installation activities.

G.2.18 Recreation and Tourism

Comment Summary

Commenters requested BOEM consider impacts on recreational use on the coast, specifically Monhegan Island, the closest National Natural Landmark to the WEA; therefore, it faces the greatest potential for impact, in particular on views and nighttime skies.

BOEM Response to Comments

BOEM anticipates that the impacts on recreation and tourism as a result of site characterization and site assessment activities for the Proposed Action would be **negligible** because transient and **negligible** vessel activity (compared to existing vessel traffic levels) associated with the Proposed Action and the installation and maintenance of the proposed met buoys is not expected to lead to significant space-use conflicts with existing recreational activities in the region. The overall effect would be small, and the resource would be expected to return to a condition with no measurable effects without mitigation. For a full description of the potential impacts on recreation and tourism, see **Section 3.4.10** of the EA.

G.2.19 Cultural, Historical, and Archaeological Resources

Comment Summary

Multiple commenters encouraged BOEM to consult and work with Tribal governments and agencies, noting that there are 10 federally recognized Tribes in New England.

One commenter states that there are potential impacts to cultural resources of Tribes including interference of fishing, altered viewshed, visual pollution caused by meteorological buoys, and noise pollution and vibrations caused by on and offshore construction.

One commenter requested BOEM include an environmental justice analysis that considers disproportionate impacts to Tribes. A commenter recommended CBAs be a requirement in the development process, ensuring the diverse communities that dot the coast of the Gulf of Maine benefit equitably from the potential economic opportunities associated with offshore wind development.

Several commenters requested BOEM consider any National Historic Landmarks within view of the WEA, as well as any important scenic views that could be affected by offshore development.

BOEM Response to Comments

BOEM has determined that views and vistas of the Atlantic Ocean, free of modern visual elements, are contributing elements of some historic properties' eligibility for listing in the National Register of Historic Places. Potential adverse physical impacts on marine cultural resources and terrestrial cultural resources are possible, depending on the location of future seafloor and ground-disturbing activities. Implementation of existing federal and state cultural resource laws and regulations would reduce the severity of potential impacts in most cases.

The issuance of a lease by BOEM to the lessee conveys no right to proceed with development of a wind energy facility. Therefore, this EA does not consider construction and operation of any commercial wind power facilities. Construction and operations would be evaluated if a lessee submits a COP for proposed development in any of the leases within the WEA.

G.2.20 General Support or Opposition

Comment Summary

Many commenters expressed support of the Proposed Action.

One commenter requested BOEM minimize impacts on marine mammals, benthic habitat, EFH, and invertebrates and that more research needs to be done on the impact of wind farms.

Commenters who are in support of the Proposed Action expressed that the project would have the potential to increase clean energy production and will help reach President Biden's goal for offshore wind energy production by 2030.

Commenters stated that there is local demand and load center growth that will support the addition of offshore wind energy.

Other commenters expressed their appreciation to BOEM for stakeholder engagement through the offshore wind development process.

Several commenters expressed that the potential negative environmental impacts of wind energy are still widely unknown.

Many commenters were concerned with the impact of wind energy development on wildlife, commercial fishing, and the ability for turbine infrastructure to withstand the atmospheric conditions within the Gulf of Maine.

BOEM Response to Comments

Comments in support of, or opposition to, the WEA in the Gulf of Maine, are noted.

Biological surveys are necessary to characterize the biological resources that could be affected by the proposed activity or could affect activities of a proposed project. 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 EA **Chapter 2**, **Table 2-7**. Mitigation and monitoring measures are described in **Section 4** and **Appendix H** of the EA.

The issuance of a lease by BOEM to the lessee conveys no right to proceed with development of a wind energy facility.

G.2.21 Regulatory Compliance

Comment Summary

Several commenters advised BOEM to ensure that the development of offshore wind projects includes consultation with Indigenous Tribal governments and other affected communities.

A commenter emphasized the importance of acknowledging Indigenous sovereignty throughout the development process.

A commenter encouraged the development of stakeholder engagement plans, which allow for meaningful engagement with environmental justice initiatives.

One commenter reminded BOEM that the Gulf of Maine final WEA is outside of the action area identified during the previous programmatic informal Atlantic OCS ESA consultation completed in June 2021, and noted that this is due to a difference in the Atlantic Renewable Energy Regions in the OCS, which extend to the 100-meter depth contour. The commenter encouraged and anticipated future consultation with BOEM to help address activities that may affect ESA-listed species and critical habitats and added that developers will need to consider future Marine Mammal Protection Act permitting needs in consultation with NMFS prior to any disturbance.

One commenter encouraged BOEM to consult with Massachusetts, New Hampshire and Maine State Historic Preservation Officers, per 36 CFR 800.4(a)(2), to identify any National Register of Historic Properties or National Historic Landmarks within the area of potential effects (APE), particularly landmarks in parks that may be affected. The commenter added that NPS will likely be a Cooperating or Participating Agency in the review of any projects to eventually be developed in this area under Title 41 of Fixing America's Surface Transportation Act of 2015 (FAST-41) (42 U.S.C. 4370m), and under NEPA (42 U.S.C. 4321 et seq.)

One commenter requested that BOEM perform an individual assessment of cultural resources under Section 106.

BOEM Response to Comments

BOEM acknowledges and appreciates its regulatory duty to meaningfully engage Tribal governments and other affected communities. BOEM will adhere to all applicable local, state, and federal regulations that require public involvement and stakeholder engagement.

BOEM appreciates insights from regarding protection of National Historic Landmarks and other historic properties within the APE. BOEM will consult with all applicable State Historic Preservation Officers per 36 CFR 800.4(a)(2) and expects to coordinate with NPS on any future wind energy projects that reside in the WEA.

BOEM is in the process of consultation and submission of a BA to NMFS.

On May 6, 2024, BOEM invited the following 11 federally recognized Native American Tribes with ancestral ties to the region under consideration in the EA to participate in government-to-government consultation: Houlton Band of Maliseet Indians, Mashantucket (Western) Pequot Tribal Nation, Mashpee Wampanoag Tribe, Mi'kmaq Nation, Mohegan Tribe of Indians of Connecticut, Narragansett Indian Tribe, Passamaquoddy Tribe of Indians—Indian Township, Passamaquoddy Tribe of Indians—Pleasant Point, Penobscot Indian Nation, Shinnecock Indian Nation, and Wampanoag Tribe of Gay Head (Aquinnah). BOEM initiated Section 106 consultation through letters on March 21, 2024, with the Maine State Historic Preservation Office (SHPO), Massachusetts SHPO, New Hampshire SHPO, Advisory Council on Historic Preservation, and the aforementioned list of 11 federally recognized Native American Tribes.

G.2.22 Out of Scope

Comment Summary

One commenter stated that wind energy development could likely affect all Gulf of Maine currents, leading to significant adverse effects. Informal calculations were provided to demonstrate the amount of kinetic energy being diverted from the air-sea interface of the Eastern Maine Coastal Current, followed by a statement encouraging BOEM to consider energy diversion impacts on ocean currents and the premature disintegration of over-slowed currents.

BOEM Response to Comments

Concern regarding the impact of wind energy development on Gulf of Maine currents is noted.

The issuance of a lease by BOEM to the lessee conveys no right to proceed with development of a wind energy facility. This EA does not consider construction and operation of any commercial wind power facilities, which would be evaluated if a lessee submits a COP for proposed development in any of the leases within the WEA.

G.3 References

Anderson J. 2021. Letter to J.F. Bennett concerning the effects of certain site assessment and site characterization activities to be carried out to support the siting of offshore wind energy development projects off the U.S. Atlantic Coast. Gloucester (MA): U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

Baker, K., and U. Howson. 2021. Data Collection and Site Survey Activities for Renewable Energy on the Atlantic Outer Continental Shelf. Biological Assessment. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. October 2018, Revised February 2021. 152 p.

Bureau of Ocean Energy Management (BOEM). 2022. Guidelines for Mitigation Impacts to Commercial and Recreational Fisheries on the Outer Continential Shelf Pursuant to 30 CFR Part 585. Available: https://www.boem.gov/sites/default/files/documents/renewable-energy/DRAFT%20Fisheries%20Mitigation%20Guidance%2006232022_0.pdf. Accessed October 13, 2023.

National Marine Fisheries Service (NMFS). 2013. Endangered Species Act Section 7 consultation biological opinion. 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. Gloucester (MA): National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Greater Atlantic Regional Fisheries Office. 255 p. Report No.: NER-2012-9211, GARFO-2012-00011

National Marine Fisheries Service (NMFS). 2020. Endangered Species Act Section 7 consultation biological opinion for the construction, operation, maintenance, and decommissioning of the Vineyard Wind Offshore Energy Project (Lease OCS-A 0501). Gloucester (MA): National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 326 p. Report No.: GARFO-2019-00343.

National Marine Fisheries Service (NMFS). 2023. National Marine Fisheries Service: Summary of Endangered Species Act Acoustic Thresholds (Marine Mammals, Fishes, and Sea Turtles). January 2023. 10 p.

Appendix H: Standard Operating Conditions

This section lists the Standard Operating Conditions (SOCs) that are part of the Proposed Action. The SOCs to minimize or eliminate potential impacts on 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 Briefing. 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 protected species observers (PSOs). New personnel must be briefed as they join the work in progress.

1.2 Addendum C. 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 ESA Consultation for Biological Surveys. The Lessee must consult with BOEM, NMFS, and USFWS prior to designing and conducting a literature review intended to support offshore renewable energy plans that could interact with ESA-listed species.

2 Protected Species

2.1 Protected Species. Unless otherwise authorized by BOEM or Bureau of Safety and Environmental Enforcement (BSEE), Lessee's Outer Continental Shelf (OCS) activities must adhere to the standards outlined in the most recent literature review, as well as any measures for the protection of endangered and protected species developed during ESA Section 7 consultation with NMFS and USFWS in effect at the time the activity is initiated under this lease.

3 Archaeological Survey Requirements

3.1 Archaeological Survey. 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., Site Assessment Plan [SAP] and/or Construction and Operations Plan [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:

- Houlton Band of Maliseet Indians
- Mashantucket (Western) Pequot Tribal Nation
- Mashpee Wampanoag Tribe
- Mi’kmaq Nation

- Mohegan Tribe of Indians of Connecticut
- Narragansett Indian Tribe
- Passamaquoddy Tribe of Indians- Indian Township Reservation
- Passamaquoddy Tribe of Indians- Pleasant Point Reservation
- Penobscot Indian Nation
- Shinnecock Indian Nation
- 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). 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 submittal (i.e., SAP and/or COP) 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 164 feet (50 meters), 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 affect potential historic properties identified as a result of the High-Resolution Geophysical (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 they may elect to be present during HRG surveys and bottom-disturbing activities performed in support of plan submittal (i.e., SAP and/or COP) 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 they wish 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/or COP) submittal and after review of the location by a Qualified Marine Archaeologist under Section 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 BOEM and BSEE (TIMSWeb and notification email to env-compliance-arc@bsee.gov) within 24 hours of discovery;

3.7.3 Notify BOEM and BSEE in writing via report to BOEM and BSEE (TIMSWeb and notification email to env-compliance-arc@bsee.gov) 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 on the site or on 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 Code of Federal Regulations [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 on 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 activities must meet USCG requirements for private aids to navigation (https://www.navcen.uscg.gov/sites/default/files/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 the USFWS's Offshore Motus network.

4.3 Acoustic Detectors for Bats. The Lessee must install acoustic detectors for bats on survey vessels to supplement the data captured by buoys and are important to capture bat activity at the margins of or in proximity to the Research Lease Area, especially in the areas closest to land. The USFWS will provide a bat survey and monitoring protocol for the applicant to use as guidelines for acoustic detections.

4.4 Bird Deterrents. To minimize the attraction of birds, the Lessee must install bird deterrent devices (e.g., anti-perching), where appropriate. The Lessee will include a description of the type and location of the deterrents in their SAP.

4.5 Avian and Bat Annual Reporting. The Lessee must provide an annual report to both the Lessor and 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/labs/bird-banding-laboratory. Additionally, annual reporting of injured or dead listed species will be recorded in the Injury and Mortality Reporting (IMR) system (https://ecos.fws.gov/imr/welcome).

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

4.7 Oil Spill Response Plan. The Lessee must use approved oil spill response plan (OSRP) mitigation measures, as necessary, to prevent birds from going to affected areas including chumming, hazing, and relocating to unaffected areas.

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.