Appendix D: Planned Activities Scenario

Contents

Appendix D: Planned Activities Scenario .... D-i

D.1 Ongoing and Planned Activities Scenario D-1

D.2 Ongoing and Planned Activities D-1

D.2.1 Offshore Wind Energy Development Activities D-2

D.2.2 Commercial Fisheries Cumulative Fishery Effects Analysis D-4

D.2.3 Incorporation by Reference of Cumulative Impacts Study and the Analyses Therein D-8

D.2.4 Undersea Transmission Lines, Gas Pipelines, and Other Submarine Cables D-8

D.2.5 Tidal Energy Projects D-8

D.2.6 Dredging and Port Improvement Projects D-9

D.2.7 Marine Minerals Use and Ocean Dredged Material Disposal D-10

D.2.8 Military Use D-11

D.2.9 Marine Transportation D-11

D.2.10 National Marine Fisheries Service Activities D-12

D.2.11 Global Climate Change D-14

D.2.12 Oil and Gas Activities D-19

D.2.13 Onshore Development Activities D-20

D.3 References Cited D-25

List of Tables

Table D-1. Site characterization survey assumptions D-3
Table D-2. Future offshore wind project construction schedule (dates shown as of August 12, 2024) D-5
Table D-3. Other fishery management plans D-14
Table D-4. Climate change plans and policies D-16
Table D-5. Resiliency plans and policies in the Lease Area D-18
Table D-6. Liquid natural gas terminals in the eastern United States D-20
Table D-7. Existing, approved, and proposed onshore development activities D-21
Table D1-1. Summary of activities and the associated impact-producing factors for air quality D-37
Table D1-2. Summary of activities and the associated impact-producing factors for bats D-38
Table D1-3. Summary of activities and the associated impact-producing factors for benthic resources D-39
Table D1-4. Summary of activities and the associated impact-producing factors for birds D-41
Table D1-5. Summary of activities and the associated impact-producing factors for coastal habitats and fauna D-43
Table D1-6. Summary of activities and the associated impact-producing factors for commercial fisheries and for-hire recreational fishing D-45
Table D1-7. Summary of activities and the associated impact-producing factors for cultural resources D-47
Table D1-8. Summary of activities and the associated impact-producing factors for demographics, employment, and economics D-49
Table D1-9. Summary of activities and the associated impact-producing factors for environmental justice D-51
Table D1-10. Summary of activities and the associated impact-producing factors for finfish, invertebrates, and essential fish habitat D-52
Table D1-11. Summary of activities and the associated impact-producing factors for land use and coastal infrastructure D-55
Table D1-12. Summary of activities and the associated impact-producing factors for marine mammals D-56
Table D1-13. Summary of activities and the associated impact-producing factors for navigation and vessel traffic D-59
Table D1-14. Summary of activities and the associated impact-producing factors for other uses: military and national security uses D-60
Table D1-15. Summary of activities and the associated impact-producing factors for other uses: aviation and air traffic D-60

Table D1-16. Summary of activities and the associated impact-producing factors for other uses: cables and pipelines D-60
Table D1-17. Summary of activities and the associated impact-producing factors for other uses: radar systems D-60
Table D1-18. Summary of activities and the associated impact-producing factors for other uses: scientific research and surveys D-61
Table D1-19. Summary of activities and the associated impact-producing factors for recreation and tourism D-61
Table D1-20. Summary of activities and the associated impact-producing factors for sea turtles D-62
Table D1-21. Summary of activities and the associated impact-producing factors for water quality D-65
Table D1-22. Summary of activities and the associated impact-producing factors for scenic and visual resources D-66
Table D1-23. Summary of activities and the associated impact-producing factors for wetlands D-66
Table D2-1. Offshore wind development activities on the U.S. East Coast: Projects and assumptions (Part 1, Turbine and Cable Design Parameters) D-79
Table D2-2. Offshore wind development activities on the U.S. East Coast: Projects and assumptions (Part 2, Seabed/Anchoring Disturbance and Scour Protection) D-83
Table D2-3. Offshore wind development activities on the U.S. East Coast: Projects and assumptions (Part 3, Gallons of Coolant, Oils, Lubricants, and Diesel Fuel) D-84
Table D2-4. Offshore wind development activities on the U.S. East Coast: Projects and assumptions (Part 4, OCS Construction and Operation Emissions) D-85

This page intentionally left blank.

D.1 Ongoing and Planned Activities Scenario

This appendix describes the other ongoing and planned activities that could occur in the geographic analysis area for each resource and contribute to baseline conditions and trends for resources considered in this Environmental Impact Statement (EIS). The SouthCoast Wind Project (Project) is the construction, operations and maintenance (O&M), and conceptual decommissioning of a wind energy facility proposed by SouthCoast Wind Energy LLC (SouthCoast Wind) in its Construction and Operations Plan (COP) within the Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0521, approximately 26 nautical miles (nm) (48 kilometers [km]) south of Martha's Vineyard and 20 nm (37 km) south of Nantucket, Massachusetts.

The geographic analysis area varies for each resource as described in the individual resource sections of Chapter 3, *Affected Environment and Environmental Consequences*. BOEM anticipates that impacts could occur from the start of Project construction in 2024 through Project decommissioning. Construction of the Project is anticipated to be completed in approximately 3 years, and the decommissioning phase of the Project is anticipated to be around 35 years after construction is completed.[1] The geographic analysis area is defined by the anticipated geographic extent of impacts for each resource. For the mobile resources—bats, birds, finfish, and invertebrates; marine mammals; and sea turtles—the species potentially affected are those that occur in the area of impact of the Proposed Action. The geographic analysis area for these mobile resources is the general range of the species. The purpose is to capture the cumulative impacts on each of those resources that would be affected by the Proposed Action, as well as the impacts that would still occur under the No Action Alternative.

In this appendix, distances in miles are in statute miles (miles used in the traditional sense) or nm (miles used specifically for marine navigation). This appendix uses statute miles more commonly and refers to them simply as *miles*, whereas nm are referred to by name.

D.2 Ongoing and Planned Activities

This section includes a list and description of ongoing and planned activities that could contribute to baseline conditions and trends in the geographic analysis area for each resource topic analyzed in this EIS. Projects or actions that are considered speculative per the definition provided in 43 Code of Federal

---

[1] SouthCoast Wind's lease with BOEM (Lease OCS-A 0521) has an operations term of 33 years that commences on the date of COP approval (https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/MA/Lease-OCS-A-0521.pdf; see also 30 CFR 585.235(a)(3)). SouthCoast Wind would need to request and be granted an extension of its operations term from BOEM to operate the proposed Project for 35 years. While SouthCoast Wind has not made such a request, this EIS uses the longer period to avoid possibly underestimating any potential effects.

Regulations (CFR) 46.30[2] are noted in subsequent tables but excluded from the cumulative impact analysis in Chapter 3.

Ongoing and planned activities described in this section consist of 11 types of actions: (1) offshore wind energy development activities; (2) undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); (3) tidal energy projects; (4) dredging and port improvement projects; (5) marine minerals use and ocean-dredged material disposal; (6) military use; (7) marine transportation; (8) fisheries use, management, and monitoring surveys; (9) global climate change; (10) oil and gas activities; and (11) onshore development activities.

BOEM analyzed the possible extent of future other offshore wind energy development activities on the Atlantic Outer Continental Shelf (OCS) to determine reasonably foreseeable cumulative effects measured by installed power capacity. Attachment 2, Table D2-1, represents the status of projects as of October 1, 2022. The methodology for developing the scenario is the same as for the Vineyard Wind 1 project and details of the scenario development are described in the Vineyard Wind 1 Final EIS (BOEM 2021a).

D.2.1 Offshore Wind Energy Development Activities

D.2.1.1 Site Characterization Studies

A lessee is required to provide the results of site characterization activities with its site assessment plan (SAP) and COP. For the purposes of the cumulative impact analysis, BOEM makes the following assumptions, which represent the maximum-case scenario for survey and sampling activities:

- Site characterization would occur on all existing leases and potential export cable routes.
- Site characterization would likely take place in the first 3 years following execution of a lease, based on the fact that a lessee would likely want to generate data for its COP at the earliest possible opportunity.
- Lessees would likely survey most or all of the proposed Lease Area during the 5-year site assessment term to collect required geophysical information for siting of a meteorological tower, two buoys, and commercial facilities (wind turbines). The surveys may be completed in phases, with the meteorological tower and buoy areas likely to be surveyed first.
- Lessees would not use air guns, which are typically used for deep-penetration two-dimensional or three-dimensional exploratory seismic surveys to determine the location, extent, and properties of oil and gas resources (BOEM 2016).

[2] 43 CFR 46.30 – Reasonably foreseeable future actions include those federal and non-federal activities not yet undertaken, but sufficiently likely to occur, that a responsible official of ordinary prudence would take such activities into account in reaching a decision. The federal and non-federal activities that BOEM must take into account in the analysis of cumulative impacts include, but are not limited to, activities for which there are existing decisions, funding, or proposals identified by BOEM. Reasonably foreseeable future actions do not include those actions that are highly speculative or indefinite.

Table D-1 describes the typical site characterization surveys, the types of equipment and method used, and which resources the survey information would inform.

Table D-1. Site characterization survey assumptions

Survey Type	Survey Equipment and Method	Resource Surveyed or Information Used to Inform
HRG surveys	Side-scan sonar, sub-bottom profiler, magnetometer, multi- beam echosounder	Shallow hazards, archaeological, bathymetric charting, benthic habitat
Geotechnical/sub-bottom sampling	Vibracores, deep borings, cone penetration tests	Geological, marine archaeology
Biological	Grab sampling, benthic sled, underwater imagery/sediment profile imaging	Benthic habitat
	Aerial digital imaging; visual observation from boat or airplane	Birds, marine mammals, sea turtles
	Ultrasonic detectors installed on survey vessels used for other surveys	Bat
	Visual observation from boat or airplane	Marine fauna (marine mammals and sea turtles)
	Direct sampling of fish and invertebrates	Fish and invertebrates

Source: BOEM 2016.
HRG = high-resolution geophysical

D.2.1.2 Site Assessment Activities

After SAP approval, a lessee can evaluate the meteorological conditions, such as wind resources, with the approved installation of meteorological towers and buoys. Meteorological buoys have become the preferred meteorological and oceanographic (metocean) data collection platform for developers, and BOEM expects that most future site assessments would use buoys instead of towers (BOEM 2021b). For newly issued plans, BOEM is no longer considering the installation of met towers. The installation and operation of meteorological buoys involves substantially less activity and a much smaller footprint than the construction and operation of a meteorological tower. Site assessment activities have been approved or are in the process of being approved for multiple lease areas consisting of one to three meteorological buoys per SAP (Attachment 2, Table D2-1). Site assessment activities would likely take place starting within 1 to 2 years of lease execution, because preparation of an SAP (and subsequent BOEM review) takes time. The No Action Alternative and cumulative analyses consider these site assessment activities.

D.2.1.3 Construction and Operation of Offshore Wind Facilities

Attachment 2, Table D2-1 lists all offshore wind development activities that BOEM considers reasonably foreseeable by lease areas and projects.

D.2.2 Commercial Fisheries Cumulative Fishery Effects Analysis

Table D-2 depicts future construction of offshore wind projects from Maine to North Carolina including development of Lease Areas OCS-A 0520 and OCS-A 0522 that are proposed offshore Massachusetts adjacent to SouthCoast Wind. Also included are all of the projects currently in various stages of planning within BOEM's offshore leases from Massachusetts to North Carolina. Projected construction dates for each offshore wind project are listed in Attachment 2, Table D2-1, and each project will require a National Environmental Policy Act (NEPA) process with an EIS or environmental assessment prior to approval.

Table D-2 summarizes (1) the incremental number of construction locations that are projected to be active in each region during each year between 2021 and 2030; (2) the number of operational foundations in each region at the beginning of each year between 2021 and 2030; and (3) the total number of active construction locations and operational foundations across the Atlantic OCS by year.

Note that the Kitty Hawk project is included despite its location in the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) South Atlantic Region. Fishing vessels operating in fisheries managed by the NMFS Greater Atlantic Regional Office regularly harvest in this area. It is also likely that vessels participating in fisheries managed by the NMFS Southeast Regional Office would be affected by the Kitty Hawk project.

BOEM assumes proposed offshore wind projects would include the same or similar components as the proposed Project: wind turbines, offshore and onshore cable systems, offshore substation platform (OSP), onshore O&M facilities, and onshore interconnection facilities. BOEM further assumes that other potential offshore wind projects would employ the same or similar construction, O&M, and conceptual decommissioning activities as the proposed Project. However, offshore wind projects would be subject to evolving economic, environmental, and regulatory conditions. Lease areas may be split into multiple projects, expanded, or removed, and development in a particular lease area may occur in phases over long periods of time. Research currently being conducted in combination with data gathered regarding physical, biological, socioeconomic, and cultural resources during development of initial offshore wind projects in the United States could affect the design and implementation of future projects, as could advancements in technology. For the analysis of ongoing and planned activities the proposed projects included in Attachment 2, Table D2-1 are analyzed in Chapter 3 of this EIS. For a list of mitigation measures that were considered in the impact analysis in Chapter 3 of this EIS, please see Appendix G, *Mitigation and Monitoring*.

Table D-2. Future offshore wind project construction schedule (dates shown as of August 12, 2024)

Project/Region	Number of Foundations										
	Before 2021	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030 and Beyond
NE Aqua Ventus (Maine state waters)	-	-	-	-		-2	-	-	-	-	-
Total Other State Waters Projects	0	0	0	0	0	2	0	0	0	0	0
Estimated Other State Waters Construction Total	0	0	0	0	0	2	0	0	0	0	0
Estimated O&M Total	0	0	0	0	0	0	2	2	2	2	2
EXISTING AND ONGOING PROJECTS											
Block Island (Rhode Island state waters)	5	-	-	-	-	-	-	-	-	-	-
Vineyard Wind 1, part of OCS-A 0501	-	-	-	63-	63-	-	-	-	-	-	-
South Fork Wind, OCS-A 0517	-	-	-	13	-	-	-	-	-	-	-
CVOW-Pilot, OCS-A 0497	2	-	-	-	-	-	-	-	-	-	-
Revolution Wind, part of OCS-A 0486	-	-	-	102-	67	-	-	-	-	-	-
Ocean Wind 1, OCS-A 0498	-	-	-	-	101-	-	-101	-	-	-	-
Sunrise Wind, OCS-A 0487	-	-	-	-	95	-	-	-	-	-	-
New England Wind, OCS-A 0534 and portion of OCS-A 0501 remainder (Phase 1 [i.e., Park City Wind])[b]	-	-	-	-	-	64	-	-	-	-	-
New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])[b]	-	-	-	-	-	66	-	-	-	-	-
Empire Wind 1, part of OCS-A 0512	-	-	-	-	55	-	-	-	-	-	-
Empire Wind 2, part of OCS-A 0512	-	-	-	-	-	-	85	-	-	-	-
CVOW-Commercial, OCS-A 0483	-	-	-	-	179	-	-	-	-	-	-
Estimated Existing and Ongoing Project Construction Total											
Estimated O&M Total											
Massachusetts/Rhode Island Region											
SouthCoast Wind, OCS-A 0521[c]	-	-	-	-	-	149					
Beacon Wind 1, part of OCS-A 0520[c]	-	-	-	-		-	78	-	-	-	-

Project/Region	Number of Foundations										
	Before 2021	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030 and Beyond
Beacon Wind 2, part of OCS-A 0520	-	-	-	-	-	-	-	79	-	-	-
Bay State Wind, part of OCS-A 0500	-	-	-	-	-	-	96	-	-	-	-
OCS-A 0500 remainder							119				
OCS-A 0487 remainder											
Vineyard Wind NE, OCS-A 0522	-	-	-	-	-	-	-	160	-	-	-
Estimated annual Massachusetts/Rhode Island construction	0	0	0	0	70	149	293	293	0	0	0
Estimated O&M total	0	0	0	0	0	70	414	442	681	681	681
New York/New Jersey Region											
Atlantic Shores South, OCS-A 0499	-	-	-	-	-		197		-	-	-
Atlantic Shores North, OCS-A 0549										158	
Ocean Wind 2, OCS-A 0532	-	-	-	-	-	-	111				
Bluepoint Wind, OCS-A 0537	-	-	-	-	-	-	-	82	-	-	-
Attentive Energy OCS-A 0538								102			
Ocean Wind 2, part of OCS- A 0532							111				
Community Offshore Wind OCS A- 0539								148			
Atlantic Shores Offshore Wind Bight, OCS-A 0541								95			
Invenergy Wind Offshore, OCS-A 0542								99			
Vineyard Mid-Atlantic, LLC, OCS-A 0544								104			
Estimated annual New York/New Jersey construction	0	0	0				111	630	0	158	0
Estimated O&M total	0	0	0	0	0	0	0	111	741	741	899
Delaware/Maryland Region											
Skipjack, OCS-A 0519	-	-	-	-	-	-	17	-	-	-	-
US Wind/Maryland Offshore Wind, part of OCS-A 0490						125					
GSOE I, OCS-A 0482							96				
OCS-A 0519 remainder											
Estimated annual Delaware/Maryland construction	0	0	0	0	0	125	113	0	0	0	0
Estimated O&M total	0	0	0	0	0	0	125	238	238	238	238

Project/Region	Number of Foundations										
	Before 2021	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030 and Beyond
Virginia/North Carolina Region											
Kitty Hawk North, OCS-A 0508							70				
Kitty Hawk South, OCS-A 0508 remainder							123				
TotalEnergies Renewables Wind, OCS-A 0545							65				
Duke Energy Renewables Wind, OCS-A 0546							65				
Estimated annual Virginia/North Carolina construction	0	0	0	0	0	0	323	0	0	0	0
Estimated O&M total	0	0	0	0	0	0	0	323	323	323	323
Gulf of Mexico Region											
RWE Offshore US Gulf, OCS-G 37334	-	-	-	-	-	-	-	-	-	-	103
Estimated Gulf of Mexico Construction Total	0	0	0	0	0	0	0	0	0	0	103
Estimated O&M Total	0	0	0	0	0	0	0	0	0	0	0
Total											
Estimated total construction	7	0	0	13	459	406	1,223	869	0	158	103
Estimated O&M total	0	7	7	7	20	479	885	2,108	2,977	2,977	3,135

[a] BOEM recognizes that the estimates presented within this cumulative analysis are likely high, conservative estimates; however, BOEM believes that this analysis appropriately captures the potential cumulative impacts and errs on the side of maximum impacts.
[b] New England Wind Phase I and Phase 2 would collectively have no more than 130 foundations, and the maximum number of foundations for Phase I would be 64.
[c] Beacon Wind 1 and Beacon Wind 2 would collectively have no more than 157 foundations. BOEM made the assumption to split the foundation numbers evenly across both projects.
CVOW = Coastal Virginia Offshore Wind; GSOE = Garden State Offshore Energy

D.2.3 Incorporation by Reference of Cumulative Impacts Study and the Analyses Therein

BOEM has completed a study of impact-producing factors (IPFs) on the North Atlantic OCS to consider in an offshore wind development cumulative impacts scenario (BOEM 2019). The study is incorporated in this document by reference. The study identifies cause-and-effect relationships between renewable energy projects and resources potentially affected by such projects. It further classifies those relationships into a manageable number of IPFs through which renewable energy projects could affect resources. It also identifies the types of actions and activities to be considered in a cumulative impact scenario. The study identifies actions and activities that may affect the same physical, biological, economic, or cultural resources as renewable energy projects, and observes that such actions and activities may have the same IPFs as offshore wind projects.

The BOEM (2019) study identifies the relationships between IPFs associated with specific ongoing and planned activities in the North Atlantic OCS to consider in a NEPA cumulative impacts scenario. These IPFs and their relationships were used in the EIS analysis of cumulative impacts.

As discussed in the BOEM (2019) study, reasonably foreseeable activities other than offshore wind projects may also affect the same resources as the proposed Project or other offshore wind projects, possibly via the same IPFs or via IPFs through which offshore wind projects do not contribute. This appendix lists reasonably foreseeable non-offshore wind activities that may contribute to the cumulative impacts of the proposed Project.

D.2.4 Undersea Transmission Lines, Gas Pipelines, and Other Submarine Cables

Several in-service and abandoned submarine telecommunications cables are present in the offshore export cable corridor and in the vicinity of the Lease Area (COP Volume 2, Figure 14-6, Table 14-2; SouthCoast Wind 2024). The Brayton Point export cable corridor could have up to 13 crossings of planned cables and up to 3 crossings of existing pipelines. The Falmouth export cable corridor could have up to 2 crossings of existing cables and more than 7 crossings of planned cables associated with the Vineyard Wind and New England Wind 1 projects and New England Wind offshore wind projects.

The offshore wind projects listed in Attachment 2, Table D2-1 that have a COP under review are presumed to include at least one identified cable route. Cable routes have not yet been announced for the remainder of the projects.

D.2.5 Tidal Energy Projects

The Bourne Tidal Test Site located in the Cape Cod Canal near Bourne, Massachusetts, is a testing platform for tidal turbines that was installed in late 2017 by the Marine Renewable Energy Collaborative. The Bourne Tidal Test Site offers a test platform for tidal turbines (MRECo 2017, 2018). On behalf of the Marine Renewable Energy Collaborative of New England, Barrett Energy Resources Group, LLC (BERG) filed a Draft Pilot License Application dated November 3, 2021. The Draft Pilot License Application is an application to interconnect and operate a marine hydrokinetic test facility (the Bourne Tidal Test Site) (Barrett 2021).

The Roosevelt Island Tidal Energy Project is in the East Channel of the East River, a tidal strait connecting Long Island Sound with the Atlantic Ocean in New York Harbor. In 2005, Verdant Power petitioned the Federal Energy Regulatory Commission (FERC) for permission for the first U.S. commercial license for tidal power. In 2012, FERC issued a 10-year license to install up to 1 megawatt (MW) of power (30 turbines/10 TriFrames) at the Roosevelt Island Tidal Energy Project (FERC 2012a; Verdant Power 2022).

The Cobscook Bay Tidal Project, located in Maine, is a FERC-licensed tidal project that began operations in 2012 (FERC 2012b). The project owner, Ocean Renewable Power Company, informed FERC in a March 14, 2017, submittal that it did not intend to file a notice of intent (NOI) to relicense the project or a Pre-Application Document at the time. The Ocean Renewable Power Company anticipates that the project infrastructure, environmental monitoring and data analysis efforts, resource information documentation, and collaborative relationships with existing marine users will continue through the duration of the existing pilot license term through 2022 and potentially beyond (PNNL 2020). The Western Passage Tidal Energy Project, a proposed tidal energy site in the Western Passage, received a preliminary permit from FERC in 2016. The preliminary permit allows developers to study a project but does not authorize construction (PNNL 2021).

D.2.6 Dredging and Port Improvement Projects

The following dredging and port improvement projects have been proposed or studied at ports that may be used by the Project in Massachusetts, Rhode Island, Connecticut, South Carolina, Texas, and Maryland, and are either funded/under construction projects or are considered reasonably foreseeable.

- **Point Judith, Port of Galilee, Rhode Island.** The Rhode Island Department of Environmental Management (RIDEM), which operates the Port of Galilee, a Narragansett-based commercial fishing port, began four projects in 2022 in the north bulkhead area of the port totaling nearly $15 million in investments. At the end of 2023, RIDEM was in the third phase of a multi-year investment with work aimed at the replacement of bulkheads and docks, water supply, electrical, and security upgrades, and improvements to bolster the port against the effects of climate change (Office of the Governor of Rhode Island 2022; State of Rhode Island Department of Environmental Management 2023).
- **Port of Davisville, Rhode Island.** The Rhode Island Fiscal Year 2023 budget included $60 million and $35 million, respectively, for infrastructure upgrades to the Port of Davisville and the South Quay Marine Terminal in East Providence to support offshore wind activities on the U.S. East Coast. The funding for the Port of Davisville would support construction of the port's Terminal 5 Pier and completion of required dredging, preparation of about 34 acres to accommodate additional cargo laydown, and reconstruction and hardening of the existing surface of Pier 1 (Buljan 2022).
- **Massachusetts Port Authority.** The Port of Massachusetts is implementing an $850 million port upgrade project to accommodate larger freight vessels. Project work includes dredging of Boston Harbor, construction of a new berth, and installation of new ship-to-shore cranes (Glenn 2021).

- **Port of New Bedford, Massachusetts.** The New Bedford Port Authority recently completed a $17 million project to expand the North Terminal at the Port of New Bedford; adding 150,000 square feet of terminal space. The bulkhead was constructed using up to 97,000 yards of contaminated dredge material (Port of New Bedford 2022; Standard Times 2022). Additionally, the New Bedford Port Authority has been awarded $24 million to reconstruct and extend Leonard's Wharf to support commercial fishing and the offshore wind industry (Standard Times 2023).
- **New London Heavy Lift Port, Connecticut.** The Connecticut Port Authority is conducting a project to redevelop the Port of New London State Pier as a heavy-lift capable port facility, in partnership with terminal operator Gateway Terminal, and joint venture partners Ørsted and Eversource. Heavy-lift capability would support various cargoes including wind turbine construction staging and pre-assembly, including construction support for the South Fork, Revolution Wind, and Sunrise offshore wind projects. Environmental permits for in-water work and onshore construction were issued in December 2021(Connecticut Port Authority 2021a; 2021b; CT Examiner 2022). Operations began at the port in 2023 though a portion of the site remains under construction (CT Insider 2023).
- **Sparrows Point Port, Maryland.** The Sparrows Point Container Terminal project will construct a new container terminal and intermodal yard located on 330 acres within the Tradepoint Atlantic industrial development site on Sparrows Point. In addition to onshore development, the project would include the widening and deepening of an existing channel and connection into the Brewerton Federal Navigation channel. USACE is currently preparing an EIS for the project (88 FR 87414).
- **Port of Charleston, South Carolina.** Construction is currently underway at the Port of Charleston on a near-dock rail-served cargo yard and inner-harbor barge operation. The $400 million Navy Base Intermodal Facility and $150 million inner-harbor barge operation includes the construction of almost 80,000 feet of rail track and will establish a designated marine highway to move shipping containers. Construction on the project is anticipated to be complete by July 2025 (South Carolina Ports Authority 2022).
- **Port of Corpus Christi, Texas.** The $681.6 million Channel Improvement Project to widen the channel to 530 feet and deepen to 54 feet is in the final construction phase and is estimated to be complete in early 2025 (Port of Corpus Christi 2023).

D.2.7 Marine Minerals Use and Ocean Dredged Material Disposal

To help meet the sand resource needs of coastal communities, BOEM-funded reconnaissance or design-level OCS studies along the East Coast from Rhode Island to Florida have identified potential future sand resources in many areas. Sand resources identified nearest the Project include OCS locations offshore Massachusetts and Rhode Island; many of these potential sand resources are within 5 miles of the Project Lease Area and associated planned infrastructure (e.g., export cables) (Mabee and Woodruff 2016; King et al. 2016). Topographic profiles and grain size analyses were performed on sediment samples collected at 18 Massachusetts beaches experiencing erosion were taken during the summer and winter seasons from 2014 through 2016 to evaluate seasonal and spatial variability. This information will be used primarily to match native-beach material with compatible offshore sand resources for beach nourishment projects (BOEM 2016).

U.S. Environmental Protection Agency (USEPA) Region 1 is responsible for designating and managing ocean disposal sites for all materials except dredged material in the region of the Project. Under Section 103 of the Marine Protection, Research and Sanctuaries Act (MPRSA) (33 USC 1401 et seq.), USACE regulates the transportation of dredged material for purposes of dumping it into ocean water. There is one USEPA-designated open-ocean disposal site along the southern Massachusetts/Rhode Island Coast, the Rhode Island Sound Disposal Site located approximately 10 miles northeast of Block Island. The Rhode Island Sound Disposal Site was first used in 2003 and was last used in 2019 (USACE 2022). The Eastern Long Island Sound Disposal Site offshore New London, Connecticut is designated for offshore disposal and is in use (USACE 2022).

D.2.8 Military Use

The Lease Area is within the Narragansett Bay Operations Area. The Narragansett Bay Operations Area extends from the shoreline seaward to approximately 180 nm from land at its farthest point; the subsurface portion of the Narragansett Bay Operations Area has the same boundaries as the surface water portion. The offshore Narragansett Bay Range Complex provides infrastructure for U.S. Atlantic Fleet training and testing exercises (U.S. Navy 2018). The offshore Narragansett Bay Range Complex also supports training and testing by other services (Ecology & Environment 2016).

Military activities with the Narragansett Bay Range Complex can include various vessel training exercises, submarine and antisubmarine training, and U.S. Air Force exercises. The U.S. Navy, the U.S. Coast Guard (USCG), and other military entities have numerous facilities in the region. Major onshore regional facilities include Joint Base Cape Cod, Naval Station Newport, Newport Naval Undersea Warfare Center, Naval Submarine Base New London, and USCG Academy (BOEM 2013; Rhode Island Coastal Resources Management Council 2010). The U.S. Atlantic Fleet also conducts training and testing exercises in the Narraganset Bay Operations Area, and the Newport Naval Undersea Warfare Center routinely performs testing in the area (BOEM 2013).

D.2.9 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, tankers (such as those used for liquid petroleum), cargo, cruise ships, smaller passenger vessels, and commercial fishing vessels. Recreational vessel traffic includes private motorboats and sailboats. A number of federal agencies, state agencies, educational institutions, and environmental non-governmental organizations participate in ongoing research offshore including oceanographic, biological, geophysical, and archaeological surveys. The Northeast Regional Planning Body anticipates that major vessel traffic routes will be relatively stable in the region for the foreseeable future, but that coastal developments and market demands that are unknown at this time could affect them (Northeast Regional Planning Body 2016). Most vessel traffic, excluding recreational vessels, tends to travel within established vessel traffic routes and the number of trips, as well as the number of unique vessels, has remained consistent (USCG 2021). In response to future offshore wind projects in the New York Bight, multiple additional fairways and a new anchorage may be established to route existing vessel traffic around wind energy projects (USCG

2021). Two Maritime Highway Routes are designated in the Atlantic Coast by the U.S. Department of Transportation Maritime Administration; Marine Highway M-95 (Atlantic Ocean Coastal Waters) that extends from Florida to Maine and Marine Highway M-295 that includes the East River (New York Harbor), Long Island Sound (New York and Connecticut) to Block Island Sound (Rhode Island) (USDOT 2022).

D.2.10 National Marine Fisheries Service Activities

Research and enhancement permits may be issued for marine mammals protected by the Marine Mammal Protection Act (MMPA) and for threatened and endangered species protected under the federal Endangered Species Act (ESA). NMFS is anticipated to continue issuing research permits under Section 10(a)(1)(A) of the ESA to allow take of certain ESA-listed species for scientific research. Scientific research permits issued by NMFS currently authorize studies on ESA-listed species in the Atlantic Ocean. Current fisheries management and ecosystem monitoring surveys conducted by or in coordination with the Northeast Fisheries Science Center (NEFSC) could overlap with offshore wind lease areas in the New England region and south into the Mid-Atlantic region. Surveys include (1) the NEFSC Bottom Trawl Survey, a more than 50-year multispecies stock assessment tool using a bottom trawl; (2) the NEFSC Sea Scallop/Integrated Habitat Survey, a sea scallop stock assessment and habitat characterization tool, using a bottom dredge and camera tow; (3) the NEFSC Surfclam/Ocean Quahog Survey, a stock assessment tool for both species using a bottom dredge; and (4) the NEFSC Ecosystem Monitoring Program, a more than 40-year shelf ecosystem monitoring program using plankton tows and conductivity, temperature, and depth units. These surveys are anticipated to continue within the region, regardless of offshore wind development.

The regulatory process administered by NMFS, which includes stock assessments for all marine mammals and 5-year reviews for all ESA-listed species, assists in informing decisions on take authorizations and the assessment of project-specific and cumulative impacts that consider ongoing and planned activities in biological opinions. Stock assessments completed regularly under the MMPA include estimates of potential biological removal that stocks of marine mammals can sustainably absorb. MMPA take authorizations require that a proposed action have no more than a negligible impact on species or stocks, and that a proposed action impose the least practicable adverse impact on the species. MMPA authorizations are reinforced by monitoring and reporting requirements so that NMFS is kept informed of deviations from what has been approved. Biological opinions for federal and non-federal actions are similarly grounded in status reviews and conditioned to avoid jeopardy and to allow continued progress toward recovery. These processes help to ensure that, through compliance with these regulatory requirements, a proposed action would not have a measurable impact on the conservation, recovery, and management of the resource.

D.2.10.1 Directed Take Permits for Scientific Research and Enhancement

NMFS issues permits for scientific research on protected species. These research permits include the authorization of directed take for activities, such as capturing animals and taking measurements and biological samples to study their health, tagging animals to study their distribution and migration, photographing and counting animals to get population estimates, taking animals in poor health to an animal hospital, and filming animals. NMFS also issues permits for enhancement purposes; these permits are issued to enhance the survival or recovery of a species or stock in the wild by taking actions that increase an individual's or population's ability to recover in the wild. Scientific research and enhancement permits have been issued previously for satellite, acoustic, and multi-sensor tagging studies on large and small cetaceans; research on reproduction, mortality, health, and conservation issues for NARWs; and research on population dynamics of harbor and gray seals. Reasonably foreseeable future impacts from scientific research and enhancement permits include physical and behavioral stressors (e.g., restraint and capture, marking, implantable and suction tagging, biological sampling).

D.2.10.2 Fisheries Use and Management

NMFS implements regulations to manage commercial and recreational fisheries in federal waters, including those within which the Project would be located; the State of Massachusetts regulates commercial fisheries in state waters (within 3 nm of the coastline). There are no aquaculture leases in the vicinity of the Falmouth landfall locations (SouthCoast Wind 2024). There are nine approved aquaculture leases located near the Brayton Point offshore export cable in and near the Sakonnet River that are mostly for oysters but also for clams, scallops, and quahogs (RIDEM 2022). The Project (including landfall and potential marshalling and O&M port locations) overlaps four of NMFS's eight regional councils to manage federal fisheries: Mid-Atlantic Fishery Management Council (MAFMC), which includes New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina; South Atlantic Fishery Management Council, which includes North Carolina, South Carolina, Georgia, and part of Florida; the Gulf of Mexico Fishery Management Council, which includes part of Florida, Louisiana, Alabama, Mississippi, and Texas; and New England Fishery Management Council (NEFMC), which includes Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut (NEFMC 2022). The councils manage species with many Fishery Management Plans (FMPs) that are frequently updated, revised, and amended and coordinate with each other to jointly manage species across jurisdictional boundaries (MAFMC 2022). Many of the fisheries managed by the councils are fished for in state waters or outside of the Mid-Atlantic region, so the council works with the Atlantic States Marine Fisheries Commission (ASMFC). The ASMFC is composed of the 15 Atlantic coast states and coordinates the management of marine and anadromous resources found in the states' marine waters. In addition, the states and NMFS, under the framework of ASMFC's *Amendment 3 to the Interstate Fishery Management Plan for American Lobster*, cooperatively manage the American lobster resource and fishery (NOAA 1997).

The FMPs of the councils and ASMFC were established, in part, to manage fisheries to avoid overfishing. They accomplish this through an array of management measures, including annual catch quotas, minimum size limits, and closed areas. These various measures can further reduce (or increase) the size of landings of commercial fisheries in the Northeast and Mid-Atlantic regions.

NMFS also manages highly migratory species, such as tuna and sharks, that can travel long distances and cross domestic boundaries. Table D-3 summarizes other FMPs and actions in the region.

Table D-3. Other fishery management plans

Area	Plan and Projects
ASMFC	ASMFC Five-Year Strategic Plan 2019–2023 (ASMFC 2019) ASMFC 2022 Action Plan (ASMFC 2021) Management, Policy and Science Strategies for Adapting Fisheries Management to Changes in Species Abundance and Distribution Resulting from Climate Change (ASMFC 2018).
Massachusetts	Massachusetts Shellfish Initiative 2021–2025 Strategic Plan (MSI 2021).
Rhode Island	Rhode Island 2018 Shellfish Sector Management Plan (RIDEM 2018) Rhode Island Department of Environmental Management Division of Marine Fisheries Strategic Plan (2021–2025) (RIDEM 2021).
Connecticut	Town of Groton, Connecticut Shellfish Management Plan (Town of Groton 2020).
Maryland	The Maryland Department of Natural Resources implements fishery management plans for the following species: American eel, Atlantic croaker, black drum, black sea bass, blue crab within the Chesapeake Bay, blue crab within coastal bays, bluefish, brook trout, catfish, eastern oyster, hard clam within coastal bays, horseshoe crab, largemouth bass, Spanish and king mackerel, red drum, alewife and blueback river herring, American and hickory shad, spot, spotted seatrout, striped bass, summer flounder, tautog, weakfish, and yellow perch (Maryland DNR 2024).
South Carolina	S.C. Sea Grant Consortium Strategic Plan, 2024–2027 (S.C. Sea Grant Consortium 2024).
Texas	The Texas Parks and Wildlife Department implements fisheries management programs including operation of hatcheries and development of artificial reefs and habitat projects (TPWD 2024).

D.2.11 Global Climate Change

Climate change results primarily from the increasing concentration of greenhouse gas (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). Section 7.6.1.4 of the *Programmatic EIS for Alternative Energy Development and Production and Alternate Use of Activities on the Outer Continental Shelf* (MMS 2007) describes global climate change with respect to assessing renewable energy development. Key drivers of climate change are increasing atmospheric concentrations of carbon dioxide (CO_2) and other GHGs, such as methane (CH_4) and nitrous oxide (N_2O). These GHGs reduce the ability of solar radiation to reradiate out of Earth's atmosphere and into space. Although all three of these GHGs have natural sources, the majority of these GHGs are released from anthropogenic activity. Since the industrial revolution, the rate at which solar radiation is reradiated back into space has slowed due to increasing GHG concentrations in the atmosphere, resulting in a net increase of energy in the Earth's system (Solomon et al. 2007). This energy increase presents as heat, raising the planet's temperature and causing climate change.

Fluorinated gases are a type of GHG released in trace amounts but are highly efficient at preventing solar radiation from being re-radiated back into space. They have a much longer lifespan than CO_2, CH_4, and N_2O. Fluorinated gases have no natural sources, are either a product or byproduct of manufacturing, and can have 23,000 times the warming potential of an equal amount of CO_2. These gases include hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride. These gases are currently being phased out; however, sulfur hexafluoride is still used in wind turbine generator (WTG) switchgears and OSP high-voltage and medium-voltage gas-insulated switchgears.

The Intergovernmental Panel on Climate Change released a special report in October 2018 that compared risks associated with an increase of global warming of 1.5 degrees Celsius (°C) and an increase of 2°C. The report found that climate-related risks depend on the rate, peak, and duration of global warming, and that an increase of 2°C was associated with greater risks associated with climatic changes such as extreme weather and drought; global sea level rise; impacts 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 (IPCC 2018). Higher global temperatures increase the chances of sea level rise by the end of the century, with a projected relative seal level rise of 0.6 to 2.2 meters along the contiguous U.S. coastline by 2100 (NOAA 2022). Expected relative sea level rise would cause tide and storm surge heights to increase, leading to a shift in the U.S. coastal flood regimes by 2050 with major and moderate high tide flood events occurring as frequently as moderate and minor high tide flood events occur today (NOAA 2022).

Global emissions of GHGs have impacts whose local effects are increasingly elucidated through research. For example, a recent study concerning North Atlantic right whale provides evidence that the whale's feeding area moved north following relocation of its food source related to climate change, and whale mortality may have increased because of fewer controls on fishing activities in the new, more northerly area (Meyer-Gutbrod et al. 2021). Climate change is predicted to affect Northeast fishery species in different ways (Hare et al. 2016), and the NMFS biological opinion discusses in detail the potential impacts of global climate change on protected species that occur within the Proposed Action area (NMFS 2013).

Local emissions, such as those from maintenance of and accidental chemical leaks from wind energy projects, would contribute incrementally to global GHG emissions. However, the largest climate impact from wind energy projects is expected to be beneficial: the energy generated by wind energy projects is expected to displace energy generated by combustion of fossil fuels, which would lead to reductions in regional emissions of air pollutants and GHGs from fossil-fueled power plants.

Table D-4 summarizes regional plans and policies that are in place to address climate change, and

Table D-5 summarizes resiliency plans.

Table D-4. Climate change plans and policies

Plans and Policies	Summary/Goal
Massachusetts	
Global Warming Solutions Act of 2008	Framework to reduce GHG emissions by requiring 25% reduction in emissions from all sectors below 1990 baseline emissions level in 2020, at least 80% reduction in 2050. Full implementation of these policies is projected to result in total net reduction of 25.0 million metric tons of carbon dioxide equivalent, or 26.4% below 1990 baseline level (Commonwealth of Massachusetts 2018a).
Massachusetts Clean Energy and Climate Plan for 2025 and 2030	Interim policy that updates the 2015 and 2020 climate plans. Policies that aim to reduce GHG emissions in the commonwealth across all sectors; full implementation of policies would result in reducing emissions by at least 50% below 1900 level in 2030 (Commonwealth of Massachusetts 2020a).
An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy (2021)	Requires the Secretary of the Executive Office of Energy and Environmental Affairs to set interim emissions limit and sector-specific sublimit every 5 years. Calls for the 2030 emissions limit to be at least 50% below the 1990 baseline, the 2040 emissions limit to be at least 75% below the 1990 baseline, and a 2050 emissions limit that achieves at least net zero statewide GHG emissions, provided that in no event shall the emissions in 2050 be higher than a level 85% below the 1990 baseline (Commonwealth of Massachusetts 2021).
Massachusetts 2050 Decarbonization Roadmap (2020)	Framework for long-term and short-term strategies to reach net zero statewide greenhouse gas emissions by 2050 (Commonwealth of Massachusetts 2020b).
Executive Order 569, Establishing an Integrated Climate Strategy for the Commonwealth and "Act to Promote Energy Diversity" (2016)	Calls for large procurements of offshore wind and hydroelectric resources (Commonwealth of Massachusetts 2016).
Environmental Bond Bill and An Act to Advance Clean Energy (2018)	Sets new targets for offshore wind, solar, and storage technologies; expands Renewable Portfolio Standard requirements for 2020–2029; establishes a Clean Peak Standard; and permits fuel switching in energy efficiency programs.
Massachusetts State Hazard Mitigation and Climate Adaptation Plan 2018	Updated 2013 plan to comprehensively integrate climate change impacts and adaptation strategies with hazard mitigation planning while complying with federal requirements for state hazard mitigation plans and maintaining eligibility for federal disaster recovery and hazard mitigation funding under the Stafford Act. The plan received FEMA-approval and is effective through September 2023 (Commonwealth of Massachusetts 2018b).
Rhode Island	
Resilient Rhode Island Act (2014)	The 2014 Resilient Rhode Island Act established the Executive Climate Change Coordinating Council. It also set specific GHG emissions reduction targets; established an advisory board and a science and technical advisory board to assist the council; and incorporated consideration of climate change impacts into the powers and duties of all state agencies. The Executive Climate Change Coordinating Council is charged with developing and tracking the implementation of a plan to achieve GHG emissions reductions below 1990 levels of 10% by 2020, 45% by 2035, and 80% by 2050 (State of Rhode Island 2014).

Plans and Policies	Summary/Goal
Rhode Island 2021 Act on Climate (Section 42, Chapter 6.2)	The 2021 Act on Climate sets mandatory, enforceable climate emissions reduction goals leading the state to achieve net-zero emissions economy-wide by 2050. This legislation updates the previous 2014 Resilient Rhode Island Act.
Connecticut	
Executive Order 3 (2019)	Executive Order 3 established a framework for monitoring and reporting on the state's implementation of GHG emissions reduction strategies set forth in the previous Governor's Council on Climate Change, and a framework to develop a statewide Adaptation and Resilience Plan for Connecticut (State of Connecticut 2019).
Executive Order 21-3 (2021)	Executive Order 21-2 establishes policies for energy efficiency and resiliency, including conducting a State Vulnerability Assessment of state government assets and operations and climate resilience project pipeline (State of Connecticut 2021a).
Maryland	
Climate Solutions Now Act of 2022 (Article II, Section 17(b), Chapter 38).	The Climate Solutions Now Act of 2022 calls for Maryland to reduce GHG by 60% as compared to a 2006 baseline by 2031 and for the Maryland economy to reach net-zero emissions by 2045.
Maryland's Climate Pollution Reduction Plan (2023)	Establishes plans to achieve net-zero emissions by 2045 through incentives for home electrification, electric vehicles, and commercial building efficiency and investments in infrastructure and natural and working lands (Maryland Department of the Environment 2023).
South Carolina	
Charleston, South Carolina Climate Action Plan (2021)	Establishes a five-year framework for the city of Charleston to reduce emissions by 56% by 2030 and to net-zero by 2050 (City of Charleston 2021).
Texas	
Texas Coastal Resiliency Master Plan (2023)	Texas General Land Office 2023 *Texas Coastal Resiliency Master Plan* is the third installment of a statewide plan to protect and promote a vibrant and resilient Texas coast (Texas General Land Office 2023). The Resiliency Master Plan identifies ten actions to coordinate Texas's coastal resiliency needs: • Managing coastal habitats • Managing gulf shorelines • Managing bay shorelines • Improving community resilience • Adapting to changing conditions • Managing watersheds • Growing key knowledge and experience • Enhancing emergency preparation and response • Addressing under-represented needs • Maintaining coastal economic growth

Table D-5. Resiliency plans and policies in the Lease Area

Plans and Policies	Summary
Massachusetts	
Municipal Vulnerability Preparedness grant program (2017)	Created as part of Executive Order 568, the Municipal Vulnerability Preparedness grant program provides support for cities and towns in Massachusetts to identify climate hazards, assess vulnerabilities, and develop action plans to improve resilience to climate change (Climate Change Clearinghouse for the Commonwealth 2022).
Coastal Grant and Resilience Program	Provide financial and technical support for local and regional efforts to increase community understanding of coastal storm and climate impacts, evaluate vulnerabilities, conduct adaptation planning, redesign and retrofit vulnerable public facilities and infrastructure, and restore shorelines to enhance natural resources and provide storm damage protection. The Town of Falmouth was awarded a grant in 2022 for a project to address erosion along the Eel River Inlet shoreline (Commonwealth of Massachusetts 2022).
Rhode Island	
Rhode Island Executive Order 17-10: Action Plan to Stand Up to Climate Change (2017)	Executive Order 17-10 established the office of the Rhode Island Resiliency Officer. The Rhode Island Executive Climate Change Coordinating Council works with the Resiliency Officer to develop climate preparedness strategies.
Rhode Island Shoreline Change Special Area Management Plan (Rhode Island Coastal Resources Management Council 2018)	The Shoreline Change Special Area Management Plan (SAMP) provides information, guidance, and a suite of tools to empower state and local decision makers as they plan for, recover from, and successfully adapt to the impacts of coastal storms, erosion, and sea level rise (Rhode Island Coastal Resources Management Council 2018).
Connecticut	
Public Act No. 21-115 An Act Concerning Climate Change Adaptation (2021)	This act authorizes Connecticut municipalities to establish a municipal stormwater authority, broadens the authority of municipal flood and erosion control boards to include flood prevention and climate resilience and allows municipalities to form joint boards, and establishes an Environmental Infrastructure Fund (State of Connecticut 2021b).
Taking Action on Climate Change and Building a More Resilient Connecticut for All – Phase I Report (Office of the Governor of Connecticut 2021)	The Phase I report implements provisions of Executive Order 3, including a report on the progress on mitigation strategies and recommendations. Continued reporting on implementation of the mitigation strategies was also called for annually in the Executive Order. The framework for inventory of vulnerable assets and operations and the report from state agencies on adaptation strategies in their planning processes required under Executive Order Objective 2 is to be included in the Phase 2 report.
Maryland	
Maryland Senate Bill 457: Resilience Authorities (2020)	This bill authorizes local governments to establish and fund a resilience authority to fund large-scale infrastructure projects aimed as addressing the effects of climate change.

South Carolina	
Disaster Relief and Resilience Act (2020)	Establishes the South Carolina Office of Resilience to coordinate disaster recovery and resilience efforts within South Carolina, creates the Disaster Relief and Resilience Reserve Fund to finance disaster recovery efforts and hazard mitigation projects, and creates the Resilience Revolving Fund to provide low-interest loans to local governments to perform floodplain buyouts and restoration.
Strategic Statewide Resilience and Risk Reduction Plan (2023)	Serves as the framework to guide state investment in flood mitigation projects and the adoption of programs and policies to protect the people and property of South Carolina from the damage and destruction of extreme weather events (South Carolina Office of Resilience 2023).
Texas	
Texas Coastal Resiliency Master Plan (2017)	The Texas Coastal Resiliency Master Plan was developed to direct future management of Texas coastline in support of sustaining resilient communities and coastal ecosystems (Texas General Land Office 2017).
Texas Infrastructure Resiliency Fund (2019)	The Texas Infrastructure Resiliency Fund was established to finance flood mitigation and protection projects and related planning efforts. It includes funds for federal matching to implement projects already eligible for partial federal funding; floodplain management for flood planning, protection, mitigation, or adaption projects; flood plan implementation for projects included in the state flood plan; and the Hurricane Harvey fund to implement projects related to Hurricane Harvey recovery.

D.2.12 Oil and Gas Activities

The proposed Project area is in the North Atlantic Planning Area of the OCS Oil and Gas Leasing Program (National OCS Program). On September 8, 2020, the White House issued a presidential memorandum for the Secretary of the Interior on the withdrawal of certain areas of the United States OCS from leasing disposition for 10 years, including the areas currently designated by BOEM as the South Atlantic and Straits of Florida Planning Areas (White House 2020a). The South Atlantic Planning Area includes the OCS off South Carolina, Georgia, and northern Florida. On September 25, 2020, the White House issued a similar memorandum for the Mid-Atlantic Planning Area that lies south of the northern administrative boundary of North Carolina (White House 2020b). This withdrawal prevents consideration of these areas for any leasing for purposes of oil and gas exploration, development, or production during the 10-year period beginning July 1, 2022 and ending June 30, 2032. However, currently, there has been no decision by the Secretary of the Interior regarding future oil and gas leasing in the North Atlantic or remainder of the Mid-Atlantic Planning Areas. Existing leases in the withdrawn areas are not affected.

BOEM issues geological and geophysical permits to obtain data for hydrocarbon exploration and production; locate and monitor marine mineral resources; aid in locating sites for alternative energy structures and pipelines; identify possible manmade, seafloor, or geological hazards; and locate potential archaeological and benthic resources. Geological and geophysical surveys are typically classified into categories by equipment type and survey technique. There are currently no such permits under review for areas offshore Massachusetts or Rhode Island (BOEM 2022).

Several liquefied natural gas ports are on the East Coast of the United States. Table D-6 lists existing and proposed liquified natural gas ports on the East Coast that provide (or may provide in the future) services such as natural gas export, natural gas supply to the interstate pipeline system or local distribution companies, storage of liquified natural gas for periods of peak demand, or production of liquified natural gas for fuel and industrial use (FERC 2022).

Table D-6. Liquid natural gas terminals in the eastern United States

Terminal Name	Type	Company	Jurisdiction	Distance from Project (approximate)	Status
Everett, MA	Import terminal	GDF SUEZ— DOMAC	FERC	90 miles north	Existing
Offshore Boston, MA	Import terminal	Neptune LNG	MARAD/USCG	100 miles north	Existing
Offshore Boston, MA	Import terminal, authorized to re-export delivered LNG	Excelerate Energy—Northeast Gateway	MARAD/USCG	95 miles north (Buoy B)	Existing
Cove Point, MD (Chesapeake Bay)	Import terminal/ Export Terminal	Dominion—Cove Point LNG	FERC	340 miles southwest	Existing
Elba Island, GA (Savannah River)	Import terminal	El Paso—Southern LNG	FERC	835 miles southwest	Existing
Elba Island, GA (Savannah River)	Import Terminal/ Export terminal	Southern LNG Company	FERC	835 miles southwest	Existing
Jacksonville, FL	Export terminal	Eagle LNG Partners	FERC	960 miles southwest	Proposed

Source: FERC 2022.
DOMAC = Distrigas of Massachusetts Corporation; GDF = Gaz de France; FL = Florida; GA = Georgia; LNG = liquified natural gas; MA = Massachusetts; MARAD = U.S. Department of Transportation Maritime Administration; MD = Maryland.

D.2.13 Onshore Development Activities

Onshore development activities that may contribute to cumulative impacts include visible infrastructure, such as onshore wind turbines and cell towers, port development, and other energy projects, such as transmission and pipeline projects. Coastal development projects permitted through regional planning commissions, counties, and towns may also contribute to cumulative impacts. These may include residential, commercial, and industrial developments spurred by population growth in the region (Table D-7).

Table D-7. Existing, approved, and proposed onshore development activities

Type	Description
Local planning documents	*Massachusetts* Town of Falmouth Local Comprehensive Plan (Town of Falmouth 2016). City of New Bedford City Master Plan (City of New Bedford 2010). Town of Somerset Master Plan (Town of Somerset 2020).
	Rhode Island Town of Bristol 2016 Comprehensive Community Plan (Town of Bristol 2016). Town of Portsmouth Comprehensive Community Plan (Town of Portsmouth 2021). Town of North Kingstown Comprehensive Plan (Town of North Kingstown 2019). Town of Tiverton 2018 Comprehensive Plan (Town of Tiverton 2018). Providence Tomorrow, City of Providence Comprehensive Plan (City of Providence 2014). Aquidneck Island Planning Commission (AIPC 2022).
	Connecticut City of New London Strategic Plan (City of New London 2017).
	Maryland Baltimore County Master Plan 2030 (Baltimore County Department of Planning 2023).
	South Carolina Charleston 2021 City Plan (Charleston Planning Commission 2021).
	Texas Corpus Christi, Plan CC Comprehensive Plan (City of Corpus Christi 2016).
Onshore wind projects	According to the USGS, there are no onshore wind projects within the 42.8-mile (68.9-kilometer) viewshed of the Project (USGS 2022).
Communications towers	There are numerous communications towers in communities within the viewshed of the Project. For example, there are 17 communications towers and 102 antennas within a 3-mile radius of Falmouth, Massachusetts; 55 communications towers and 360 antennas within a 3-mile radius of Brayton Point, Massachusetts; and 96 communications towers and 396 antennas within a 3-mile radius of the Port of New Bedford, Massachusetts (AntennaSearch.com 2022).

Type	Description
Development projects	*Massachusetts* City of New Bedford • The South Coast Rail project aims to restore commuter rail service between Boston and southeastern Massachusetts, including the City of New Bedford. Phase 1 construction is underway and will be complete by the end of 2023 (Massachusetts Bay Transportation Authority 2022). • An Offshore Wind Control Center is proposed by the offshore wind project developer, Vineyard Wind in the City of New Bedford. The development is contingent on Commonwealth Wind being selected by the state (Buljan 2021). Town of Falmouth • The Town of Falmouth intends to improve street safety and accessibility for motorists, pedestrians, and bicyclists through the development of a Complete Streets Prioritization Plan. If approved, the project would be eligible for up to $400,000 in construction funding from MassDOT (Cape Cod Commission 2022). Town of Somerset • The Town of Somerset received $32,100 as part of the Shared Streets and Spaces Grant Program through Mass DOT to extend bike lanes to improve connections to the South Coast Bikeway (Town of Somerset 2022). • Brayton Point LLC Redevelopment Project proposed by Brayton Point LLC (2021). Martha's Vineyard • None identified.
	Rhode Island Town of Bristol • The Walley Beach/Halsey C. Herreshoff Park Seawall Repair project aims to restore the existing seawall along the seaside park. Proposed activities include replacing lost material and providing protective measures for the lawn. The project began in Spring 2021 and construction is ongoing (East Bay Rhode Island 2022). Town of Portsmouth • On May 20, 2021, a planned 3.16 MW, 18.3-acre solar project located on West Main Road in the Town of Portsmouth was approved by the town's Zoning Board of Review (West Main Solar 1, LLC 2021). Town of Tiverton • Two solar projects in the Town of Tiverton are currently in the planning stage: Brayton Road Solar and Cook Farm Solar Project. The Brayton Road Solar project received preliminary plan approval in 2021 and is expected to be approved by the Planning Board in 2022. The Cook Farm Solar project has received final plan approval from the Planning Board but has not begun construction (Newport Daily News 2021).
Port studies/ upgrades	*Massachusetts* • *Massachusetts Port Authority.* The Port of Massachusetts is implementing an $850 million port upgrade project to accommodate larger freight vessels. Project work includes dredging of Boston Harbor, constructing a new berth, and installing new ship-to-share cranes (Glenn 2021). • *Port of New Bedford.* The New Bedford Port Authority is conducting a $17 million project to expand the North Terminal at the Port of New Bedford, adding 150,000 square feet of terminal space. The bulkhead will be constructed using up to 97,000 yards of

Type	Description
	contaminated dredge material. Construction is anticipated to commence in May 2022 (Port of New Bedford 2022; Standard Times 2022).
	Rhode Island • *Point Judith, Port of Galilee, Rhode Island.* The Rhode Island Department of Environmental Management, which operates the Port of Galilee, a Narragansett-based commercial fishing port, is conducting four projects in 2022 in the north bulkhead area of the port totaling nearly $15 million in investments. The proposed Rhode Island Fiscal Year 2023 budget includes approximately $50 million in State Fiscal Recovery Funding to continue the work of upgrading essential infrastructure at the Port of Galilee. The proposed investment would fund the replacement of bulkheads and docks, water supply, electrical, and security upgrades, and improvements to bolster the port against the effects of climate change (Office of the Governor of Rhode Island 2022). • *Port of Davisville, Rhode Island.* The Rhode Island Fiscal Year 2023 budget includes $60 million and $35 million, respectively, for infrastructure upgrades to the Port of Davisville and the South Quay Marine Terminal in East Providence to support offshore wind activities on the U.S. East Coast. The funding for the Port of Davisville would support construction of the port's Terminal 5 Pier and completion of required dredging, preparation of about 34 acres to accommodate additional cargo laydown, and reconstruction and hardening of the existing surface of Pier 1 (Buljan 2022).
	Connecticut • *New London Heavy Lift Port.* The Connecticut Port Authority is conducting a project to redevelop the Port of New London State Pier as a heavy-lift capable port facility, in partnership with terminal operator Gateway Terminal, and joint venture partners Ørsted and Eversource. Heavy-lift capability would support various cargoes including wind turbine construction staging and pre-assembly, including construction support for the South Fork, Revolution Wind, and Sunrise offshore wind projects. Environmental permits for in-water work and onshore construction were issued in December 2021. Construction is anticipated to be completed by 1Q 2023 (Connecticut Port Authority 2021a; 2021b; CT Examiner 2022).
	Maryland • *Sparrows Point Port*. The Sparrows Point Container Terminal project will construct a new container terminal and intermodal yard located on 330 acres within the Tradepoint Atlantic industrial development site on Sparrows Point. In addition to onshore development, the project would include the widening and deepening of an existing channel and connection into the Brewerton Federal Navigation channel. USACE is currently preparing an EIS for the project (88 FR 87414).
	South Carolina • *Port of Charleston*. Construction is currently underway at the Port of Charleston on a near-dock rail-served cargo yard and inner-harbor barge operation. The $400 million Navy Base Intermodal Facility and $150 million inner-harbor barge operation includes the construction of almost 80,000 feet of rail track and will establish a designated marine highway to move shipping containers. Construction on the project is anticipated to be complete by July 2025 (South Carolina Ports Authority 2022).
	Texas

Type	Description
	• *Port of Corpus Christi*. The $681.6 million Channel Improvement Project to widen the channel to 530 feet and deepen to 54 feet is in the final construction phase and is estimated to be complete in early 2025 (Port of Corpus Christi 2023).

D.3 References Cited

AntennaSearch.com. 2022. Tower and Antenna Database. Updated June 5, 2022. Available: www.antennasearch.com. Accessed: July 9, 2022.

Aquidneck Island Planning Commission (AIPC). 2022. Connect Aquidneck. Available: https://aquidneckplanning.org/. Accessed: April 28, 2022.

Atlantic States Marine Fisheries Commission (ASMFC). 2018. Management, Policy and Science Strategies for Adapting Fisheries Management to Changes in Species Abundance and Distribution Resulting from Climate Change. February. Available: http://www.asmfc.org/files/pub/ClimateChangeWorkGroupGuidanceDocument_Feb2018.pdf. Accessed: January 7, 2019.

Atlantic States Marine Fisheries Commission (ASMFC). 2019. *ASMFC Five-Year Strategic Plan 2019–2023*. Available: http://www.asmfc.org/files/pub/2019-2023StrategicPlan_Final.pdf. Accessed: March 2022.

Atlantic States Marine Fisheries Commission (ASMFC). 2021. *Atlantic States Marine Fisheries Commission 2022 Action Plan*. Available: http://www.asmfc.org/files/pub/2022ActionPlan.pdf. Accessed: March 2022.

Baltimore County Department of Planning. 2023. Baltimore County Master Plan 2030. July 10, 2023. Available: https://www.baltimorecountymd.gov/departments/planning/masterplanning/. Accessed: January 24, 2024.

Barrett, Stephen B. 2021. *Bourne Tidal Test Site Draft Pilot License Application.* September 2021. Available: https://tethys.pnnl.gov/publications/bourne-tidal-test-site-draft-pilot-license-application. Accessed: April 22, 2022.

Blunden, J., and D. S. Arndt. 2020. State of the climate in 2019. Bulletin of the American Meteorological Society 101(8):S1–S429.

Brayton Point LLC. 2021. "About the Project." Brayton Pont Commerce Center. Available: http://www.braytonpointcommercecenter.com/about/. Accessed: July 9, 2022.

Buljan, Adrijana. 2021. US Developer Plans to Build Offshore Wind Control Centre in New Bedford. Available: https://www.offshorewind.biz/2021/11/11/us-developer-plans-to-build-offshore-wind-control-centre-in-new-bedford/. Accessed: May 10, 2022.

Buljan, Adrijana. 2022. Rhode Island Ports to Undergo Offshore Wind Upgrades with USD 95 Million State Support. March 21, 2022. Available: https://www.offshorewind.biz/2022/03/21/rhode-island-ports-to-undergo-offshore-wind-upgrades-with-usd-95-million-state-support/. Accessed: April 22, 2022.

Bureau of Ocean Energy Management (BOEM). 2013. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Rhode Island and*

Massachusetts Revised Environmental Assessment. OCS EIS/EA BOEM 2013-1131. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs.

Bureau of Ocean Energy Management (BOEM). 2016. *Revised Environmental Assessment for Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York*. OCS EIS/EA BOEM 2016-070. October 2016.

Bureau of Ocean Energy Management (BOEM). 2019. *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Continental Shelf*. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Sterling, VA. OCS Study 2019-036.

Bureau of Ocean Energy Management (BOEM). 2021a. *Vineyard Wind 1 Offshore Wind Energy Project Final Environmental Impact Statement*. OCS EIS/EA, BOEM 2021-0012. March.

Bureau of Ocean Energy Management (BOEM). 2021b. *Commercial and Research Wind Lease and Grant Issuance and Associated Site Assessment Activities on the Atlantic Outer Continental Shelf of the New York Bight*. OCS EIS/EA BOEM 2021-073. December.

Bureau of Ocean Energy Management (BOEM). 2022. Submitted Atlantic OCS Region Permit Requests. Available: https://www.boem.gov/submitted-atlantic-ocs-region-permit-requests. Accessed: June 20, 2022.

BVG Associates. 2015. *Virginia offshore port readiness evaluation. Report 1: An evaluation of 10 Virginia ports.* A report to the Virginia Department of Mines, Minerals and Energy. April. Available: https://www.hrpdcva.gov/uploads/docs/Port%20Readiness%20Evaluation%20-%20An%20Evaluation%20of%2010%20Virginia%20Ports.pdf. Accessed: July 9, 2022.

Cape Cod Commission. 2022. Falmouth Complete Streets. Available: https://www.capecodcommission.org/our-work/falmouth-complete-streets/. Accessed: May 10, 2022.

Charleston Planning Commission. 2021. Charleston 2021 City Plan. Available: https://www.dropbox.com/s/ecgp2sy5gehz6wz/Final%20City%20Plan%20%28Adopted%20October%2012%202021%29.pdf?dl=0. Accessed: January 24, 2024.

City of Charleston. 2021. Climate Action Plan, an Equitable Strategy for a Healthier Future. May 2021. Available: https://www.charleston-sc.gov/DocumentCenter/View/29030/Climate-Action-Plan-May-2021?bidId=. Accessed: January 23, 2024.

City of Corpus Christi. 2016. Plan CC Comprehensive Plan. September 2016. Available: https://www-cdn.cctexas.com/sites/default/files/PlanCC%20Final%20Version%20Approved%209-27-2016.pdf. Accessed: January 24, 2024.

City of New Bedford. 2010. A City Master Plan: New Bedford 2020. Available: http://s3.amazonaws.com/newbedford-ma/wp-content/uploads/sites/46/20191219215710/NewBedford2020_ACityMasterPlan_2010.pdf. Accessed: April 27, 2022.

City of New London. 2017. Plan of Conservation & Development. Available: http://www.ci.new-london.ct.us/filestorage/7495/7518/7664/12871/Adoptive-Effective_Strategic_Plan-Adp_10.19_Eff.10.26.2017.pdf. Accessed: May 18, 2022.

City of Providence. 2014. Providence Tomorrow. November 24, 2014. Available: https://www.providenceri.gov/wp-content/uploads/2017/05/Planning-ProvidenceTomorrowFinal_November2014.pdf. Accessed: January 24, 2024.

Climate Change Clearinghouse for the Commonwealth. 2022. Resilient MA: Municipal Vulnerability Preparedness Program. Available: https://resilientma.org/mvp/. Accessed: May 10, 2022.

Commonwealth of Massachusetts. 2016. Chapter 188: An Act to Promote Energy Diversity. Available: https://malegislature.gov/laws/sessionlaws/acts/2016/chapter188. Accessed: May 4, 2022.

Commonwealth of Massachusetts. 2018a. *Global Warming Solutions Act: 10-Year Progress Report.* Available: https://www.mass.gov/doc/gwsa-10-year-progress-report/download. Accessed: May 4, 2022.

Commonwealth of Massachusetts. 2018b. Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan. Available: https://www.mass.gov/service-details/massachusetts-integrated-state-hazard-mitigation-and-climate-adaptation-plan. Accessed: May 4, 2022.

Commonwealth of Massachusetts. 2020a. Clean Energy and Climate Plan for 2030. Available: https://www.mass.gov/doc/interim-clean-energy-and-climate-plan-for-2030-december-30-2020/download. Accessed: May 4, 2022.

Commonwealth of Massachusetts. 2020b. Massachusetts 2050 Decarbonization Roadmap. Available: https://www.mass.gov/doc/ma-2050-decarbonization-roadmap/download. Accessed: May 4, 2022.

Commonwealth of Massachusetts. 2021. Chapter 8: An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy. Available: https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8. Accessed: May 4, 2022.

Commonwealth of Massachusetts. 2022. Coastal Resilience Grant Program. Available: https://www.mass.gov/service-details/coastal-resilience-grant-program. Accessed: May 10, 2022.

Connecticut Port Authority. 2021a. State Pier Infrastructure Improvements Project. Available: https://statepiernewlondon.com/. Accessed: April 25, 2022.

Connecticut Port Authority. 2021b. Connecticut Port Authority State Pier Improvements Project Receives Final In-Water Work Permit, Board of Directors Approves Notice to Proceed for First Phase of

Dredging. December 21, 2021. Available: https://ctportauthority.com/final-in-water-work-permit/. Accessed: April 25, 2022.

CT Examiner. 2022. Looming Deadlines Push Costs, Possible 16-Hour Days for State Pier Redevelopment by Brendan Crowley. February 22, 2022. Available: https://ctexaminer.com/2022/02/22/looming-deadlines-push-port-authority-to-consider-16-hour-days-higher-costs-for-state-pier-redevelopment/. Accessed: April 22, 2022.

CT Insider. 2023. Controversial New London state pier poised to turn a profit this year after delays, rising costs. December 26, 2023. Available: https://www.ctinsider.com/connecticut/article/ct-state-pier-new-london-profit-18567912.php. Accessed: May 3, 2024.

East Bay Rhode Island. 2022. Improved Walley Beach and park scheduled to reopen by June. Available: https://www.eastbayri.com/stories/improved-walley-beach-and-park-scheduled-to-reopen-by-june,103025. Accessed: May 12, 2022.

Ecology & Environment. 2016. Military Range Complex - Environmental Common Operating Picture (COP) GIS metadata. Finalized 04/15/2016. Prepared for: Naval Facilities Engineering Command (NAVFAC) Atlantic, Norfolk, Virginia. Available: https://portal.midatlanticocean.org/static/data_manager/metadata/pdf/NationalSecurityMidAMilitary_Range_Complex.pdf. Accessed: April 25, 2022.

Federal Energy Regulatory Commission (FERC). 2012a. Order Issuing Project Pilot License. Verdant Power, LLC. Project Number 12611-005.

Federal Energy Regulatory Commission (FERC). 2012b. Environmental Assessment for Hydropower Project Pilot License. Cobscook Bay Tidal Energy Project—FERC Project Number 12711-005 (DOE/EA1916). Available at: https://www.energy.gov/sites/prod/files/EA-1916-DEA-2011.pdf. Accessed: April 22, 2022.

Federal Energy Regulatory Commission (FERC). 2022. North American LNG Import Terminals – Existing, Approved, Not Yet Built, and Proposed, and North American LNG Export Terminals, Existing, Approved, Not Yet Built, and Proposed. Available: https://cms.ferc.gov/media/north-american-lng-export-terminals-existing-approved-not-yet-built-and-proposed-8 and https://cms.ferc.gov/media/north-american-lng-import-terminals-existing-approved-not-yet-built-and-proposed-8. Accessed: July 2022.

Glenn, Jack. 2021. Massport upgrades looks to bring bigger ships to New England. December 20, 2021. Available: https://www.freightwaves.com/news/massport-upgrades-looks-to-bring-bigger-ships-to-new-england. Accessed: April 22, 2022.

Hare, J. A., W. E. Morrison, M. W. Nelson, M. M. Stachura, E. J. Teeters, and R. B. Griffis. 2016. A Vulnerability Assessment of Fish and Invertebrates to Climate Change on the Northeast U.S. Continental Shelf. *PLoS ONE* 11(2): e0146756. DOI:10.1371/journal.pone.0146756.

Intergovernmental Panel on Climate Change (IPCC). 2018. IPCC Special Report on Impacts of Global Warming of 1.5 Degrees Celsius Above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty: Summary for Policymakers. Available: https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf. Accessed: July 9, 2022.

King, J.W., J. Boothroyd, B. Oakley, G. Fugate, C. Gibson. 2016. Summary Report, Cooperative Agreement: M14AC00011 University of Rhode Island Identification of Sand/Gravel Resources in Rhode Island Waters While working Toward a Better Understanding of Storm Impacts on Sediment Budgets. Available: https://www.boem.gov/sites/default/files/mm-research/2021-05/RI-M14AC00011-Summary-Report-FINAL.pdf. Accessed: April 25, 2022.

Mabee, S and J.D. Woodruff. 2016. Agreement: M14AC00006 Massachusetts Geological Survey/University of Massachusetts; Sand Resource Assessment at Critical Beaches on the Massachusetts Coast. July 22, 2016. Available: https://www.boem.gov/sites/default/files/mm-research/2021-05/MA-BOEM-Final-Summary-Report-opt.pdf. Accessed: April 25, 2022.

Marine Renewable Energy Collaborative (MRECo). 2017. New England Marine Energy Development System (NEMEDS) Brochure. Available at: https://www.mreconewengland.org/marine_renewable_energy/wp-content/uploads/2017/08/MRECo_Testing_Facilities_v2017.pdf. Accessed: April 22, 2022.

Marine Renewable Energy Collaborative (MRECo). 2018. Bourne Tidal Test Site Brochure. Available at: https://www.mreconewengland.org/marine_renewable_energy/wp-content/uploads/2017/12/BrochurewithCompletedStructure.pdf. Accessed: April 22, 2022.

Maryland Department of Natural Resources. 2024. Fishery Management Plans. Available: https://dnr.maryland.gov/fisheries/pages/management.aspx. Accessed: January 22, 2024.

Massachusetts Bay Transportation Authority. 2022. South Coast Rail. Available: https://www.mbta.com/projects/south-coast-rail. Accessed: May 10, 2022.

Massachusetts Shellfish Initiative (MSI). 2021. 2021-2025 Strategic Plan. Available: http://www.massshellfishinitiative.org/uploads/1/0/4/9/104987295/msi_strategic_plan.pdf. Accessed: April 27, 2022.

Mayflower Wind Energy, LLC (Mayflower Wind). 2022. *Mayflower Wind Construction and Operations Plan*. Available: https://www.boem.gov/renewable-energy/state-activities/mayflower-wind.

Meyer-Gutbrod, E. L., C. H. Greene, K. T. A. Davies, and D. G. Johns. 2021. Ocean Regime Shift is Driving Collapse of the North Atlantic Right Whale Population. *Oceanography* 34(3):22–31 (September 2021). Available: https://tos.org/oceanography/assets/docs/34-3_meyer-gutbrod.pdf. Accessed: January 27, 2022.

Mid-Atlantic Fishery Management Council (MAFMC). 2022. “About the Council.” Available: http://www.mafmc.org/about/. Accessed: July 9, 2022.

Minerals Management Service (MMS). 2007. Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement. October. OCS EIS/EA MMS 2007-046. Available: https://www.boem.gov/sites/default/files/renewable-energy-program/Regulatory-Information/Alt_Energy_FPEIS_VolIIFrontMatter.pdf. Accessed: July 9, 2022.

National Marine Fisheries Service (NMFS). 2013. Endangered Species Act Section 7 Consultation Biological Opinion for Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf in Massachusetts, Rhode Island, New York and New Jersey Wind Energy Areas. NER-2012-9211.

National Oceanic and Atmospheric Administration (NOAA). 1997. *Amendment 3 to the Interstate Fishery Management Plan for American Lobster*. Available: http://www.asmfc.org/uploads/file/lobsterAmendment3.pdf. Accessed: February 28, 2019.

National Oceanic and Atmospheric Administration (NOAA). 2022. *Global and Regional Sea Level Rise Scenarios for the United States*. Available: https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report-sections.html. Accessed: March 24, 2022.

New England Fishery Management Council (NEFMC). 2022. “About NEFMC.” Available: https://www.nefmc.org/about. Accessed: July 9, 2022.

Newport Daily News. 2021. Here is where commercial-scale solar arrays are being proposed in Newport County. Available: https://www.newportri.com/story/news/local/2021/12/02/commercial-solar-array-proposals-projects-newport-county-ri/8802754002/. Accessed: May 12, 2022.

Northeast Regional Planning Body. 2016. *Northeast Ocean Plan: Full Plan*. Available at: https://neoceanplanning.org/wp-content/uploads/2018/01/Northeast-Ocean-Plan_Full.pdf. Accessed May 22, 2022.

Office of the Governor of Connecticut. 2021. Taking Action on Climate Change and Building a More Resilient Connecticut for All. Available: https://portal.ct.gov/-/media/DEEP/climatechange/GC3/GC3_Phase1_Report_Jan2021.pdf. Accessed: May 9, 2022.

Office of the Governor of Rhode Island. 2022. Governor McKee’s Proposed $46 Million Infrastructure Investment in FY 2023 Budget Aims to Extend Life of Port of Galilee by Decades. February 3, 2022. Available: https://governor.ri.gov/press-releases/governor-mckees-proposed-46-million-infrastructure-investment-fy-2023-budget-aims. Accessed: April 22, 2022.

Pacific Northwest National Laboratory (PNNL). 2020. Cobscook Bay Tidal Energy Project. Available: https://tethys.pnnl.gov/project-sites/western-passage-tidal-energy-project. Accessed: April 22, 2022.

Pacific Northwest National Laboratory (PNNL). 2021. Western Passage Tidal Energy Project. Available: https://tethys.pnnl.gov/project-sites/cobscook-bay-tidal-energy-project. Accessed: April 22, 2022.

Port of Corpus Christi. 2023. Port of Corpus Christi Ship Channel Improvement Project Advances to Final Phase. September 26, 2023. Available: https://portofcc.com/port-of-corpus-christi-ship-channel-improvement-project-advances-to-final-phase/. Accessed: January 18, 2024.

Port of New Bedford. 2022. Port of New Bedford Awards Contract For North Terminal Expansion. March 25, 2022. Available: https://portofnewbedford.org/port-of-new-bedford-awards-contract-for-north-terminal-expansion/. Accessed: April 22, 2022.

Reuters. 2021. *US port spend brings offshore wind factories closer*. Reporting by: Neil Ford. Editing by: Robin Sayles. Available: https://www.reutersevents.com/renewables/wind/us-port-spend-brings-offshore-wind-factories-closer. Accessed: July 9, 2022.

Rhode Island Coastal Resources Management Council. 2010. *Rhode Island Ocean Special Area Management Plan: Ocean SAMP – Volumes 1 and 2.* Report by Rhode Island Coastal Resources Management Council. https://seagrant.gso.uri.edu/oceansamp/documents.html. Accessed: July 9, 2022.

Rhode Island Coastal Resources Management Council. 2018. Rhode Island Shoreline Change Special Area Management Plan (Beach SAMP) Volume I. Approved: June 12, 2018. Available: http://www.beachsamp.org/wp-content/uploads/2018/09/BeachSAMP_Cover_JCBTribute_Cred-Ack_TOC_FINAL.pdf. Accessed: May 9, 2022.

Rhode Island Department of Environmental Management (RIDEM). 2018. 2018 Shellfish Sector Management Plan. Available: http://www.dem.ri.gov/pubs/regs/regs/fishwild/mpshell.pdf. Accessed: April 27, 2022.

Rhode Island Department of Environmental Management (RIDEM). 2021. Strategic Plan (2021-2025). Available: http://www.dem.ri.gov/programs/bnatres/marine/pdf/DMFStratPlan2021.pdf. Accessed: April 27, 2022.

Rhode Island Department of Environmental Management (RIDEM). 2022. RIDEM Marine Fisheries Map. Available: https://ridemgis.maps.arcgis.com/apps/webappviewer/index.html?id=8beb98d758f14265a84d69758d96742f. Accessed: June 20, 2022.

Solomon, S., D. Qin, M. Manning, R. B. Alley, T. Berntsen, et al. 2007. Technical summary. Climate change 2007: the physical science basis In: Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor, and H. L. Miller, editors. Fourth Assessment Report of the Intergovernmental Panel on Climate Change.

South Carolina Ports Authority. 2022. SC Ports Developing Near-Dock Rail at the Port of Charleson. Available: https://scspa.com/news/sc-ports-developing-near-dock-rail-at-the-port-of-charleston/. Accessed: January 18, 2024.

South Carolina Office of Resilience. 2023. Strategic Statewide Resilience and Risk Reduction Plan. Available: https://scor.sc.gov/resilience. Accessed: January 23, 2024.

Standard Times. 2022. 'A big day for the Port of New Bedford': Development projects could bring hundreds of jobs. Available: https://www.southcoasttoday.com/story/news/local/2022/03/25/development-projects-coming-port-new-bedford-foss-marine-terminal/7151371001/. Accessed: April 22, 2022.

State of Connecticut. 2019. Executive Order 3. Available: https://portal.ct.gov/-/media/Office-of-the-Governor/Executive-Orders/Lamont-Executive-Orders/Executive-Order-No-3.pdf. Accessed: May 9, 2022.

State of Connecticut. 2021a. Executive Order 21-3. Available: https://portal.ct.gov/-/media/Office-of-the-Governor/Executive-Orders/Lamont-Executive-Orders/Executive-Order-No-21-3.pdf. Accessed: May 9, 2022.

State of Connecticut. 2021b. Substitute House Bill No. 6441, Public Act No. 21-115: An Act Concerning Climate Change Adaption. Available: https://www.cga.ct.gov/2021/ACT/PA/PDF/2021PA-00115-R00HB-06441-PA.PDF. Accessed: May 9, 2022.

State of Rhode Island. 2014. Resilient Rhode Island Act. Available: https://energy.ri.gov/heating-cooling/fossil-fuels/learn-about-natural-gas/resilient-rhode-island-act-2014. Accessed: July 9, 2022.

State of Rhode Island Department of Environmental Management. 2023. McKee Highlights 2023 DEM Accomplishments; Progress Toward Act on Climate,8 Million Visits to State Parks and Beaches, New Environmental Justice Policy to Correct Historic Inequities. December 2023. Available: https://dem.ri.gov/press-releases/mckee-highlights-2023-dem-accomplishments-progress-toward-act-climate-8-million. Accessed: May 3, 2024.

Texas General Land Office. 2017. Texas Coastal Resiliency Master Plan. March 2017. Available: https://www.glo.texas.gov/coastal-grants/projects/files/Master-Plan.pdf. Accessed: January 23, 2024.

Texas General Land Office. 2023. Texas Coastal Resiliency Master Plan. March 2023. Available: https://www.glo.texas.gov/coast/coastal-management/coastal-resiliency/index.html. Accessed: February 14, 2024.

The White House. 2020a. Memorandum on the Withdrawal of Certain Areas of the United States Outer Continental Shelf from Leasing Disposition. Available: https://trumpwhitehouse.archives.gov/presidential-actions/memorandum-withdrawal-certain-areas-united-states-outer-continental-shelf-leasing-disposition/. Accessed: July 9, 2022.

The White House. 2020b. Presidential Determination on the Withdrawal of Certain Areas of the United States Outer Continental Shelf from Leasing Disposition. Available: https://trumpwhitehouse.archives.gov/presidential-actions/presidential-determination-withdrawal-certain-areas-united-states-outer-continental-shelf-leasing-disposition/. Accessed: July 9, 2022.

Town of Bristol. 2016. Town of Bristol 2016 Comprehensive Community Plan. Available: https://www.bristolri.gov/wp-content/uploads/2016%20Bristol%20Comprehensive%20Plan.pdf. Accessed: April 28, 2022.

Town of Falmouth. 2016. Town of Falmouth Local Comprehensive Plan, December 2016. Prepared by the Town of Falmouth Local Comprehensive Plan Subcommittee. Available: https://www.falmouthma.gov/DocumentCenter/View/10427/B-1-Local-Comprehensive-Plan. Accessed: April 27, 2022.

Town of Groton. 2020. Shellfish Management Plan for the Town of Groton, Connecticut. Available: https://cms9files.revize.com/grotonct/document_center/Departments/Town%20Clerk/2020%20Groton%20Shellfish%20Management%20Plan%20-%20Final%20draft.pdf. Accessed: April 27, 2022.

Town of North Kingstown. 2019. Town of North Kingstown Comprehensive Plan. Available: https://www.northkingstownri.gov/DocumentCenter/View/3282/North-Kingstown-Comprehensive-Plan-September-2019-FINAL-REV. Accessed: January 24, 2024.

Town of Portsmouth. 2021. Town of Portsmouth Comprehensive Plan. Prepared by Portsmouth, RI Planning Board and Weston & Sampson, November 21, 2021. Available: https://www.portsmouthri.gov/DocumentCenter/View/4784/PUBLIC-REVIEW-COMP-PLAN-DRAFT-2021. Accessed: April 28, 2022.

Town of Somerset. 2020. Town of Somerset Master Plan. March 2020. Available: https://www.townofsomerset.org/sites/g/files/vyhlif3821/f/uploads/somerset_mp_full_report_3_21_2020_final_0.pdf. Accessed: April 28, 2022.

Town of Somerset. 2022. Town Planner. Available: https://www.townofsomerset.org/town-planner. Accessed: May 10, 2022.

Town of Tiverton. 2018. Town of Tiverton Rhode Island Comprehensive Community Plan. Available: https://www.tiverton.ri.gov/documents/planningboard/Adopted%20and%20State%20Approved%20Comp%20Plan%20Tiverton%20with%20maps%20and%20appendices.pdf. Accessed: April 28, 2022.

U.S. Army Corps of Engineers (USACE). 2019. *Dredging to start in Norfolk Harbor inner channels*. U.S. Army Corps of Engineers Headquarters Website. By: Vince Little. December 26. Available: https://www.usace.army.mil/Media/News/NewsSearch/Article/2047595/dredging-to-start-in-norfolk-harbor-inner-channels/. Accessed: July 22, 2021.

U.S. Army Corps of Engineers (USACE). 2022. Ocean Dredged Material Disposal Site Database. Available: https://odd.el.erdc.dren.mil/ODMDSSearch.cfm. Accessed: May 1, 2022.

U.S. Coast Guard (USCG). 2021. *Port Access Route Study: Northern New York Bight.* USCG-2020-0278. December 2021. Available: https://www.regulations.gov/document/USCG-2020-0278-0067. Accessed: March 23, 2022.

U.S. Department of Transportation (DOT) 2022. America's Marine Highway Route Designations. U.S. Department of Transportation Maritime Administration. Available: https://cms.marad.dot.gov/sites/marad.dot.gov/files/2021-08/Route%20Designation%20one-pagers%20Aug%202021.pdf. Accessed: April 25, 2022.

United States Geological Survey (USGS). 2022. The U.S. Wind Turbine Database. Available: https://eerscmap.usgs.gov/uswtdb/. Accessed: July 9, 2022

U.S. Navy. 2018. Final Environmental Impact Statement/Overseas Environmental Impact Statement Atlantic Fleet Training and Testing. September 2018. Available: https://media.defense.gov/2020/May/13/2002299472/-1/-1/1/2.0%20AFTT%20FEIS%20DESCRIPTION%20OF%20PROPOSED%20ACTION%20AND%20ALTERNATIVES.PDF. Accessed: April 25, 2022.

Verdant Power. 2022. RITE Project – FERC No. P-12611. Available at: https://www.verdantpower.com. Accessed: April 22, 2022.

Virginia Department of Environmental Quality. 2021. *Virginia Section 309 Coastal Needs Assessment.* Virginia Department of Environmental Quality, Coastal Zone Management Program. Approved by NOAA February 4, 2021. Available: https://www.deq.virginia.gov/home/showpublisheddocument/8346/637540014441970000. Accessed: May 3, 2022.

Virginia Marine Resources Commission. 2021. *Fisheries Management*. Virginia Marine Resources Commission, 2021. Available: https://mrc.virginia.gov/fmac/fmoverview.shtm.

West Main Solar 1, LLC. 2021. Master Plan Application for Major Land Development Project 3.16 MW DC Ground Mount Solar PV Development. Available: https://www.portsmouthri.gov/AgendaCenter/ViewFile/Item/7790?fileID=10918. Accessed: May 12, 2022.

Attachment 1: Ongoing and Future Non-Offshore Wind Activity Analysis

This page intentionally left blank.

BOEM developed the following tables based on its 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019), which evaluates potential impacts associated with ongoing and future non-offshore wind activities.

Table D1-1. Summary of activities and the associated impact-producing factors for air quality

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	Accidental releases of air toxics HAPs are due to potential chemical spills. Ongoing releases occur in low frequencies. These may lead to short-term periods of toxic pollutant emissions through surface evaporation. According to the U.S. Department of Energy, 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Approximately 40.5 million barrels of oil were lost as a result of tanker incidents from 1970 to 2009, according to International Tanker Owners Pollution Federation Limited, which collects data on oil spills from tankers and other sources. From 1990 to 1999, the average annual input to the coastal Northeast was 220,000 barrels of petroleum and offshore it was up to less than 70,000 barrels.	Accidental releases of air toxics or HAPs will be due to potential chemical spills. Gradually increasing vessel traffic over the next 40 years would increase the risk of accidental releases. These may lead to short-term periods of toxic pollutant emissions through evaporation. Air quality impacts will be short-term and limited to the local area at and around the accidental release location.
Air emissions: Construction and decommissioning Air emissions: O&M Air emissions: Power generation emissions reductions	Air emissions originate from combustion engines and electric power generated by burning fuel. These activities are regulated under the CAA to meet set standards. Air quality has generally improved over the last 40 years; however, some areas in the Northeast have experienced a decline in air quality over the last 2 years. Some areas of the Atlantic coast remain in nonattainment for ozone, with the source of this pollution from power generation. Many of these states have made commitments toward cleaner energy goals to improve this, and offshore wind is part of these goals. Primary processes and activities that can affect the air quality impacts are expansions and modifications to existing fossil fuel power plants, onshore and offshore activities involving renewable energy facilities, and various construction activities.	Many Atlantic states have committed to clean energy goals, with offshore wind being a large part of that. Other reductions include transitioning to onshore wind and solar. The No Action Alternative without implementation of other future offshore wind projects would likely result in increased air quality impacts regionally due to the need to construct and operate new energy generation facilities to meet future power demands. These facilities may consist of new natural-gas-fired power plants, coal-fired, oil-fired, or clean-coal-fired plants. These types of facilities would likely have larger and continuous emissions and result in greater regional scale impacts on air quality.

CAA = Clean Air Act; hazmat = hazardous materials; HAPs = hazardous air pollutants

Table D1-2. Summary of activities and the associated impact-producing factors for bats

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded and would result in high-intensity, low-exposure level, long-term, but localized intermittent risk to bats in nearshore waters. Direct impacts are not expected to occur as recent research has shown that bats may be less sensitive to TTS than other terrestrial mammals (Simmons et al. 2016). Indirect impacts (i.e., displacement from potentially suitable habitats) could occur as a result of construction activities, which could generate noise sufficient to cause avoidance behavior (Schaub et al. 2008). Construction activity would be temporary and highly localized.	Similar to ongoing activities, noise associated with pile driving activities would be limited to nearshore waters, and these high-intensity, but low-exposure risks would not be expected to result in direct impacts. Some indirect impacts (i.e., displacement from potentially suitable foraging habitats) could occur as a result of construction activities, which could generate noise sufficient to cause avoidance behavior (Schaub et al. 2008). Construction activity would be temporary and highly localized, and no population-level effects would be expected.
Noise: Construction	Onshore construction occurs regularly for generic infrastructure projects in the bats geographic analysis area. There is a potential for displacement caused by equipment if construction occurs at night (Schaub et al. 2008). Any displacement would only be temporary. No individual or population level impacts would be expected. Some bats roosting in the vicinity of construction activities may be disturbed during construction but would be expected to move to a different roost farther from construction noise. This would not be expected to result in any impacts as frequent roost switching is a common component of a bat's life history (Hann et al. 2017; Whitaker 1998).	Onshore construction is expected to continue at current trends. Some behavioral responses and avoidance of construction areas may occur (Schaub et al. 2008). However, no injury or mortality would be expected.
Presence of structures: Migration disturbances	There may be few structures scattered throughout the offshore bats geographic analysis area, such as navigation and weather buoys and light towers. Migrating bats can easily fly around or over these sparsely distributed structures, and no migration disturbance would be expected. Bat use of offshore areas is very limited and generally restricted to spring and fall migration. Very few bats would be expected to encounter structures on the OCS and no population-level effects would be expected.	The infrequent installation of future new structures in the marine environment of the next 40 years is expected to continue. As described under Ongoing Activities, these structures would not be expected to cause disturbance to migrating tree bats in the marine environment.
Presence of structures: Turbine strikes	There may be few structures in the offshore bats geographic analysis area, such as navigation and weather buoys, turbines, and light towers. Migrating tree bats can easily fly around or over these sparsely distributed structures, and no strikes would be expected.	The infrequent installation of future new structures in the marine environment of the next 40 years is expected to continue. As described under Ongoing Activities, these structures would not be expected to result in increased collision risk to migrating tree bats in the marine environment.
Land disturbance: onshore construction	Onshore construction activities are expected to continue at current trends. Potential direct effects on individuals may occur if construction activities include tree removal when bats are potentially present. Injury or mortality may occur if trees being removed are occupied by bats at the time of removal. While there is some potential for indirect impacts associated with habitat loss, no individual or population-level effects would be expected.	Future non-offshore wind development would continue to occur at the current rate. This development has the potential to result in habitat loss and could result in injury or mortality of individuals.

Table D1-3. Summary of activities and the associated impact-producing factors for benthic resources

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for a discussion of ongoing accidental releases. Accidental releases of hazmat occur periodically, mostly consisting of fuels, lubricating oils, and other petroleum compounds. Because most of these materials tend to float in seawater, they rarely contact benthic resources. The chemicals with potential to sink or dissolve rapidly often dilute to non-toxic levels before they affect benthic resources. The corresponding impacts on benthic resources are rarely noticeable.	Gradually increasing vessel traffic over the next 40 years would increase the risk of accidental releases. See previous cell and the Water Quality table for details.
Accidental releases: Invasive species	Invasive species are periodically released accidentally during ongoing activities, including the discharge of ballast water and bilge water from marine vessels. The impacts on benthic resources (e.g., competitive disadvantage, smothering) depend on many factors, but can be noticeable, widespread, and permanent.	No future activities were identified within the geographic analysis area other than ongoing activities.
Accidental releases: Trash and debris	Ongoing releases of trash and debris occurs from onshore sources, fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities and cables, lines and pipeline laying. However, there does not appear to be evidence that ongoing releases have detectable impacts on benthic resources.	No future activities were identified within the geographic analysis area other than ongoing activities.
Anchoring	Regular vessel anchoring related to ongoing military, survey, commercial, and recreational activities continue to cause temporary to permanent impacts in the immediate area where anchors and chains meet the seafloor. These impacts include increased turbidity levels and the potential for direct contact to cause injury and mortality of benthic resources, as well as physical damage to their habitats. All impacts are localized; turbidity is temporary; injury and mortality are recovered in the short term; and physical damage can be permanent if it occurs in eelgrass beds or hard bottom.	No future activities were identified within the geographic analysis area other than ongoing activities.
EMFs	EMFs continuously emanate from existing telecommunication and electrical power transmission cables. New cables generating EMFs are infrequently installed in the geographic analysis area. Some benthic species can detect EMFs, although EMFs do not appear to present a barrier to movement. The extent of impacts (behavioral changes) is likely less than 50 feet (15.2 meters) from the cable and the intensity of impacts on benthic resources is likely undetectable.	No future activities were identified within the geographic analysis area other than ongoing activities.
Cable emplacement and maintenance	Cable maintenance activities infrequently disturb benthic resources and cause temporary increases in suspended sediment; these disturbances would be local and limited to the emplacement corridor. New cables are infrequently added near shore. Cable emplacement/maintenance activities injure and kill benthic resources, and result in temporary to long-term habitat alterations. The intensity of impacts depends on the time (season) and place (habitat type) where the activities occur. (See also the IPFs of Seabed profile alterations and Sediment deposition and burial.)	No future activities were identified within the geographic analysis area other than ongoing activities.
Noise: Onshore/offshore construction	See finfish, invertebrates, and EFH table. Detectable impacts of construction noise on benthic resources rarely, if ever, overlap from multiple sources.	See finfish, invertebrates, and EFH table. Detectable impacts of construction noise on benthic resources would rarely, if ever, overlap from multiple sources.
Noise: G&G	See finfish, invertebrates, and EFH table. Detectable impacts of G&G noise on benthic resources rarely, if ever, overlap from multiple sources.	See finfish, invertebrates, and EFH table. Detectable impacts of G&G noise on benthic resources would rarely, if ever, overlap from multiple sources.
Noise: O&M	See finfish, invertebrates, and EFH table.	See finfish, invertebrates, and EFH table.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can cause injury and/or mortality to benthic resources in a small area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area. The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified within the geographic analysis area other than ongoing activities.
Noise: Cable laying/trenching	Infrequent trenching activities for pipeline and cable laying, as well as other cable burial methods, emit noise. These disturbances are local, temporary, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	New or expanded submarine cables and pipelines are likely to occur in the geographic analysis area. These disturbances would be infrequent over the next 40 years, local, temporary, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.
Port utilization: Expansion	See finfish, invertebrates, and EFH table.	See finfish, invertebrates, and EFH table.

Associated IPFs: Sub-IFPs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear are periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb, injure, or kill benthic resources, creating small, short-term, localized impacts.	Future new cables would present additional risk of gear loss, resulting in small, short-term, localized impacts (disturbance, injury).
Presence of structures: Hydrodynamic disturbance	See finfish, invertebrates, and EFH table.	See finfish, invertebrates, and EFH table.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables continuously create uncommon relief in a mostly sandy seascape. Structure-oriented fishes are attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes can adversely affect populations and communities of benthic resources. These impacts are local and permanent.	New cables installed in the geographic analysis area over the next 40 years would likely require hard protection atop portions of the route (see the "cable emplacement and maintenance" row in this table). Any new towers, buoy, or piers would also create uncommon relief in a mostly flat, sandy seascape. Structure-oriented fishes could be attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes could adversely affect populations and communities of benthic resources. These impacts are expected to be local and to be permanent as long as the structures remain.
Presence of structures: Habitat conversion	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables continuously provide uncommon hard-bottom habitat. A large portion is homogeneous sandy seascape but there is some other hard and/or complex habitat. Benthic species dependent on hard-bottom habitat can benefit on a constant basis, although the new habitat can also be colonized by invasive species (e.g., certain tunicate species). Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat to the new hard-structure habitat.	Any new towers, buoy, piers, or cable protection structures would create uncommon relief in a mostly sandy seascape. Benthic species dependent on hard-bottom habitat could benefit, although the new habitat could also be colonized by invasive species (e.g., certain tunicate species). Soft bottom is the dominant habitat type in the region, and species that rely on this habitat would not likely experience population-level impacts (Guida et al. 2017; Greene et al. 2010).
Presence of structures: Cable infrastructure	The presence of cable infrastructure, especially hard protection atop cables, causes impacts through entanglement/gear loss/damage, fish aggregation, and habitat conversion.	See other sub-IPFs within Presence of structures.
Discharges/intakes	The gradually increasing amount of vessel traffic is increasing the cumulative permitted discharges from vessels. Many discharges are required to comply with permitting standards established to ensure potential impacts on the environment are minimized or mitigated. However, there does not appear to be evidence that the volumes and extents have any impact on benthic resources.	There is the potential for new ocean dumping/dredge disposal sites in the Northeast. Impacts (disturbance, reduction in fitness) of infrequent ocean disposal to benthic resources are short-term because spoils are typically recolonized naturally. In addition, USEPA has established dredge spoil criteria and it regulates the disposal permits issued by USACE; these discharges are required to comply with permitting standards established to ensure potential impacts on the environment are minimized or mitigated.
Cable emplacement and maintenance: Seabed profile alterations	Ongoing sediment dredging for navigation purposes results in localized short-term impacts (habitat alteration, injury, and mortality) on benthic resources through this IPF. Dredging typically occurs only in sandy or silty habitats, which are abundant in the geographic analysis area and are quick to recover from disturbance. Therefore, such impacts, while locally intense, have little impact on benthic resources in the geographic analysis area.	No future activities were identified within the geographic analysis area other than ongoing activities.
Cable emplacement and maintenance: Sediment deposition and burial	Ongoing sediment dredging for navigation purposes results in fine sediment deposition. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local, limited to the emplacement corridor. Sediment deposition could have adverse impacts on some benthic resources, especially eggs and larvae, including smothering and loss of fitness. Impacts may vary based on season/time of year. Where dredged materials are disposed, benthic resources are smothered. However, such areas are typically recolonized naturally in the short term. Most sediment dredging projects have time-of-year restrictions to minimize impacts on benthic resources. Most benthic resources in the geographic analysis area are adapted to the turbidity and periodic sediment deposition that occur naturally in the geographic analysis area.	USACE and/or private ports may undertake dredging projects periodically. Where dredged materials are disposed, benthic resources are buried. However, such areas are typically recolonized naturally in the short term. Most benthic resources in the geographic analysis area are adapted to the turbidity and periodic sediment deposition that occur naturally in the geographic analysis area.

EFH = Essential Fish Habitat; EMFs = electromagnetic fields; hazmat = hazardous materials

Table D1-4. Summary of activities and the associated impact-producing factors for birds

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Ingestion of hydrocarbons can lead to morbidity and mortality due to decreased hematological function, dehydration, drowning, hypothermia, starvation, and weight loss (Briggs et al. 1997; Haney et al. 2017; Paruk et al. 2016). Additionally, even small exposures that result in feather oiling can lead to sublethal effects that include changes in flight efficiencies and result in increased energy expenditure during daily and seasonal activities including chick provisioning, commuting, courtship, foraging, long-distance migration, predator evasion, and territory defense (Maggini et al. 2017). These impacts rarely result in population-level impacts.	Gradually increasing vessel traffic over the next 40 years would increase the potential risk of accidental releases and associated impacts, including mortality, decreased fitness, and health effects on individuals. Impacts are unlikely to affect populations.
Accidental releases: Trash and debris	Trash and debris are accidentally discharged through onshore sources; fisheries use; dredged material ocean disposal; marine minerals extraction; marine transportation, navigation, and traffic; survey activities; and cables, lines, and pipeline laying on an ongoing basis. In a study from 2010, students at sea collected more than 520,000 bits of plastic debris per square mile. In addition, many fragments come from consumer products blown out of landfills or tossed out as litter (Law et al. 2010). Birds may accidentally ingest trash mistaken for prey. Mortality is typically a result of blockages caused by both hard and soft plastic debris (Roman et al. 2019).	As population and vessel traffic increase gradually over the next 40 years, accidental release of trash and debris may increase. This may result in increased injury or mortality of individuals. However, there does not appear to be evidence that the volumes and extents would have any impact on bird populations.
Light: Vessels	Ocean vessels have an array of lights including navigational lights, deck lights, and interior lights. Such lights can attract some birds. The impact is localized and temporary. This attraction would not be expected to result in an increased risk of collision with vessels. Population-level impacts would not be expected.	Gradually increasing vessel traffic over the next 40 years would increase the potential for bird and vessel interactions. While birds may be attracted to vessel lights, this attraction would not be expected to result in increased risk of collision with vessels. No population-level impacts would be expected.
Light: Structures	Buoys, towers, and onshore structures with lights can attract birds. Onshore structures like houses and ports emit a great deal more light than offshore buoys and towers. This attraction has the potential to result in an increased risk of collision with lighted structures (Hüppop et al. 2006). Light from structures is widespread and permanent near the coast, but minimal offshore.	Light from onshore structures is expected to gradually increase in proportion with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.
Cable emplacement and maintenance	Cable emplacement and maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances will be temporary and generally limited to the emplacement corridor. Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances will be temporary and limited to the emplacement corridor. Suspended sediment could impair the vision of diving birds that are foraging in the water column (Cook and Burton 2010). However, given the localized nature of the potential impacts, individuals would be expected to successfully forage in nearby areas not affected by increased sedimentation and no biologically significant impacts on individuals or populations would be expected.	Future new cables, would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in localized, short-term impacts. Impacts would be temporary and localized, with no biologically significant impacts on individuals or populations.
Noise: Aircraft	Aircraft routinely travel in the geographic analysis area for birds. With the possible exception of rescue operations and survey aircraft, no ongoing aircraft flights would occur at altitudes that would elicit a response from birds. If flights are at a sufficiently low altitude, birds may flush, resulting in non-biologically significant increased energy expenditure. Disturbance, if any, would be localized and temporary and impacts would be expected to dissipate once the aircraft has left the area.	Aircraft noise is likely to continue to increase as commercial air traffic increases; however, very few flights would be expected to be at a sufficiently low altitude to elicit a response from birds. If flights are at a sufficiently low altitude, birds may flush, resulting in non-biologically significant increased energy expenditure. Disturbance, if any, would be localized and temporary and impacts would be expected to dissipate once the aircraft has left the area.
Noise: G&G	Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities could result in diving birds leaving the local area. Non-diving birds would be unaffected. Any displacement would only be temporary during non-migratory periods, but impacts could be greater if displacement were to occur in preferred feeding areas during seasonal migration periods.	Same as ongoing activities, with the addition of possible future oil and gas surveys.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water could result in intermittent, temporary, localized impacts on diving birds due to displacement from foraging areas if birds are present in the vicinity of pile-driving activity. The extent of these impacts depends on pile size, hammer energy, and local acoustic conditions. No biologically significant impacts on individuals or populations would be expected.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Noise: Onshore construction	Onshore construction is routinely used in generic infrastructure projects. Equipment could potentially cause displacement. Any displacement would only be temporary and no individual fitness or population-level impacts would be expected.	Onshore construction will continue at current trends. Some behavior responses could range from escape behavior to mild annoyance, but no individual injury or mortality would be expected.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Noise: Vessels	Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Sub-surface noise from vessels could disturb diving birds foraging for prey below the surface. The consequence to birds would be similar to noise from G&G but likely less because noise levels are lower.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Presence of structures: Entanglement, gear loss, gear damage	Each year, 2,551 seabirds die annually from interactions with U.S. commercial fisheries on the Atlantic (Sigourney et al. 2019). Even more die due to abandoned commercial fishing gear (nets). In addition, recreational fishing gear (hooks and lines) is periodically lost on existing buoys, pilings, hard protection, and other structures and has the potential to entangle birds.	No future activities were identified within the geographic analysis area for birds other than ongoing activities.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various hard protections atop cables create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these objects. These impacts are local and can be short-term to permanent. These fish aggregations can provide localized, short-term to permanent, beneficial impacts on some bird species because it could increase prey species availability.	New cables, installed incrementally in the geographic analysis area for birds over the next 20 to 40 years, would likely require hard protection atop portions of the cables (see cable emplacement and maintenance row). Any new towers, buoys, or piers would also create uncommon relief in a mostly flat seascape. Structure-oriented fishes could be attracted to these locations. Abundance of certain fishes may increase. These impacts are expected to be local and may be short-term to permanent. These fish aggregations can provide localized, short-term to permanent beneficial impacts on some bird species due to increased prey species availability.
Presence of structures: Migration disturbances	A few structures may be scattered about the offshore geographic analysis area for birds, such as navigation and weather buoys and light towers. Migrating birds can easily fly around or over these sparsely distributed structures.	The infrequent installation of future new structures in the marine or onshore environment over the next 40 years would not be expected to result in migration disturbances.
Presence of structures: Turbine strikes, displacement, and attraction	A few structures may be in the offshore geographic analysis area for birds, such as navigation and weather buoys, turbines, and light towers. Given the limited number of structures currently in the geographic analysis area, individual- and population-level impacts due to displacement from current foraging habitat would not be expected. Stationary structures in the offshore environment would not be expected to pose a collision risk to birds. Some birds like cormorants and gulls may be attracted to these structures and opportunistically roost on these structures.	The installation of future new structures in the marine or onshore environment over the next 40 years would not be expected to result in an increase in collision risk or to result in displacement. Some potential for attraction and opportunistic roosting exists but would be expected to be limited given the anticipated number of structures.
Traffic: Aircraft	General aviation accounts for approximately two bird strikes per 100,000 flights (Dolbeer et al. 2019). In addition to general aviation, aircraft are used for scientific and academic surveys in marine environments.	Bird fatalities associated with general aviation would be expected to increase with the current trend in commercial air travel. Aircraft will continue to be used to conduct scientific research studies as well as wildlife monitoring and pre-construction surveys. These flights would be well below the 100,000 flights and no bird strikes would be expected to occur.
Land disturbance: Onshore construction	Onshore construction activity will continue at current trends. There is some potential for indirect impacts associated with habitat loss and fragmentation.	Future non-offshore wind development would continue to occur at the current rate. This development has the potential to result in habitat loss but would not be expected to result in injury or mortality of individuals.

hazmat = hazardous materials

Table D1-5. Summary of activities and the associated impact-producing factors for coastal habitats and fauna

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for a discussion of ongoing accidental releases. Accidental releases of fuel/fluids/ hazmat have the potential to cause habitat contamination and harm to the species that build biogenic coastal habitats (e.g., eelgrass, oysters, mussels, slipper limpets, salt marsh cordgrass) from releases and/or cleanup activities. Only a portion of the ongoing releases contact coastal habitats in the geographic analysis area. Impacts are small, localized, and temporary.	See the Water Quality table for a discussion of accidental releases.
Accidental releases: Trash and debris	Ongoing releases of trash and debris occur from onshore sources, fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities and cables, lines and pipeline laying. As population and vessel traffic increase, accidental releases of trash and debris may increase. Such materials may be obvious when they come to rest on shorelines; however, there does not appear to be evidence that the volumes and extents would have any detectable impact on coastal habitats.	No future activities were identified within the geographic analysis area for coastal habitats other than ongoing activities.
Anchoring	Vessel anchoring related to ongoing military, survey, commercial, and recreational activities will continue to cause temporary to permanent impacts in the immediate area where anchors and chains meet the seafloor. These impacts include increased turbidity levels and potential for direct contact to cause physical damage to coastal habitats. All impacts are localized; turbidity is short-term and temporary; physical damage can be permanent if it occurs in eelgrass beds or hard bottom.	No future activities were identified within the geographic analysis area for coastal habitats other than ongoing activities.
EMF	EMFs continuously emanate from existing telecommunication and electrical power transmission cables. New cables generating EMFs are infrequently installed in the analysis area. The extent of impacts is likely less than 50 feet from the cable, and the intensity of impacts on coastal habitats is likely undetectable.	No future activities were identified within the geographic analysis area for coastal habitats other than ongoing activities.
Light: Vessels	Navigation lights and deck lights on vessels would be a source of ongoing light. The extent of impacts is limited to the immediate vicinity of the lights, and the intensity of impacts on coastal habitats is likely undetectable.	Light is expected to continue to increase gradually with increasing vessel traffic over the next 40 years. The extent of impacts would likely be limited to the immediate vicinity of the lights, and the intensity of impacts on coastal habitats would likely be undetectable.
Light: Structures	Ongoing lights from navigational aids and other structures onshore and nearshore. The extent of impacts is likely limited to the immediate vicinity of the lights, and the intensity of impacts on coastal habitats is likely undetectable.	No future activities were identified within the geographic analysis area for coastal habitats other than ongoing activities.
Cable emplacement and maintenance	Ongoing cable maintenance activities infrequently disturb bottom sediments; these disturbances are local and limited to the emplacement corridor (see the Sediment deposition and burial IPF).	No future activities were identified within the geographic analysis area other than ongoing activities.
Noise: Onshore/offshore construction	Ongoing noise from construction occurs frequently near shores of populated areas in New England and the mid-Atlantic, but infrequently offshore. Noise from construction near shore is expected to gradually increase over the next 40 years in line with human population growth along the coast of the geographic analysis area. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary.	No future activities were identified within the analysis area other than ongoing activities.
Noise: G&G	Site characterization surveys and scientific surveys are ongoing. The intensity and extent of the resulting impacts are difficult to generalize but are local and temporary.	Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 40 years. Site characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize but are likely local and temporary.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can reach coastal habitats. The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified within the analysis area other than ongoing activities.
Noise: Cable laying/trenching	Rare but ongoing trenching for pipeline and cable laying activities emits noise; cable burial via jet embedment also causes similar noise impacts. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise on coastal habitats are discountable compared to the impacts of the physical disturbance and sediment suspension.	New or expanded submarine cables and pipelines may occur in the geographic analysis area infrequently over the next 40 years. These disturbances would be temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise on coastal habitats are discountable compared to the impacts of the physical disturbance and sediment suspension.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Habitat conversion	Various structures, including pilings, piers, towers, riprap, buoys, and various means of hard protection, are periodically added to the seascape, creating uncommon relief in a mostly flat seascape and converting previously existing habitat (whether hard-bottom or soft-bottom) to a type of hard habitat, although it differs from the typical hard-bottom habitat in the analysis area, namely, coarse substrates in a sand matrix. The new habitat may or may not function similarly to hard-bottom habitat typical in the region (Kerckhof et al. 2019; HDR 2019). Soft bottom is the dominant habitat type on the OCS, and structures do not meaningfully reduce the amount of soft-bottom habitat available (Guida et al. 2017; Greene et al. 2010). Structures can also create an artificial reef effect, attracting a different community of organisms.	Any new cable or pipeline installed in the geographic analysis area would likely require hard protection atop portions of the route (see cells to the left). Such protection is anticipated to increase incrementally over the next 40 years. Where cables would be buried deeply enough that protection would not be used, presence of the cable would have no impact on coastal habitats.
Presence of structures: Transmission cable infrastructure	Various means of hard protection atop existing cables can create uncommon hard-bottom habitat. Where cables are buried deeply enough that protection is not used, presence of the cable has no impact on coastal habitats.	See above.
Land disturbance: Erosion and sedimentation	Ongoing development of onshore properties, especially shoreline parcels, periodically causes short-term erosion and sedimentation of coastal habitats.	No future activities were identified within the geographic analysis area other than ongoing activities.
Land disturbance: Onshore construction	Ongoing development of onshore properties, especially shoreline parcels, periodically causes short-term to permanent degradation of onshore coastal habitats.	No future activities were identified within the geographic analysis area other than ongoing activities.
Land disturbance: Onshore, land use changes	Ongoing development of onshore properties, especially shoreline parcels, periodically causes the conversion of onshore coastal habitats to developed space.	No future activities were identified within the geographic analysis area other than ongoing activities.
Cable emplacement and maintenance: Seabed profile alterations	Ongoing sediment dredging for navigation purposes results in localized, short-term impacts on coastal habitats through this IPF. Dredging typically occurs only in sandy or silty habitats, which are abundant in the analysis area and are quick to recover from disturbance. Therefore, such impacts, while locally intense, have little effect on the general character of coastal habitats.	No future activities were identified within the geographic analysis area other than ongoing activities.
Cable emplacement and maintenance: Sediment deposition and burial	Ongoing sediment dredging for navigation purposes results in fine sediment deposition within coastal habitats. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local, limited to the emplacement corridor. No dredged material disposal sites were identified within the geographic analysis area.	No future activities were identified within the geographic analysis area other than ongoing activities.

hazmat = hazardous materials

Table D1-6. Summary of activities and the associated impact-producing factors for commercial fisheries and for-hire recreational fishing

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Anchoring	Impacts from anchoring occur due to ongoing military, survey, commercial, and recreational activities. The short-term, localized impact on this resource is the presence of a navigational hazard (anchored vessel) to fishing vessels.	Impacts from anchoring may occur on a semi-regular basis over the next 40 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Anchoring could pose a temporary (hours to days), localized (within a few hundred meters of anchored vessel) navigational hazard to fishing vessels.
Cable emplacement and maintenance	New cable emplacement and infrequent cable maintenance activities disturb the seafloor, increase suspended sediment, and cause temporary displacement of fishing vessels. These disturbances would be local and limited to the emplacement corridor.	Future new cables and cable maintenance would occasionally disturb the seafloor and cause temporary displacement in fishing vessels and increases in suspended sediment resulting in local, short-term impacts. If the cable routes enter the geographic analysis area for this resource, short-term disruption of fishing activities would be expected.
Noise: Construction, trenching, operations and maintenance	Noise from construction occurs frequently in coastal habitats in populated areas in New England and the Mid-Atlantic, but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. Infrequent offshore trenching could occur in connection with cable installation. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Low levels of elevated noise from operational WTGs likely have low to no impacts on fish and no impacts at a fishery level. Noise is also created by O&M of marine minerals extraction, which has small, local impacts on fish, but likely no impacts at a fishery level.	Noise from construction near shore is expected to gradually increase in line with human population growth along the coast of the geographic analysis area for this resource. Noise from dredging and sand and gravel mining could occur. New or expanded marine minerals extraction may increase noise during their O&M over the next 40 years. Impacts from construction, operations, and maintenance would likely be small and local on fish, and not seen at a fishery level. Periodic trenching would be needed for repair or new installation of underground infrastructure. These disturbances would be temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise on commercial fish species are typically less prominent than the impacts of the physical disturbance and sediment suspension. Therefore, fishery-level impacts are unlikely.
Noise: G&G	Ongoing site characterization surveys and scientific surveys produce noise around sites of investigation. These activities can disturb fish and invertebrates in the immediate vicinity of the investigation and can cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions.	Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 40 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise to penetrate deep into the seabed, potentially resulting in injury or mortality to finfish and invertebrates in a small area around each sound source and short-term stress and behavioral changes to individuals over a greater area. Site characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves more similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize but are likely local and temporary.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when ports or marinas, piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can cause injury and/or mortality to finfish and invertebrates in a small area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area, leading to temporary local impacts on commercial fisheries and for-hire recreational fishing. The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified in the analysis area other than ongoing activities.
Noise: Vessels	Vessel noise is anticipated to continue at levels similar to current levels. While vessel noise may have some impact on behavior, it is likely limited to brief startle and temporary stress responses. Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels.	Planned new barge route and dredging disposal sites would generate vessel noise when implemented.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 40 years.	Ports would need to perform maintenance and upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep-draft vessels as they continue to increase in size. Port utilization is expected to increase over the next 40 years, with increased activity during construction. The ability of ports to receive the increase in vessel traffic may require port modifications, such as channel deepening, leading to local impacts on fish populations. Port expansions could also increase vessel traffic and competition for dockside services, which could affect fishing vessels.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Navigation hazard and allisions	Structures in and near the cumulative lease areas that pose potential navigation hazards include offshore wind turbines, buoys, and shoreline developments such as docks and ports. An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. Two types of allisions occur: drift and powered. A drift allision generally occurs when a vessel is powered down due to operator choice or power failure. A powered allision generally occurs when an operator fails to adequately control their vessel movements or is distracted.	No known reasonably foreseeable structures are proposed to be located in the geographic analysis area that could affect commercial fisheries. Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb habitats and potentially harm individuals, creating small, localized, short-term impacts on fish, but likely no impacts at a fishery level.	No future activities were identified in the analysis area other than ongoing activities.
Presence of structures: Habitat conversion and fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly sandy seascape. A large portion is homogeneous sandy seascape but there is some other hard and/or complex habitat. Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat to the new hard-structure habitat. Structure-oriented fishes are attracted to these locations. These impacts are local and can be short-term to permanent. Fish aggregation may be considered adverse, beneficial, or neither. Commercial and for-hire recreational fishing can occur near these structures. For-hire recreational fishing is more popular, as commercial mobile fishing gear risk snagging on the structures.	New cables, installed incrementally in the analysis area over the next 20 to 40 years, would likely require hard protection atop portions of the route (see cable emplacement and maintenance IPF above). Any new towers, buoys, or piers would also create uncommon relief in a mostly flat seascape. Structure-oriented species could be attracted to these locations. Structure-oriented species would benefit (Claisse et al. 2014; Smith et al. 2016). This may lead to more and larger structure-oriented fish communities and larger predators opportunistically feeding on the communities, as well as increased private and for-hire recreational fishing opportunities. Soft bottom is the dominant habitat type in the region, and species that rely on this habitat would not likely experience population-level impacts (Guida et al. 2017; Greene et al. 2010). These impacts are expected to be local and may be long term.
Presence of structures: Migration disturbances	Human structures in the marine environment, e.g., shipwrecks, artificial reefs, buoys, and oil platforms, can attract finfish and invertebrates that approach the structures during their migrations. This could slow species migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement than structure (Secor et al. 2018). There is no evidence to suggest that structures pose a barrier to migratory animals.	The infrequent installation of future new structures in the marine environment over the next 40 years may attract finfish and invertebrates that approach the structures during their migrations. This could tend to slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement (Secor et al. 2018). Migratory animals would likely be able to proceed from structures unimpeded. Therefore, fishery-level impacts are not anticipated.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Presence of structures: Cable infrastructure	The existing offshore cable infrastructure supports the economy by transmitting electric power and communications between mainland and islands. Shoreline developments are ongoing and include docks, ports, and other commercial, industrial, and residential structures.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Traffic: Vessels and vessel collisions	No substantial changes are anticipated to the vessel traffic volumes. The geographic analysis area would continue to have numerous ports and the extensive marine traffic related to shipping, fishing, and recreation would continue to be important to the region's economy. The region's substantial marine traffic may result in occasional collisions. Vessels need to navigate around structures to avoid allisions. When multiple vessels need to navigate around a structure, then navigation is more complex, as the vessels need to avoid both the structure and each other. The risk for collisions is ongoing but infrequent.	New vessel traffic in the geographic analysis area would consistently be generated by proposed barge routes and dredging demolition sites. Marine commerce and related industries would continue to be important to the regional economy.

Table D1-7. Summary of activities and the associated impact-producing factors for cultural resources

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for water quality for a quantitative analysis of these risks. Accidental releases of fuel/fluids/hazmat occur during vessel use for recreational, fisheries, marine transportation, or military purposes, and other ongoing activities. Both released fluids and cleanup activities that require the removal of contaminated soils and/or seafloor sediments can cause impacts on cultural resources because resources are affected during by the released chemicals as well as the ensuing cleanup activities.	Gradually increasing vessel traffic over the next 40 years would increase the risk of accidental releases within the geographic analysis area for cultural resources, increasing the frequency of small releases. Although the majority of anticipated accidental releases would be small, resulting in small-scale impacts on cultural resources, a single, large-scale accidental release such as an oil spill, could have significant impacts on marine and coastal cultural resources. A large-scale release would require extensive cleanup activities to remove contaminated materials resulting in damage to or the complete removal of terrestrial and marine cultural resources. In addition, the accidentally released materials in deep water settings could settle on seafloor cultural resources such as wreck sites, accelerating their decomposition and/or covering them and making them inaccessible/unrecognizable to researchers, resulting in a significant loss of historic information. As a result, although considered unlikely, a large-scale accidental release and associated cleanup could result in permanent, geographically extensive, and large-scale impacts on cultural resources.
Accidental releases: Trash and debris	Accidental releases of trash and debris occur during vessel use for recreational, fisheries, marine transportation, or military purposes and other ongoing activities. While the released trash and debris can directly affect cultural resources, the majority of impacts associated with accidental releases occur during cleanup activities, especially if soil or sediment removed during cleanup affect known and undiscovered archaeological resources. In addition, the presence of large amounts of trash on shorelines or the ocean surface can impact the cultural value of Traditional Cultural Properties (TCPs) for stakeholders. State and federal laws prohibiting large releases of trash would limit the size of any individual release and ongoing local, state, and federal efforts to clean up trash on beaches and waterways would continue to mitigate the effects of small-scale accidental releases of trash.	Future activities with the potential to result in accidental releases include construction and operations of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications). Accidental releases would continue at current rates along the northeast Atlantic coast.
Anchoring	The use of vessel anchoring and gear (i.e., wire ropes, cables, chain, sweep on the seafloor) that disturbs the seafloor, such as bottom trawls and anchors, by military, recreational, industrial, and commercial vessels can impact cultural resources by physically damaging maritime archaeological resources such as shipwrecks and debris fields.	Future activities with the potential to result in anchoring/gear utilization include construction and operations of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); military use; marine transportation; fisheries use and management; and oil and gas activities. These activities are likely to continue to occur at current rates along the entire coast of the eastern United States.
Gear utilization: Dredging	Activities associated with dredge operations and activities could damage marine archaeological resources. Ongoing activities identified by BOEM with the potential to result in dredging impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); tidal energy projects; marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities.	Dredging activities would gradually increase through time as new offshore infrastructure is built, such as gas pipelines and electrical lines, and as ports and harbors are expanded or maintained.
Light: Vessels	Light associated with military, commercial, or construction vessel traffic can temporarily affect coastal historic structures and TCP resources when the addition of intrusive, modern lighting changes the physical environment (“setting”) of cultural resources. The impacts of construction and operational lighting would be limited to cultural resources on the shoreline for which a nighttime sky is a contributing element to historic integrity. This excludes resources that are closed at night, such as historic buildings, lighthouses, and battlefields, and resources that generate their own nighttime light, such as historic districts. Offshore construction activities that require increased vessel traffic, construction vessels stationed offshore, and construction area lighting for prolonged periods can cause more sustained and significant visual impacts on coastal historic structure and TCP resources.	Future activities with the potential to result in vessel lighting impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Light pollution from vessel traffic would continue at the current intensity along the northeast coast, with a slight increase due to population increase and development over time.
Light: Structures	The construction of new structures that introduce new light sources into the setting of historic architectural properties or TCPs can result in impacts, particularly if the historic and/or cultural significance of the resource is associated with uninterrupted nighttime skies or periods of darkness. Any tall structure (commercial building, radio antenna, large satellite dishes, etc.) requiring nighttime hazard lighting to prevent aircraft collision can cause these types of impacts.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.

Associated IPF: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Port utilization: Expansion	Major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. Expansion of port facilities can introduce large, modern port infrastructure into the viewsheds of nearby historic properties, affecting their setting and historic significance.	Future activities with the potential to result in port expansion impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); tidal energy projects; marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; and oil and gas activities. Port expansion would continue at current levels, which reflect efforts to capture business associated with the offshore wind industry (irrespective of specific projects).
Presence of structures	The only existing offshore structures within the viewshed of the geographic analysis area are minor features such as buoys.	Non-offshore wind structures that could be viewed would be limited to meteorological towers. Marine activity would also occur within the marine viewshed of the geographic analysis area.
Cable emplacement and maintenance	Infrequent cable maintenance activities disturb the seafloor and could cause impacts on submerged archaeological resources. These disturbances would be local and limited to emplacement corridors.	Future activities with the potential to result in seafloor disturbances similar to offshore impacts include construction and operation of undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); tidal energy projects; marine minerals use and ocean-dredged material disposal; military use; and oil and gas activities. Such activities could cause impacts on submerged archaeological resources including shipwrecks and formerly subaerially exposed pre-contact Native American archaeological sites.
Land disturbance: Onshore construction	Onshore construction activities can impact archaeological resources by damaging and/or removing resources.	Future activities that could result in terrestrial land disturbance impacts include onshore residential, commercial, industrial, and military development activities along the East Coast, particularly those proximate to export cables and interconnection facilities. Onshore construction would continue at current rates.

hazmat = hazardous materials; TCPs = Traditional Cultural Resources

Table D1-8. Summary of activities and the associated impact-producing factors for demographics, employment, and economics

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Light: Structures	Offshore buoys and towers emit low-intensity light, while onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.
Light: Vessels	Ocean vessels have an array of lights including navigational lights and deck lights.	Anticipated modest growth in vessel traffic would result in some growth in the nighttime traffic of vessels with lighting.
Cable emplacement and maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be local and limited to emplacement corridors. In the geographic analysis area for demographics, employment, and economics there are six existing power cables.	Future new cables would disturb the seafloor and cause temporary increases in suspended sediment resulting in infrequent, localized, short-term impacts over the next 40 years.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. These disturbances are temporary, local, and extend only a short distance beyond the work area.	No future activities were identified within the geographic analysis area for demographics, employment, and economics other than ongoing activities.
Noise: Cable laying/trenching	Infrequent trenching for pipeline and cable laying activities emit noise. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	Periodic trenching would be needed over the next 40 years for repair or new installation of underground infrastructure.
Noise: Vessels	Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels.	Planned new barge route and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The New Jersey Wind Port is being developed and the Port of Paulsboro (New Jersey) and Port of New London (Connecticut) are being upgraded specifically to support the construction of offshore wind energy facilities.	Ports would need to perform maintenance and upgrade facilities over the next 40 years to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep-draft vessels as they continue to increase in size.
Port utilization: Maintenance/dredging	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. As ports expand, maintenance dredging of shipping channels is expected to increase.	Ports would need to perform maintenance and upgrades over the next 40 years to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep-draft vessels as they continue to increase in size.
Presence of structures: Allisions	An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. The likelihood of allisions is expected to continue at or near current levels.	Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. Such loss and damage are direct costs for gear owners and are expected to continue at or near current levels.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these locations, which may be known as fish aggregation devices (FADs). Recreational and commercial fishing can occur near the FADs, although recreational fishing is more popular, because commercial mobile fishing gear is more likely to snag on FADs.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Habitat conversion	Structures, including foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly flat seascape. Structure-oriented species thus benefit on a constant basis.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure, because vessels need to avoid both the structure and each other.	Vessel traffic, overall, is not expected to meaningfully increase over the next 40 years. The presence of navigation hazards is expected to continue at or near current levels.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Viewshed	No existing offshore structures are within the viewshed of the offshore wind lease area except buoys.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Transmission cable infrastructure	The existing offshore cable infrastructure supports the economy by transmitting electric power and communications between mainland and islands. Additional communication cables run between the U.S. East Coast and European countries along the eastern Atlantic.	No known proposed structures not associated with offshore wind development are reasonably foreseeable.
Traffic: Vessels	Ports and marine traffic related to shipping, fishing, and recreation are important to the region's economy. No substantial changes are anticipated to existing vessel traffic volumes.	New vessel traffic near the geographic analysis area would be generated by proposed barge routes and dredging demolition sites over the next 40 years. Marine commerce and related industries would continue to be important to the geographic analysis area economy.
Traffic: Vessel collisions	The region's substantial marine traffic may result in occasional vessel collisions, which would result in costs to the vessels involved. The likelihood of collisions is expected to continue at or near current rates.	No substantial changes anticipated.
Land disturbance: Onshore construction	Onshore development activities support local population growth, employment, and economies. Disturbances can cause temporary, localized traffic delays and restricted access to adjacent properties. The rate of onshore land disturbance is expected to continue at or near current rates.	Onshore development projects would be ongoing in accordance with local government land use plans and regulations.

FADs = fish aggregating devices

Table D1-9. Summary of activities and the associated impact-producing factors for environmental justice

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Air emissions: Construction/decommissioning	Ongoing population growth and new development within the analysis area is likely to increase traffic with resulting increase in emissions from motor vehicles. Some new industrial development may result in emissions-producing uses. At the same time, many industrial waterfront areas near environmental justice communities are losing industrial uses and converting to more commercial or residential uses.	New development may include emissions-producing industry and new development that would increase emissions from motor vehicles. Some historically industrial waterfront locations will continue to lose industrial uses, with no new industrial development to replace it.
Air emissions: Operations and maintenance	Ongoing population growth and new development within the analysis area is likely to increase traffic with resulting increase in emissions from motor vehicles. Some new industrial development may result in emissions-producing uses. At the same time, many industrial waterfront areas near environmental justice communities are losing industrial uses and converting to more commercial or residential uses.	New development may include emissions-producing industry and new development that would increase emissions from motor vehicles. Some historically industrial waterfront locations will continue to lose industrial uses, with no new industrial development to replace it.
Light: Structures	Offshore buoys and towers emit low-intensity light, while onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.
Cable emplacement and maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be local and limited to emplacement corridors.	Future new cables would disturb the seafloor and cause temporary increases in suspended sediment, resulting in infrequent, localized, short-term impacts over the next 40 years.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. These disturbances are temporary, local, and extend only a short distance beyond the work area.	No future activities were identified within the analysis area other than ongoing activities.
Noise: Trenching	Infrequent trenching for pipeline and cable laying activities emits noise. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of trenching noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	Periodic trenching would be needed over the next 40 years for repair or new installation of underground infrastructure.
Noise: Vessels	Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels.	Vessel noise is anticipated to continue at or near current levels.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The New Jersey Wind Port is being developed and the Port of Paulsboro and Port of New London are being upgraded specifically to support the construction of offshore wind energy facilities.	Ports would need to perform maintenance and upgrade facilities to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep-draft vessels as they continue to increase in size.
Presence of structures: Entanglement, gear loss/damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. Such loss and damage are direct costs for gear owners and are expected to continue at or near current levels.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure, because vessels need to avoid both the structure, and each other.	Vessel traffic is generally not expected to meaningfully increase over the next 40 years. The presence of navigation hazards is expected to continue at or near current levels.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Viewshed	There are no existing offshore structures within the viewshed of the offshore wind lease area except buoys.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Cable infrastructure	Existing submarine cables cross cumulative lease areas.	Existing cable O&M activities would continue within the analysis area.
Traffic: Vessels	Ports and marine traffic related to shipping, fishing and recreation are important to the region's economy. No substantial changes are anticipated to existing vessel traffic volumes.	Vessel traffic is not expected to meaningfully increase over the next 40 years. Marine commerce and related industries would continue to be important to area employment.
Land disturbance: Erosion and sedimentation	Potential erosion and sedimentation from development and construction is controlled by local and state development regulations.	New development activities would be subject to erosion and sedimentation regulations.
Land disturbance: Onshore construction	Onshore development supports local population growth, employment, and economics.	Onshore development would continue in accordance with local government land use plans and regulations.
Land disturbance: Onshore, land use changes	Onshore development would result in changes in land use in accordance with local government land use plans and regulations.	Development of onshore solar and wind energy would provide diversified, small-scale energy generation.

Table D1-10. Summary of activities and the associated impact-producing factors for finfish, invertebrates, and essential fish habitat

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Impacts, including mortality, decreased fitness, and contamination of habitat, are localized and temporary, and rarely affect populations.	Gradually increasing vessel traffic over the next 40 years would increase the risk of accidental releases. Impacts are unlikely to affect populations.
Accidental releases: Invasive species	Invasive species are periodically released accidentally during ongoing activities, including the discharge of ballast water and bilge water from marine vessels. The impacts on finfish, invertebrates, and EFH depend on many factors, but can be widespread and permanent.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Anchoring	Vessel anchoring related to ongoing military use, and survey, commercial, and recreational activities continue to cause temporary to permanent impacts in the immediate area where anchors and chains meet the seafloor. Impacts on finfish, invertebrates, and EFH are greatest for sensitive EFH (e.g., eelgrass, hard bottom) and sessile or slow-moving species (e.g., corals, sponges, and sedentary shellfish).	Impacts from anchoring may occur on a semi-regular basis over the next 40 years due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. These impacts would include increased turbidity levels and potential for direct contact causing mortality of benthic species and, possibly, degradation of sensitive habitats. All impacts would be localized; turbidity would be temporary; impacts from direct contact would be recovered in the short term. Degradation of sensitive habitats such as certain types of hard bottom (e.g., boulder piles), if it occurs, could be long term.
EMF	EMF emanates continuously from installed telecommunication and electrical power transmission cables. Biologically significant impacts on finfish, invertebrates, and EFH have not been documented for AC cables (CSA Ocean Sciences, Inc. and Exponent 2019; Thomsen et al. 2015), but behavioral impacts have been documented for benthic species (skates and lobster) near operating DC cables (Hutchison et al. 2018). The impacts are localized and affect the animals only while they are within the EMF. There is no evidence to indicate that EMF from undersea AC power cables negatively affects commercially and recreationally important fish species (CSA Ocean Sciences, Inc. and Exponent 2019).	During operation, future new cables would produce EMF. Submarine power cables in the geographic analysis area are assumed to be installed with appropriate shielding and burial depth to reduce potential EMF to low levels. Although the EMF would exist as long as a cable was in operation, impacts, on finfish, invertebrates, and EFH would likely be difficult to detect.
Light: Vessels	Marine vessels have an array of lights including navigational lights and deck lights. There is little downward-focused lighting, and therefore only a small fraction of the emitted light enters the water. Light can attract finfish and invertebrates, potentially affecting distributions in a highly localized area. Light may also disrupt natural cycles, e.g., spawning, possibly leading to short-term impacts.	Vessels would continue to be a light source within the analysis area.
Light: Structures	Offshore buoys and towers emit light, and onshore structures, including buildings and ports, emit a great deal more on an ongoing basis. Light can attract finfish and invertebrates, potentially affecting distributions in a highly localized area. Light may also disrupt natural cycles, e.g., spawning, possibly leading to short-term impacts. Light from structures is widespread and permanent near the coast, but minimal offshore.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.
Cable emplacement and maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances are local, limited to the cable corridor. New cables are infrequently added near shore. Cable emplacement/maintenance activities disturb, displace, and injure finfish and invertebrates and result in temporary to long-term habitat alterations. The intensity of impacts depends on the time (season) and place (habitat type) where the activities occur. (See also the IPF of Sediment deposition and burial.)	Future new cables would occasionally disturb the seafloor and cause temporary increases in suspended sediment, resulting in local short-term impacts. If the cable routes enter the geographic analysis area for this resource, short-term disturbance would be expected. The intensity of impacts would depend on the time (season) and place (habitat type) where the activities would occur.
Noise: Aircraft	Noise from aircraft reaches the sea surface on a regular basis. However, there is not likely to be any impact of aircraft noise on finfish, invertebrates, and EFH, as very little of the aircraft noise propagates through the water.	Aircraft noise is likely to continue to increase as commercial air traffic increases. However, there is not likely to be any impact of aircraft noise on finfish, invertebrates, and EFH.
Noise: Onshore/offshore construction	Noise from construction occurs frequently in near shores of populated areas in New England and the mid-Atlantic but infrequently offshore. The intensity and extent of noise from construction is difficult to generalize, but impacts are local and temporary. See also sub-IPF for Noise: Pile driving.	Noise from construction near shores is expected to gradually increase in line with human population growth along the coast of the geographic analysis area for this resource.
Noise: G&G	Ongoing site characterization surveys and scientific surveys produce noise around sites of investigation. These activities can disturb finfish and invertebrates in the immediate vicinity of the investigation and can cause temporary behavioral changes. The extent depends on equipment used, noise levels, and local acoustic conditions.	Site characterization surveys, scientific surveys, and exploratory oil and gas surveys are anticipated to occur infrequently over the next 40 years. Seismic surveys used in oil and gas exploration create high-intensity impulsive noise to penetrate deep into the seabed, potentially resulting in injury or mortality to finfish and invertebrates in a small area around each sound source and short-term stress and behavioral changes to individuals over a greater area. Site characterization surveys typically use sub-bottom profiler technologies that generate less-intense sound waves more similar to common deep-water echosounders. The intensity and extent of the resulting impacts are difficult to generalize but are likely local and temporary.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Noise: O&M	Some finfish and invertebrates may be able to hear the continuous underwater noise of operational WTGs. As measured at the Block Island Wind Farm, this low frequency noise barley exceeds ambient levels at 164 feet (50 meters) from the WTG base. Based on the results of Thomsen et al. (Thomsen et al. 2015), SPLs would be expected to be at or below ambient levels at relatively short distances (approximately 164 feet [50 meters]) from WTG foundations. These low levels of elevated noise likely have little to no impact. Noise is also created by O&M of marine minerals extraction and commercial fisheries, each of which has small local impacts.	New or expanded marine minerals extraction and commercial fisheries may intermittently increase noise during their O&M over the next 40 years. Impacts would likely be small and local.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can cause injury and/or mortality to finfish and invertebrates in a small area around each pile and can cause short-term stress and behavioral changes to individuals over a greater area. Eggs, embryos, and larvae of finfish and invertebrates could also experience developmental abnormalities or mortality resulting from this noise, although thresholds of exposure are not known (Weilgart 2018; Hawkins and Popper 2017). Potentially injurious noise could also be considered as rendering EFH temporarily unavailable or unsuitable for the duration of the noise. The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Noise: Cable laying/trenching	Infrequent trenching activities for pipeline and cable laying, as well as other cable burial methods, emit noise. These disturbances are temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.	New or expanded submarine cables and pipelines are likely to occur in the geographic analysis area for this resource. These disturbances would be infrequent over the next 40 years, temporary, local, and extend only a short distance beyond the emplacement corridor. Impacts of this noise are typically less prominent than the impacts of the physical disturbance and sediment suspension.
Noise: Vessels	While ongoing vessel noise may have some effect on behavior, it is likely limited to brief startle and temporary stress responses. Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels.	See cell to the left.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 40 years.	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future. In addition, the general trend along the coast from South Carolina to Maine is that port activity will increase modestly. The ability of ports to receive the increase may require port modifications, leading to local impacts. Future channel deepening activities will likely be undertaken. Existing ports have already affected finfish, invertebrates, and EFH, and future port projects would implement BMPs to minimize impacts. Although the degree of impacts on EFH would likely be undetectable outside the immediate vicinity of the ports, adverse impacts on EFH for certain species and/or life stages may lead to impacts on finfish and invertebrates beyond the vicinity of the port.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb habitats and potentially harm individuals, creating small, localized, short-term impacts.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Presence of structures: Hydrodynamic disturbance	Manmade structures, especially tall vertical structures such as foundations for towers of various purposes, continuously alter local water flow at a fine scale. Water flow typically returns to background levels within a relatively short distance from the structure. Therefore, impacts on finfish, invertebrates, and EFH are typically undetectable. Indirect impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood. New structures are periodically added.	Tall vertical structures can increase seabed scour and sediment suspension. Impacts would likely be highly localized and difficult to detect. Indirect impacts of structures influencing primary productivity and higher trophic levels are possible but are not well understood.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly sandy seascape. Structure-oriented fishes are attracted to these locations. These impacts are local and often permanent. Fish aggregation may be considered adverse, beneficial, or neutral.	New cables, installed incrementally in the geographic analysis area for this resource over the next 20 to 40 years, would likely require hard protection atop portions of the route (see the cable emplacement and maintenance IPF). Any new towers, buoys, or piers would also create uncommon relief in a mostly sandy seascape. Structure-oriented fishes could be attracted to these locations. Abundance of certain fishes may increase. These impacts are local and may be permanent.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Habitat conversion	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly sandy seascape. A large portion is homogeneous sandy seascape but there is some other hard and/or complex habitat. Structure-oriented species thus benefit on a constant basis; however, the diversity may decline over time as early colonizers are replaced by successional communities dominated by blue mussels and anemones (Degraer et al. 2019 [Chapter 7]). Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat to the new hard-structure habitat.	New cable, installed incrementally in the analysis area over the next 20 to 40 years, would likely require hard protection atop portions of the route (see cable emplacement and maintenance). Any new towers, buoys, or piers would also create uncommon relief in a mostly sandy seascape. Structure-oriented species would benefit (Claisse et al. 2014; Smith et al. 2016); however, the diversity may decline over time as early colonizers are replaced by successional communities dominated by blue mussels and anemones (Degraer et al. 2019 [Chapter 7]). Soft bottom is the dominant habitat type from Cape Hatteras to the Gulf of Maine (over 60 million acres), and species that rely on this habitat would not likely experience population-level impacts (Guida et al. 2017; Greene et al. 2010).
Presence of structures: Migration disturbances	Human structures in the marine environment, e.g., shipwrecks, artificial reefs, and oil platforms, can attract finfish and invertebrates that approach the structures during their migrations. This could slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement than structure is (Moser and Shepherd 2009; Fabrizio et al. 2014; Secor et al. 2018). There is no evidence to suggest that structures pose a barrier to migratory animals.	The infrequent installation of future new structures in the marine environment over the next 40 years may attract finfish and invertebrates that approach the structures during their migrations. This could tend to slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement (Moser and Shepherd 2009; Fabrizio et al. 2014; Secor et al. 2018). Migratory animals would likely be able to proceed from structures unimpeded.
Presence of structures: Cable infrastructure	See other sub-IPFs within the Presence of structures IPF. See table for Coastal Habitats and Fauna.	See other sub-IPFs within the Presence of structures IPF. See table for Coastal Habitats and Fauna.
Cable emplacement and maintenance: Seabed profile alterations	Ongoing sediment dredging for navigation purposes results in localized short-term impacts (habitat alteration, change in complexity) on finfish, invertebrates, and EFH through this IPF. Dredging is most likely in sand wave areas where typical jet plowing is insufficient to meet target cable burial depth. Sand waves that are dredged would likely be redeposited in like-sediment areas. Any particular sand wave may not recover to the same height and width as pre-disturbance; however, the habitat function would largely recover post-disturbance. Therefore, seabed profile alterations, while locally intense, have little impact on finfish, invertebrates, and EFH on a regional (Cape Hatteras to Gulf of Maine) scale.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.
Cable emplacement and maintenance: Sediment deposition and burial	Ongoing sediment dredging for navigation purposes results in fine sediment deposition. Ongoing cable maintenance activities also infrequently disturb bottom sediments; these disturbances are local, limited to the emplacement corridor. Sediment deposition could have negative impacts on eggs and larvae, particularly demersal eggs such as longfin squid, which are known to have high rates of egg mortality if egg masses are exposed to abrasion or burial. Impacts may vary based on season/time of year.	No future activities were identified within the geographic analysis area for this resource other than ongoing activities.

AC = alternating current; DC = direct current; EFH = Essential Fish Habitat; EMF = electromagnetic field; hazmat = hazardous materials; SPLs = sound pressure levels

Table D1-11. Summary of activities and the associated impact-producing factors for land use and coastal infrastructure

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	Various ongoing onshore and coastal construction projects include the use of vehicles and equipment that contain fuel, fluids, and hazardous materials that could be released.	Ongoing onshore construction projects involve vehicles and equipment that use fuel, fluids, or hazardous materials could result in an accidental release. Intensity and extent would vary, depending on the size, location, and materials involved in the release.
Light: Structures	Various ongoing onshore and coastal construction projects have nighttime activities, as well as existing structures, facilities, and vehicles that would use nighttime lighting.	Ongoing onshore construction projects involving nighttime activity could generate nighttime lighting. Intensity and extent would vary, depending on the location, type, direction, and duration of nighttime lighting.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The New Jersey Wind Port is being developed and the Port of Paulsboro and Port of New London being upgraded specifically to support the construction of offshore wind energy facilities.	Ports would need to perform maintenance and upgrade facilities to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep draft vessels as they continue to increase in size.
Presence of structures: Viewshed	The only existing offshore structures within the offshore viewshed are minor features such as buoys.	Non-offshore wind structures that could be viewed in conjunction with the offshore components would be limited to met towers. Marine activity would also occur within the marine viewshed.
Presence of structures: Cable infrastructure	Onshore buried cables would only occur where permitted by local land use authorities, which would avoid long-term land use conflicts.	No known proposed structures are reasonably foreseeable and proposed to be located in the geographic analysis area for land use and coastal infrastructure.
Land disturbance: Onshore construction	Onshore construction supports local population growth, employment, and economics.	Onshore development would continue in accordance with local government land use plans and regulations.
Land disturbance: Onshore, land use changes	New development or redevelopment would result in changes in land use in accordance with local government land use plans and regulations.	Ongoing and future development and redevelopment is anticipated to reinforce existing land use patterns, based on local government planning documents.

hazmat = hazardous materials; met = meteorological

Table D1-12. Summary of activities and the associated impact-producing factors for marine mammals

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for a quantitative analysis of these risks. Ongoing releases are frequent/ chronic. Marine mammal exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality or sublethal effects on the individual fitness, including adrenal effects, hematological effects, liver effects lung disease, poor body condition, skin lesions, and several other health affects attributed to oil exposure (Kellar et al. 2017; Mazet et al. 2001; Mohr et al. 2008; Smith et al. 2017; Sullivan et al. 2019; Takeshita et al. 2017). Additionally, accidental releases may result in impacts on marine mammals due to effects on prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).	Gradually increasing vessel traffic over the next 40 years would increase the risk of accidental releases. Marine mammal exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality or sublethal effects on the individual fitness, including adrenal effects, hematological effects, liver effects lung disease, poor body condition, skin lesions, and several other health affects attributed to oil exposure (Kellar et al. 2017; Mazet et al. 2001; Mohr et al. 2008; Smith et al. 2017; Sullivan et al. 2019; Takeshita et al. 2017). Additionally, accidental releases may result in impacts on marine mammals due to effects on prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).
Accidental releases: Trash and debris	Trash and debris may be accidentally discharged through fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities and cables, lines and pipeline laying, and debris carried in river outflows or windblown from onshore. Accidental releases of trash and debris are expected to be low quantity, local, and low-impact events. Worldwide 62 of 123 (50.4%) marine mammal species have been documented ingesting marine litter (Werner et al. 2016). Stranding data indicate potential debris induced mortality rates of 0 to 22%. Mortality has been documented in cases of debris interactions, as well as blockage of the digestive track, disease, injury, and malnutrition (Baulch and Perry 2014). However, it is difficult to link physiological effects to individuals to population level impacts (Browne et al. 2015).	As population and vessel traffic increase gradually over the next 40 years, accidental release of trash and debris may increase. Trash and debris may continue to be accidentally released through fisheries use and other offshore and onshore activities. There may also be a long-term risk from exposure to plastics and other debris in the ocean. Worldwide 62 of 123 (50.4%) of marine mammal species have been documented ingesting marine litter (Werner et al. 2016). Mortality has been documented in cases of debris interacts, as well as blockage of the digestive track, disease, injury, and malnutrition (Baulch and Perry 2014).
EMFs	EMFs emanate constantly from installed telecommunication and electrical power transmission cables. Marine mammals appear to have a detection threshold for magnetic intensity gradients (i.e., changes in magnetic field levels with distance) of 0.1% of the earth's magnetic field or about 0.05 μT (Kirschvink 1990) and are thus likely to be very sensitive to minor changes in magnetic fields (Walker et al. 2003). There is a potential for animals to react to local variations of the geomagnetic field caused by power cable EMFs. Depending on the magnitude and persistence of the confounding magnetic field, such an effect could cause a trivial temporary change in swim direction or a longer detour during the animal's migration (Gill et al. 2005). Such an effect on marine mammals is more likely to occur with direct current cables than with AC cables (Normandeau et al. 2011). However, there are numerous transmission cables installed across the seafloor and no impacts on marine mammals have been demonstrated from this source of EMF.	During operation, future new cables would produce EMF. Submarine power cables in the marine mammal geographic analysis area are assumed to be installed with appropriate shielding and burial depth to reduce potential EMF to low levels. EMF of any two sources would not overlap. Although the EMF would exist as long as a cable was in operation, impacts, if any, would likely be difficult to detect, if they occur at all. Marine mammals have the potential to react to submarine cable EMF; however, no effects from the numerous submarine cables have been observed. Furthermore, this IPF would be limited to extremely small portions of the areas used by migrating marine mammals. As such, exposure to this IPF would be low, and as a result impacts on marine mammals would not be expected.
Cable emplacement and maintenance	Cable maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances will be local and generally limited to the emplacement corridor. Data are not available regarding marine mammal avoidance of localized turbidity plumes; however, Todd et al. (Todd et al. 2015) suggest that since some marine mammals often live in turbid waters and some species of mysticetes and sirenians employ feeding methods that create sediment plumes, some species of marine mammals have a tolerance for increased turbidity. Similarly, McConnell et al. (McConnell et al. 1999) documented movements and foraging of grey seals in the North Sea. One tracked individual was blind in both eyes, but otherwise healthy. Despite being blind, observed movements were typical of the other study individuals, indicating that visual cues are not essential for grey seal foraging and movement (McConnell et al. 1999). If elevated turbidity caused any behavioral responses such as avoiding the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any impacts would be temporary and short term. Turbidity associated with increased sedimentation may result in temporary, short-term impacts on marine mammal prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).	The impact on water quality from accidental sediment suspension during cable emplacement is temporary and short term. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any negative impacts would be temporary and short term. Turbidity associated with increased sedimentation may result in temporary, short-term impacts on some marine mammal prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).
Noise: Aircraft	Aircraft routinely travel in the marine mammal geographic analysis area. With the possible exception of rescue operations, no ongoing aircraft flights would occur at altitudes that would elicit a response from marine mammals. If flights are at a sufficiently low altitude, marine mammals may respond with behavioral changes, including short surface durations, abrupt dives, and percussive behaviors (i.e., breaching and tail slapping) (Patenaude et al. 2002). These brief responses would be expected to dissipate once the aircraft has left the area. Similarly, aircraft have the potential to disturb hauled-out seals if aircraft overflights occur within 2,000 feet (610 meters) of a haul out area (Efroymson et al. 2000).	Future low altitude aircraft activities such as survey activities and navy training operations could result short-term responses of marine mammals to aircraft noise. If flights are at a sufficiently low altitude, marine mammals may respond with a behavior changes, including short surface durations, abrupt dives, and percussive behaviors (i.e., breaching and tail slapping) (Patenaude et al. 2002). These brief responses would be expected to dissipate once the aircraft has left the area.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	However, this disturbance would be temporary, short-term, and result in minimal energy expenditure. These brief responses would be expected to dissipate once the aircraft has left the area.	
Noise: G&G	Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities have the potential to result in high intensity, high consequence impacts, including auditory injuries, stress, disturbance, and behavioral responses, if present within the ensonified area (NOAA 2018). Survey protocols and underwater noise mitigation procedures are typically implemented to decrease the potential for any marine mammal to be within the area where sound levels are above relevant harassment thresholds associated with an operating sound source to reduce the potential for behavioral responses and injury (PTS/TTS) close to the sound source. The magnitude of effects, if any, is intrinsically related to many factors, including acoustic signal characteristics, behavioral state (e.g., migrating), biological condition, distance from the source, duration and level of the sound exposure, as well as environmental and physical conditions that affect acoustic propagation (NOAA 2018).	Same as ongoing activities, with the addition of possible future oil and gas exploration surveys.
Noise: Turbines	Marine mammals would be able to hear the continuous underwater noise of operational WTGs. As measured at the Block Island Wind Facility, this low frequency noise barely exceeds ambient levels at 164 feet (50 meters) from the WTG base. Based on the results of Thomsen et al. (Thomsen et al. 2015) and Kraus et al. (Kraus et al. 2016), SPLs would be expected to be at or below ambient levels at relatively short distances from the WTG foundations.	This sub-IPF does not apply to future non-offshore wind development.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can result in high-intensity, low-exposure level, long-term, but localized intermittent risk to marine mammals. Impacts would be localized in nearshore waters. Pile-driving activities may negatively affect marine mammals during foraging, orientation, migration, predator detection, social interactions, or other activities (Southall et al. 2007). Noise exposure associated with pile-driving activities can interfere with these functions and have the potential to cause a range of responses, including insignificant behavioral changes, avoidance of the ensonified area, PTS, harassment, and ear injury, depending on the intensity and duration of the exposure. BOEM assumes that all ongoing and potential future activities will be conducted in accordance with a project-specific IHA to minimize impacts on marine mammals.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.
Noise: Cable laying/trenching	Noise from cable laying could periodically occur in the analysis area.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.
Noise: Vessels	Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, scientific and academic research vessels, as well as other construction vessels. The frequency range for vessel noise falls within marine mammals' known range of hearing and would be audible. Noise from vessels presents a long-term and widespread impact on marine mammals across in most oceanic regions. While vessel noise may have some effect on marine mammal behavior, it would be expected to be limited to brief startle and temporary stress response. Results from studies on acoustic impacts from vessel noise on odontocetes indicate that small vessels at a speed of 5 knots in shallow coastal water can reduce the communication range for bottlenose dolphins within 164 feet (50 meters) of the vessel by 26% (Jensen et al. 2009). Pilot whales in a quieter, deep-water habitat could experience a 50% reduction in communication range from a similar size boat and speed (Jensen et al. 2009). Since lower frequencies propagate farther away from the sound source compared to higher frequencies, LFCs are at a greater risk of experiencing Level B Harassment produced by vessel traffic.	Any offshore projects that require the use of ocean vessels could potentially result in long term but infrequent impacts on marine mammals, including temporary startle responses, masking of biologically relevant sounds, physiological stress, and behavioral changes. However, BOEM expects that these brief responses of individuals to passing vessels would be unlikely given the patchy distribution of marine mammals and no stock or population level effects would be expected.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. Port expansion activities are localized to nearshore habitats, and are expected to result in temporary, short-term impacts, if any, on marine mammals. Vessel noise may affect marine mammals, but response would be expected to be temporary and short-term (see Vessels: Noise sub-IPF above). The impacts on water quality from sediment	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from South Carolina to Maine is that port activity will increase modestly. The ability of ports to receive the increase in larger ships will require port modifications. Future channel deepening activities are being undertaken to accommodate deeper draft vessels for the Panama Canal Locks. The additional traffic and larger vessels could have impacts on water quality through

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	suspension during port expansion activities is temporary, short-term, and would be similar to those described under the cable emplacement and maintenance IPF above.	increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long-term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g. ferry use and cruise industry) and may continue to increase in the foreseeable future. Additional impacts associated with the increased risk of vessel strike could also occur (see the Traffic: Vessel collisions sub-IPF below).
Presence of structures: Entanglement or ingestion of lost fishing gear	There are more than 130 artificial reefs in the Mid-Atlantic region. This sub-IPF may result in long-term, high intensity impacts, but with low exposure due to localized and geographic spacing of artificial reefs, long-term. Currently bridge foundations and the Block Island Wind Facility may be considered artificial reefs and may have higher levels of recreational fishing, which increases the chances of marine mammals encountering lost fishing gear, resulting in possible ingestions, entanglement, injury, or death of individuals (Moore and van der Hoop 2012), if present nearshore where these structures are located. There are very few, if any, areas within the OCS geographic analysis area for marine mammals that would serve to concentrate recreational fishing and increase the likelihood that marine mammals would encounter lost fishing gear.	No future activities were identified within the marine mammal geographic analysis area other than ongoing activities.
Presence of structures: Habitat conversion and prey aggregation	There are more than 130 artificial reefs in the Mid-Atlantic region. Hard-bottom (scour control and rock mattresses) and vertical structures (bridge foundations and Block Inland Wind Facility WTGs) in a soft-bottom habitat can create artificial reefs, thus inducing the “reef” effect (Taormina et al. 2018; NMFS 2015). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans (Taormina et al. 2018), providing a potential increase in available forage items and shelter for seals and small odontocetes compared to the surrounding soft-bottoms.	The presence of structures associated with non-offshore wind development in near shore coastal waters have the potential to provide habitat for seals and small odontocetes as well as preferred prey species. This “reef effect” has the potential to result in long term, low-intensity benefits. Bridge foundations will continue to provide foraging opportunities for seals and small odontocetes with measurable benefits to some individuals. Hard-bottom (scour control and rock mattresses used to bury the offshore export cables) and vertical structures (i.e., WTG and OSP foundations) in a soft-bottom habitat can create artificial reefs, thus inducing the “reef effect” (Taormina et al. 2018; Causon and Gill 2018). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans (Taormina et al. 2018), providing a potential increase in available forage items and shelter for marine mammals compared to the surrounding soft-bottoms.
Presence of structures: Avoidance/displacement	No ongoing activities in the marine mammal geographic analysis area beyond offshore wind facilities are measurably contributing to this sub-IPF. There may be some impacts resulting from the existing Block Island Wind Facility, but given that there are only 5 WTGs, no measurable impacts are occurring.	Not contemplated for non-offshore wind facility sources.
Presence of structures: Behavioral disruption - breeding and migration	No ongoing activities in the marine mammal geographic analysis area beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non-offshore wind facility sources.
Presence of structures: Displacement into higher risk areas (Vessels and Fishing)	No ongoing activities in the marine mammal geographic analysis area beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non-offshore wind facility sources.
Traffic: Vessel collisions	Current activities that are contributing to this sub-IPF include port traffic levels, fairways, TSS, commercial vessel traffic, recreational and fishing activity, and scientific and academic vessel traffic. Vessel strike is relatively common with cetaceans (Kraus et al. 2005) and one of the primary causes of death to NARWs with as many as 75% of known anthropogenic mortalities of NARWs likely resulting from collisions with large ships along the U.S. and Canadian eastern seaboard (Kite-Powell et al. 2007). Marine mammals are more vulnerable to vessel strike when they are within the draft of the vessel and when they are beneath the surface and not detectable by visual observers. Some conditions that make marine mammals less detectable include weather conditions with poor visibility (e.g., fog, rain, and wave height) or nighttime operations. Vessels operating at speeds exceeding 10 knots have been associated with the highest risk for vessel strikes of NARWs (Vanderlaan and Taggart 2007). Reported vessel collisions with whales show that serious injury rarely occurs at speeds below 10 knots (Laist et al. 2001). Data show that the probability of a vessel strike increases with the velocity of a vessel (Pace and Silber 2005; Vanderlaan and Taggart 2007).	Vessel traffic associated with non-offshore wind development has the potential to result in an increased collision risk. While these impacts would be high consequence, the patchy distribution of marine mammals makes stock or population-level effects unlikely (Navy 2018).

μT = microtesla; AC = alternating current; EMF = electromagnetic field; hazmat = hazardous materials; IHA = Incidental Harassment Authorization; NARW = North Atlantic right whale; PTS = permanent threshold shift; SPLs = sound pressure levels; TSS = total suspended solids; TTS = temporary threshold shift

Table D1-13. Summary of activities and the associated impact-producing factors for navigation and vessel traffic

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Anchoring	Larger commercial vessels (specifically tankers) sometimes anchor outside of major ports to transfer their cargo to smaller vessels for transport into port, an operation known as lightering. These anchors have deeper ground penetration and are under higher stresses. Smaller vessels (commercial fishing or recreational vessels) would anchor for fishing and other recreational activities. These activities cause temporary to short-term impacts on navigation in the immediate anchorage area. All vessels may anchor in an emergency scenario (such as power loss) if they lose power to prevent them from drifting and creating navigational hazards for other vessels or drifting into structures.	Lightering and anchoring operations are expected to continue at or near current levels, with the expectation of moderate increase commensurate with any increase in tankers visiting ports. Deep draft visits to major port visits are expected to increase as well, increasing the potential for an emergency need to anchor, creating navigational hazards for other vessels. Recreational activity and commercial fishing activity would likely stay largely the same related to this IPF.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. Impacts from these activities would be short term and could include congestion in ports, delays, and changes in port usage by some fishing or recreational vessel operators.	Ports would need to perform maintenance and perform upgrades to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep draft vessels as they continue to increase in size. Impacts would be short term and could include congestion in ports, delays, and changes in port usage by some fishing or recreational vessel operators.
Presence of structures: Allisions	An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. There are two types of allisions that occur: drift and powered. A drift allision generally occurs when a vessel is powered down due to operator choice or power failure. A powered allision generally occurs when an operator fails to adequately control their vessel movements or is distracted.	Although there are some exceptions (ferry traffic and cruise ships), BOEM expects vessel traffic to remain relatively steady into the reasonably foreseeable future (BOEM 2019:57). Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
Presence of structures: Fish aggregation	Items in the water, such as ghost fishing gear, buoys, and energy platform foundations can create an artificial reef effect, aggregating fish. Recreational and commercial fishing can occur near the artificial reefs. Recreational fishing is more popular than commercial near artificial reefs as commercial mobile fishing gear can risk snagging on the artificial reef structure.	Fishing near artificial reefs is not expected to change meaningfully over the next 40 years.
Presence of structures: Habitat conversion	Equipment in the ocean can create a substrate for mollusks to attach to, and fish eggs to settle near. This can create a reef-like habitat and benefit structure-oriented species on a constant basis.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Migration disturbances	Noise-producing activities, such as pile driving and vessel traffic, may interfere and adversely affect marine mammals during foraging, orientation, migration, response to predators, social interactions, or other activities. Marine mammals may also be sensitive to changes in magnetic field levels. The presence of structures and operational noise could cause mammals to avoid areas.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions. When multiple vessels need to navigate around a structure, then navigation is made more complex, as the vessels need to avoid both the structure and each other.	Although there are some exceptions (ferry traffic and cruise ships), BOEM expects vessel traffic to remain relatively steady into the reasonably foreseeable future (BOEM 2019:57). Even with increased port visits by deep-draft vessels, this is still a relatively small effect when considering the whole of Atlantic Coast vessel traffic. The presence of navigation hazards is expected to continue at or near current levels.
Presence of structures: Space use conflicts	Currently, the offshore area is occupied by marine trade, stationary and mobile fishing, and survey activities.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Cable infrastructure	See IPF for Anchoring.	See IPF for Anchoring.
Cable emplacement and maintenance	Within the geographic analysis area for navigation and vessel traffic, existing cables may require access for maintenance activities. Infrequent cable maintenance activities may cause temporary increases in vessel traffic and navigational complexity.	Future new cables would cause temporary increases in vessel traffic during installation or maintenance, resulting in infrequent, localized, short-term impacts over the next 40 years. Care would need to be taken by vessels that are crossing the cable routes during these activities.
Traffic: Aircraft	USCG SAR helicopters are the main aircraft that may be flying at low enough heights to risk interaction with WTGs. USCG SAR aircraft need to fly low enough that they can spot objects in the water.	SAR operations could be expected to increase with any increase in vessel traffic. However, as vessel traffic volume is not expected to increase appreciably, neither should SAR operations. EIS Section 3.6.6 provides a discussion of navigation impacts on fishing vessel traffic.
Traffic: Vessels	See the sub-IPF for Presence of structures: Navigation hazard.	See the sub-IPF for Presence of structures: Navigation hazard.
Traffic: Vessels, collisions	See the sub-IPF for Presence of structures: Navigation hazard.	See the sub-IPF for Presence of structures: Navigation hazard.

SAR = Search and Rescue

Table D1-14. Summary of activities and the associated impact-producing factors for other uses: military and national security uses

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Allisions	Existing stationary facilities that present allision risks include buoys that are used to mark inlet approaches, channels, and shoals, dock facilities, meteorological buoys associated with offshore wind lease areas, and other offshore or shoreline-based structures.	No additional non-offshore wind stationary structures were identified within the geographic analysis area. Stationary structures such as private or commercial docks may be added close to the shoreline.
Presence of structures: Fish aggregation	No existing stationary structures that would act as FADs were identified within the geographic analysis area.	No future non-offshore wind additional stationary structures that would act as FADs were identified within the geographic analysis area.
Presence of structures: Navigation hazard	Existing stationary facilities within the geographic analysis area that present navigational hazards include buoys that are used to mark inlet approaches, channels, and shoals, dock facilities, meteorological buoys associated with offshore wind lease areas, and other offshore or shoreline-based structures.	No future non-offshore wind stationary structures were identified within the offshore analysis area. Onshore, development activities are anticipated to continue with additional proposed communications towers and onshore commercial, industrial, and residential developments.
Presence of structures: Space use conflicts	Existing stationary facilities within the geographic analysis area that could present a space use conflict include onshore wind turbines, communication towers, and other onshore commercial, industrial, and residential structures.	No future non-offshore wind stationary structures were identified within the offshore analysis area. Onshore, development activities are anticipated to continue with additional proposed communications towers and onshore commercial, industrial, and residential developments.
Presence of structures: Cable infrastructure	Existing submarine cables cross cumulative lease areas.	Submarine cables would remain in current locations with infrequent maintenance continuing along those cable routes for the foreseeable future.
Traffic: Vessels	Current vessel traffic in the region is described in EIS Section 3.6.6. Vessel activities associated with offshore wind in the cumulative lease areas is currently limited to site assessment surveys.	Continued vessel traffic in the region.
Traffic: Vessels, collisions	Current vessel traffic in the region is described in EIS Section 3.6.6. Vessel activities associated with offshore wind in the cumulative lease areas is currently limited to site assessment surveys.	Continued vessel traffic in the region.

FAD = fish aggregating device; SAR =

Table D1-15. Summary of activities and the associated impact-producing factors for other uses: aviation and air traffic

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Towers	Existing aboveground stationary facilities within the geographic analysis area that present aviation hazards include onshore wind turbines, communication towers, dock facilities, and other onshore structures exceeding 200 feet in height.	No future non-offshore wind stationary structures were identified within the offshore analysis area. Onshore development activities are anticipated to continue with additional proposed communications towers.
Presence of structures: Space use conflicts	Existing aboveground stationary facilities within the geographic analysis area that could cause space use conflicts for aircraft include onshore wind turbines, communication towers, and other onshore structures exceeding 200 feet in height.	No future non-offshore wind stationary structures were identified within the offshore analysis area. Onshore, development activities are anticipated to continue with additional proposed communications towers.

Table D1-16. Summary of activities and the associated impact-producing factors for other uses: cables and pipelines

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Allisions and navigation hazards	Structures within and near the geographic analysis area that pose potential allision hazards include buoys that are used to mark inlet approaches, channels, and shoals, meteorological buoys associated with offshore wind lease areas, and shoreline developments such as docks, ports, and other commercial, industrial, and residential structures.	Reasonably foreseeable non-offshore wind structures that could affect submarine cables have not been identified in the geographic analysis area.
Presence of structures: Space use conflicts	Existing submarine cables cross cumulative lease areas and create potential space use conflicts with marine mineral and sand borrow areas.	Reasonably foreseeable non-offshore wind structures that could create space use conflicts with submarine cables have not been identified in the geographic analysis area.
Presence of structures: Cable infrastructure	Existing submarine cables cross cumulative lease areas.	Reasonably foreseeable non-offshore wind structures have not been identified in the geographic analysis area.

Table D1-17. Summary of activities and the associated impact-producing factors for other uses: radar systems

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent

Presence of structures: Towers	Wind developments in the direct line-of-sight with, or extremely close to, radar systems can cause clutter and interference.	Reasonably foreseeable non-offshore wind structures proposed for construction in the lease areas that could affect radar systems have not been identified.

Table D1-18. Summary of activities and the associated impact-producing factors for other uses: scientific research and surveys

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Presence of structures: Navigation hazards	Stationary structures are limited in the open ocean environment of the geographic analysis area, and include met buoys associated with site assessment activities, the five Block Island Wind Farm WTGs, and the two Coastal Virginia Offshore Wind WTGs.	Reasonably foreseeable non-offshore wind activities would not implement stationary structures within the open ocean environment that would pose navigational hazards and raise the risk of allisions for survey vessels and collisions for survey aircraft.

met = meteorological

Table D1-19. Summary of activities and the associated impact-producing factors for recreation and tourism

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Anchoring	Anchoring occurs due to ongoing military, survey, commercial, and recreational activities.	Impacts from anchoring would continue, and may increase due to offshore military operations, survey activities, commercial vessel traffic, and/or recreational vessel traffic. Modest growth in vessel traffic could increase the temporary, localized impacts of navigational hazards, increased turbidity levels, and potential for direct contact causing mortality of benthic resources.
Light: Vessels	Ocean vessels have an array of lights including navigational lights and deck lights.	Anticipated modest growth in vessel traffic would result in some growth in the nighttime traffic of vessels with lighting.
Light: Structures	Offshore buoys and towers emit low-intensity light. Onshore structures, including houses and ports, emit substantially more light on an ongoing basis.	Light from onshore structures is expected to gradually increase in line with human population growth along the coast. This increase is expected to be widespread and permanent near the coast, but minimal offshore.
Cable emplacement and maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be local and limited to emplacement corridors.	Cable maintenance or replacement of existing cables in the geographic analysis area would occur infrequently and would generate short-term disturbances.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. These disturbances are temporary, local, and extend only a short distance beyond the work area.	No future activities were identified within the recreation and tourism geographic analysis area other than ongoing activities.
Noise: Cable laying/trenching	Offshore trenching occurs periodically in connection with cable installation or sand and gravel mining.	No future activities were identified within the recreation and tourism geographic analysis area other than ongoing activities.
Noise: Vessels	Vessel noise occurs offshore and more frequently near ports and docks. Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Vessel noise is anticipated to continue at or near current levels.	Planned new barge routes and dredging disposal sites would generate vessel noise when implemented. The number and location of such routes are uncertain.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance.	Ports would need to perform maintenance and upgrade facilities over the next 40 years to ensure that they can still receive the projected future volume of vessels visiting their ports, and to be able to host larger deep-draft vessels as they continue to increase in size.
Port utilization: Maintenance/dredging	Periodic maintenance is necessary for harbors within the analysis area.	Ongoing maintenance and dredging of harbors within the geographic analysis area will continue as needed. No specific projects are known.
Presence of structures: Allisions	An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. The likelihood of allisions is expected to continue at or near current levels.	Vessel allisions with non-offshore wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures.	No future activities were identified within the recreation and tourism geographic analysis area other than ongoing activities.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these locations. Recreational and commercial fishing can occur near these aggregation	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	locations, although recreational fishing is more popular, because commercial mobile fishing gear is more likely to snag on structures.	
Presence of structures: Habitat conversion	Structures, including foundations, scour protection around foundations, and various means of hard protection atop cables create uncommon relief in a mostly flat seascape. Structure-oriented species thus benefit on a constant basis.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure, because vessels need to avoid both the structure and each other.	Vessel traffic, overall, is not expected to meaningfully increase over the next 40 years. The presence of navigation hazards is expected to continue at or near current levels.
Presence of structures: Space use conflicts	Current structures do not result in space use conflicts.	Reasonably foreseeable activities (non-offshore wind) would not result in additional offshore structures.
Presence of structures: Viewshed	The only existing offshore structures within the viewshed of the Project are minor features such as buoys.	Non-offshore wind structures that could be viewed in conjunction with the offshore components of the Project would be limited to meteorological towers. Marine activity would also occur within the marine viewshed.
Traffic: Vessels	Geographic analysis area ports and marine traffic related to shipping, fishing, and recreation are important to the region's economy. No substantial changes are anticipated to existing vessel traffic volumes.	New vessel traffic near the geographic analysis area would be generated by proposed barge routes and dredging demolition sites over the next 40 years. Marine commerce and related industries would continue to be important to the geographic analysis area economy.
Traffic: Vessel collisions	The region's substantial marine traffic may result in occasional vessel collisions, which would result in costs to the vessels involved. The likelihood of collisions is expected to continue at or near current rates.	An increased risk of collisions is not anticipated from future activities.

Table D1-20. Summary of activities and the associated impact-producing factors for sea turtles

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See the Water Quality table for a quantitative analysis of these risks. Ongoing releases are frequent and chronic. Sea turtle exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality (Shigenaka et al. 2010) or sublethal effects on individual fitness, including adrenal effects, dehydration, hematological effects, increased disease incidence, liver effects, poor body condition, skin effects, skeletomuscular effects, and several other health effects that can be attributed to oil exposure (Camacho et al. 2013; Bembenek-Bailey et al. 2019; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Additionally, accidental releases may result in impacts on sea turtles due to effects on prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).	Gradually increasing vessel traffic over the next 40 years would increase the risk of accidental releases. Sea turtle exposure to aquatic contaminants and inhalation of fumes from oil spills can result in mortality (Shigenaka et al. 2010; Wallace et al. 2010) or sublethal effects on individual fitness, including adrenal effects, dehydration, hematological effects, increased disease incidence, liver effects, poor body condition, skin effects, skeletomuscular effects, and several other health effects that can be attributed to oil exposure (Camacho et al. 2013; Bembenek-Bailey et al. 2019; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Additionally, accidental releases may result in impacts on sea turtles due to effects on prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).
Accidental releases: Trash and debris	Trash and debris may be accidentally discharged through fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities, cables, lines, and pipeline laying, as well as debris carried in river outflows or windblown from onshore. Accidental releases of trash and debris are expected to be low quantity, local, and low-impact events. Direct ingestion of plastic fragments is well documented and has been observed in all species of sea turtles (Bugoni et al. 2001; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). In addition to plastic debris, ingestion of tar, paper, Styrofoam™, wood, reed, feathers, hooks, lines, and net fragments have also been documented (Thomás et al. 2002). Ingestion can also occur when individuals mistake debris for potential prey items (Gregory 2009; Hoarau et al. 2014; Thomás et al. 2002). Potential ingestion of marine debris varies among species and life history stages due to differing feeding strategies (Nelms et al. 2016). Ingestion of plastics and other marine debris can result in both lethal and sublethal impacts on sea turtles, with sublethal effects more difficult to detect (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). Long-term sublethal effects may include dietary dilution, chemical contamination, depressed immune system function, poor body condition, as well as reduced growth rates, fecundity, and reproductive success. However, these effects are cryptic and clear causal links are difficult to identify (Nelms et al. 2016).	Trash and debris may be accidentally discharged through fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities and cables, lines and pipeline laying, and debris carried in river outflows or windblown from onshore. Accidental releases of trash and debris are expected to be low quantity, local, and low-impact events. Direct and indirect ingestion of plastic fragments and other marine debris is well documented and has been observed in all species of sea turtles (Bugoni et al. 2001; Gregory 2009; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014; Thomás et al. 2002). Ingestion can result in both lethal and sublethal impacts on sea turtles, with sublethal effects more difficult to detect (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). However, these effects are cryptic and clear causal links are difficult to identify (Nelms et al. 2016).
EMFs	EMFs emanate constantly from installed telecommunication and electrical power transmission cables. Sea turtles appear to have a detection threshold of magnetosensitivity and behavioral responses to field intensities ranging	During operations, future new cables would produce EMF. Submarine power cables in the geographic analysis area for sea turtles are assumed to be installed with appropriate shielding and burial depth to reduce potential

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	from 0.0047 to 4000 µT for loggerhead turtles, and 29.3 to 200 µT for green turtles, with other species likely similar due to anatomical, behavioral, and life history similarities (Normandeau et al. 2011). Juvenile or adult sea turtles foraging on benthic organisms may be able to detect magnetic fields while they are foraging on the bottom near the cables and up to potentially 82 feet (25 meters) in the water column above the cable. Juvenile and adult sea turtles may detect the EMF over relatively small areas near cables (e.g., when resting on the bottom or foraging on benthic organisms near cables or concrete mattresses). There are no data on impacts on sea turtles from EMFs generated by underwater cables, although anthropogenic magnetic fields can influence migratory deviations (Luschi et al. 2007; Snoek et al. 2016). However, any potential impacts from AC cables on turtle navigation or orientation would likely be undetectable under natural conditions, and thus would be insignificant (Normandeau et al. 2011).	EMF to low levels. (Section 5.2.7 of BOEM's 2007 Final Programmatic EIS for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf.) EMF of any two sources would not overlap. Although the EMF would exist as long as a cable was in operation, impacts, if any, would likely be difficult to detect, if they occur at all. Furthermore, this IPF would be limited to extremely small portions of the areas used by resident or migrating sea turtles. As such, exposure to this IPF would be low, and as a result, impacts on sea turtles would not be expected.
Light: Vessels	Ocean vessels such as ongoing commercial vessel traffic, recreational and fishing activity, scientific and academic research traffic have an array of lights including navigational, deck lights, and interior lights. Such lights have some limited potential to attract sea turtles, although the impacts, if any, are expected to be localized and temporary.	Construction, operations, and decommissioning vessels associated with non-offshore wind activities produce temporary and localized light sources that could result in the attraction or avoidance behavior of sea turtles. These short-term impacts are expected to be of low intensity and occur infrequently.
Light: Structures	Artificial lighting on nesting beaches or in nearshore habitats has the potential to result in disorientation to nesting females and hatchling turtles. Artificial lighting on the OCS does not appear to have the same potential for effects. Decades of oil and gas platform operation in the Gulf of Mexico, that can have considerably more lighting than offshore WTGs, has not resulted in any known impacts on sea turtles (BOEM 2019).	Non-offshore wind activities would not be expected to appreciably contribute to this sub-IPF. As such, no impact on sea turtles would be expected.
Cable emplacement and maintenance	Cable maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances will be local and generally limited to the emplacement corridor. Data are not available regarding effects of suspended sediments on adult and juvenile sea turtles, although elevated suspended sediments may cause individuals to alter normal movements and behaviors. However, these changes are expected to be too small to be detected (NOAA 2020). Sea turtles would be expected to swim away from the sediment plume. Elevated turbidity is most likely to affect sea turtles if a plume causes a barrier to normal behaviors, but no impacts would be expected due to swimming through the plume (NOAA 2020). Turbidity associated with increased sedimentation may result in short-term, temporary impacts on sea turtle prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).	The impact on water quality from accidental sediment suspension during cable emplacement is short-term and temporary. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any impacts would be short-term and temporary. Turbidity associated with increased sedimentation may result in short-term, temporary impacts on some sea turtle prey species (see Finfish, Invertebrates, and Essential Fish Habitat table).
Noise: Aircraft	Aircraft routinely travel in the geographic analysis area for sea turtles. With the possible exception of rescue operations, no ongoing aircraft flights would occur at altitudes that would elicit a response from sea turtles. If flights are at a sufficiently low altitude, sea turtles may respond with a startle response (diving or swimming away), altered submergence patterns, and a temporary stress response (NSF and USGS 2011; Samuel et al. 2005). These brief responses would be expected to dissipate once the aircraft has left the area.	Future low-altitude aircraft activities such as survey activities and navy training operations could result in short-term responses of sea turtles to aircraft noise. If flights are at a sufficiently low altitude, sea turtles may respond with a startle response (diving or swimming away), altered submergence patterns, and a temporary stress response (NSF and USGS 2011; Samuel et al. 2005). These brief responses would be expected to dissipate once the aircraft has left the area.
Noise: G&G	Infrequent site characterization surveys and scientific surveys produce high-intensity impulsive noise around sites of investigation. These activities have the potential to result in some impacts including potential auditory injuries, short-term disturbance, behavioral responses, and short-term displacement of feeding or migrating sea turtles, if present within the ensonified area (NSF and USGS 2011). The potential for PTS and TTS is considered possible in proximity to G&G surveys utilizing air guns, but impacts are unlikely as turtles would be expected to avoid such exposure and survey vessels would pass quickly (NSF and USGS 2011). No significant impacts would be expected at the population level.	Same as ongoing activities, with the addition of possible future oil and gas exploration surveys.
Noise: Turbines	Available evidence suggests that typical underwater noise levels from operating WTGs would be below current cumulative injury and behavioral effect thresholds for sea turtles. Operating turbines were determined to produce underwater noise on the order of 110 to 125 dB_{RMS}, occasionally reaching as high as 128 dB_{RMS}, in the 10-Hz to 8-kilohertz range (Tougaard et al. 2020). As measured at the Block Island Wind Facility, low frequency operational noise barely exceeds ambient levels at 164 feet (50 meters) from the WTG base (Miller and Potty 2017). Operational noise impacts would be expected to be negligible.	This sub-IPF does not apply to future non-offshore wind development.
Noise: Pile driving	Noise from pile driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water and/or through the seabed can result in high intensity, low exposure levels, and long-term, but localized intermittent risk to sea turtles. Impacts, potentially including behavioral responses, masking, TTS, and PTS, would be localized in nearshore waters. Data regarding threshold levels for	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
	impacts on sea turtles from sound exposure during pile driving are very limited, and no regulatory threshold criteria have been established for sea turtles. Based on current literature, the following thresholds are used to assess impacts on turtles: Potential mortal injury: 210 dB cumulative SPL or greater than 207 dB peak SPL (Popper et al. 2014) Potential mortal injury: 204 dB_{SEL}, 232 dB_{PEAK} (PTS), 189 dB_{SEL}, 226 dB_{PEAK} (TTS) (Navy 2017) Behavioral harassment: 175 dB referenced to 1 µPa RMS (Navy 2017)	
Noise: Vessels	The frequency range for vessel noise (10 to 1000 Hz; MMS 2007) overlaps with sea turtles' known hearing range (less than 1,000 Hz with maximum sensitivity between 200 to 700 Hz; Bartol 1994) and would therefore be audible. However, Hazel et al. (Hazel et al. 2007) suggests that sea turtles' ability to detect approaching vessels is primarily vision-dependent, not acoustic. Sea turtles may respond to vessel approach and/or noise with a startle response (diving or swimming away) and a temporary stress response (NSF and USGS 2011). Samuel et al. (Samuel et al. 2005) indicated that vessel noise could have an effect on sea turtle behavior, especially their submergence patterns.	Any offshore projects that require the use of ocean vessels could potentially result in long-term but infrequent impacts on sea turtles, including temporary startle responses, masking of biologically relevant sounds, physiological stress, and behavioral changes, especially their submergence patterns (NSF and USGS 2011; Samuel et al. 2005). However, BOEM expects that these brief responses of individuals to passing vessels would be unlikely given the patchy distribution of sea turtles and no stock or population level effects would be expected.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. Port expansion activities are localized to nearshore habitats, and are expected to result in short-term, temporary impacts, if any, on sea turtles. Vessel noise may affect sea turtles, but response would be expected to be short-term and temporary (see the Vessels: Noise sub-IPF above). The impact on water quality from sediment suspension during port expansion activities is short-term, temporary, and would be similar to those described under the cable emplacement and maintenance IPF above.	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from South Carolina to Maine is that port activity will increase modestly. The ability of ports to receive the increase in larger ships will require port modifications. Future channel deepening activities are being undertaken to accommodate deeper draft vessels for the Panama Canal Locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long-term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future. Additional impacts associated with the increased risk of vessel strikes could also occur (see the Traffic: Vessel collisions sub-IPF below).
Presence of structures: Entanglement or ingestion of lost fishing gear	The Mid-Atlantic region has more than 130 artificial reefs. Currently bridge foundations and the Block Island Wind Facility may be considered artificial reefs and may have higher levels of recreational fishing, which increases the chances of sea turtles encountering lost fishing gear, resulting in possible ingestions, entanglement, injury, or death of individuals (Berreiros and Raykov 2014; Gregory 2009; Vegter et al. 2014) if present where these structures are located. At the scale of the OCS geographic analysis area for sea turtles, there are very few areas that would serve to concentrate recreational fishing and increase the likelihood that sea turtles would encounter lost fishing gear.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.
Presence of structures: Habitat conversion and prey aggregation	The Mid-Atlantic region has more than 130 artificial reefs. Hard-bottom (scour control and rock mattresses) and vertical structures (bridge foundations, Block Island Wind Facility WTGs, and two WTGs with the Coastal Virginia Offshore Wind pilot project) in a soft-bottom habitat can create artificial reefs, thus inducing the reef effect (Taormina et al. 2018; NMFS 2015). The reef effect is usually considered a beneficial impact, associated with higher densities and biomass of fish and decapod crustaceans (Taormina et al. 2018), providing a potential increase in available forage items and shelter for sea turtles compared to the surrounding soft-bottoms.	The presence of structures associated with non-offshore wind development in near-shore coastal waters has the potential to provide habitat for sea turtles as well as preferred prey species. This reef effect has the potential to result in long-term, low-intensity beneficial impacts. Bridge foundations will continue to provide foraging opportunities for sea turtles with measurable benefits to some individuals.
Presence of structures: Avoidance/displacement	No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to this sub-IPF. There may be some impacts resulting from the existing Block Island Wind Facility (5 WTGs) and the Coastal Virginia Offshore Wind pilot project (2 WTGs) but given the limited number of WTGs, no measurable impacts are occurring.	Not contemplated for non-offshore wind facility sources.
Presence of structures: Behavioral disruption - breeding and migration	No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non-offshore wind facility sources.
Presence of structures: Displacement into higher risk areas (Vessels and Fishing)	No ongoing activities in the geographic analysis area for sea turtles beyond offshore wind facilities are measurably contributing to this sub-IPF.	Not contemplated for non-offshore wind facility sources.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Traffic: Vessel collisions	Current activities contributing to this sub-IPF include port traffic levels, fairways, TSS, commercial vessel traffic, recreational and fishing activity, and scientific and academic vessel traffic. Propeller and collision injuries from boats and ships are common in sea turtles. Vessel strike is an increasing concern for sea turtles, especially in the southeastern United States, where development along the coasts is likely to result in increased recreational boat traffic. Sea turtles are most susceptible to vessel collisions in coastal waters, where they forage from May through November. Vessel speed may exceed 10 knots in such waters, and evidence suggests that they cannot reliably avoid being struck by vessels exceeding 2 knots (Hazel et al. 2007).	Vessel traffic associated with non-offshore wind development has the potential to result in an increased collision risk. While these impacts would be high consequence, the patchy distribution of sea turtles makes stock or population-level effects unlikely (Navy 2018).

µPa = micropascal; µT = microtesla; AC = alternating current; dB = decibels; hazmat = hazardous materials; HZ = hertz; PTS = permanent threshold shift; RMS = root mean square; SPL = sound pressure level; TTS = temporary threshold shift

Table D1-21. Summary of activities and the associated impact-producing factors for water quality

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	Accidental releases of fuels and fluids occur during vessel usage for dredge material ocean disposal, fisheries use, marine transportation, military use, survey activities, and submarine cable lines, and pipeline laying activities. According to the DOE, 31,000 barrels of petroleum are spilled into U.S. waters from vessels and pipelines in a typical year. Approximately 40.5 million barrels of oil were lost as a result of tanker incidents from 1970 to 2009, according to International Tanker Owners Pollution Federation Limited, which collects data on oil spills from tankers and other sources. From 1990 to 1999, the average annual input to the coastal Northeast was 220,000 barrels of petroleum and into the offshore was < 70,000 barrels. Impacts on water quality would be expected to brief and localized from accidental releases.	Future accidental releases from offshore vessel usage, spills, and consumption will likely continue on a similar trend. Impacts are unlikely to affect water quality.
Accidental releases: Trash and debris	Trash and debris may be accidentally discharged through fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities, and cables, lines, and pipeline laying. Accidental releases of trash and debris are expected to be low probability events. BOEM assumes operator compliance with federal and international requirements for management of shipboard trash; such events also have a relatively limited spatial impact.	As population and vessel traffic increase gradually over the next 40 years, accidental release of trash and debris may increase. However, there does not appear to be evidence that the volumes and extents anticipated would have any effect on water quality.
Anchoring	Impacts from anchoring occur due to ongoing military use and survey, commercial, and recreational activities.	Impacts from anchoring may occur semi-regularly over the next 40 years due to offshore military operations or survey activities. These impacts would include increased seabed disturbance resulting in increased turbidity levels. All impacts would be localized, short term, and temporary.
Cable emplacement and maintenance	Elevated suspended sediment concentrations can occur under natural tidal conditions and increase during storms, trawling, and vessel propulsion. Survey activities, and new cable and pipeline laying activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances would be short-term and either be limited to the emplacement corridor or localized.	Suspension of sediments may continue to occur infrequently over the next 40 years due to survey activities, and submarine cable, lines, and pipeline-laying activities. Future new cables would occasionally disturb the seafloor and cause short-term increases in turbidity and minor alterations in localized currents resulting in local short-term impacts. If the cable routes enter the water quality geographic analysis area, short-term disturbance in the form of increased suspended sediment and turbidity would be expected.
Port utilization: Expansion	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from South Carolina to Maine is that port activity will increase modestly. The ability of ports to receive the increase in larger ships will require port modifications, which, along with additional vessel traffic, could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long-term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future.	The general trend along the coastal region from South Carolina to Maine is that port activity will increase modestly over the next 40 years. Port modifications and channel deepening activities are being undertaken to accommodate the increase in vessel traffic and deeper draft vessels that transit the Panama Canal Locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future.
Presence of structures	The installation of onshore and offshore structures leads to alteration of local water currents. These disturbances would be local but, depending on the hydrologic conditions, have the potential to impact water quality through the formation of sediment plumes.	Impacts associated with the presence of structures includes temporary sediment disturbance during maintenance. This sediment suspension would lead to interim and localized impacts.
Discharges/intakes	Discharges impact water quality by introducing nutrients, chemicals, and sediments to the water. There are regulatory requirements related to prevention and control of discharges, the prevention and control of accidental spills, and the prevention and control of nonindigenous species.	Increased coastal development is causing increased nutrient pollution in communities. In addition, ocean disposal activity in the North and Mid-Atlantic is expected to gradually decrease or remain stable. Impacts of ocean disposal on water quality are minimized because USEPA has established dredge spoil criteria and regulate the disposal permits issued by USACE.

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
		The impact on water quality from sediment suspension during these future activities would be short-term and localized.
Land disturbance: erosion and sedimentation	Ground disturbance activities may lead to un-vegetated or otherwise unstable soils. Precipitation events could potentially mobilize the soils into nearby surface waters, leading to potential erosion and sedimentation effects and subsequent increased turbidity.	Ground disturbance associated with construction and installation of onshore components could lead to un-vegetated or unstable soils. Precipitation events could mobilize these soils leading to erosion and sedimentation effects and turbidity. The impacts for future offshore wind through this IPF would be staggered in time and localized. The impacts would be short term and localized with an increased likelihood of impacts limited to onshore construction periods.
Land disturbance: Onshore construction	Onshore construction activities may lead to un-vegetated or otherwise unstable soils as well as soil contamination due to leaks or spills from construction equipment. Precipitation events could potentially mobilize the soils into nearby surface waters, leading to increased turbidity and alteration of water quality.	The general trend along coastal regions is that port activity will increase modestly in the future. This increase in activity includes expansion needed to meet commercial, industrial, and recreational demand. Modifications to cargo handling equipment and conversion of some undeveloped land to meet port demand would be required to receive the increase in larger ships.

DOE = U.S. Department of Energy; hazmat = hazardous materials

Table D1-22. Summary of activities and the associated impact-producing factors for scenic and visual resources

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat, suspended sediments, trash and debris	Ongoing offshore and onshore construction projects involve the use of vehicles, vessels, and equipment that contain fuel, fluids, and hazmat that have the potential for accidental release. Offshore and onshore construction can also result in sedimentation from land and seabed disturbance and accidental releases of trash and debris with associated visual impacts.	Future offshore and onshore construction projects have the potential to result in accidental releases from vehicles, vessels, and equipment that contain fuel, fluids, and hazmat. Future offshore and onshore construction could also result in sedimentation from land and seabed disturbance and accidental releases of trash and debris with associated visual impacts.
Land disturbance: Erosion and sedimentation, onshore construction, onshore land use changes	Onshore human-caused and naturally occurring erosion and sedimentation results from construction, maintenance, and weather events.	Ongoing onshore construction projects could generate noticeable disturbance in the landscape. Intensity and extent would vary depending on the location, type, and duration of activities.
Light: Offshore structures and vessels, onshore vehicles, roads, laydown, parking, facilities, equipment, and structures	Offshore vessels have an array of lights including navigational lights, deck lights, and interior lights. Various ongoing onshore and coastal construction projects have nighttime activities, as well as existing structures, facilities, and vehicles that would require nighttime lighting.	Ongoing onshore construction projects involving nighttime activity could generate nighttime lighting. Intensity and extent would vary depending on the location, type, direction, and duration of nighttime lighting.
Structures: Viewshed	Buoys are the only existing stationary structures within the offshore viewshed of the Project. Typically, buoys are visible only in the immediate foreground (less than 1 mile). Stationary and moving barges, boats, and ships also are visible in the daytime and nighttime viewsheds.	Onshore wind-related structures that could be viewed in conjunction with the offshore project components would be limited to meteorological towers, substations, and electrical transmission towers and conductors.
Traffic: Helicopters, vessels, vehicles	Ongoing activities contribute air, marine, and onshore traffic and visible congestion.	Planned onshore and offshore construction projects involving vessel, vehicle, and helicopter traffic could generate noticeable changes in the characteristic seascape and landscape and viewer experience. Intensity and extent of the changes would vary depending on the location, type, direction, and duration of the traffic.

Table D1-23. Summary of activities and the associated impact-producing factors for wetlands

Associated IPFs: Sub-IPFs	Ongoing Activities	Future Non-Offshore Wind Activities Intensity/Extent
Land disturbance: Erosion and sedimentation	Ground disturbance activities may lead to unvegetated or otherwise unstable soils. Precipitation events could potentially mobilize the soils into nearby wetlands, leading to potential erosion and sedimentation effects and subsequent increased turbidity.	Ground disturbance associated with construction and installation of onshore components could lead to unvegetated or unstable soils. Precipitation events could mobilize these soils, leading to erosion and sedimentation effects and turbidity.
Land disturbance: Onshore construction	Onshore construction activities may lead to unvegetated or otherwise unstable soils as well as soil contamination due to leaks or spills from construction equipment. Precipitation events could potentially mobilize the soils into nearby wetlands, leading to increased turbidity and alteration of water quality.	The general trend along coastal regions is that port activity and land development will increase modestly in the future. This increase in activity includes expansion needed to meet commercial, industrial, and recreational demand. Modifications to cargo-handling equipment and conversion of some undeveloped land to meet port demand would be required to receive the increase in larger ships.

References Cited

Bartol, S. M. 1994. Auditory evoked potentials of the loggerhead sea turtle (*Caretta caretta*). Master's Thesis, College of William and Mary – Virginia Institute of Marine Science. 66 pp. Available: https://scholarworks.wm.edu/cgi/viewcontent.cgi?article=2805&context=etd.

Baulch, S., and C. Perry. 2014. Evaluating the Impacts of Marine Debris on Cetaceans. *Marine Pollution Bulletin* 80:210–221.

Bembenek-Bailey, S. A., J. N. Niemuth, P. D. McClellan-Green, M. H. Godfrey, C. A. Harms, H. Gracz, and M. K. Stoskopf. 2019. NMR Metabolomics Analysis of Skeletal Muscle, Heart, and Liver of Hatchling Loggerhead Sea Turtles (*Caretta caretta*) Experimentally Exposed to Crude Oil and/or Corexit. *Metabolites* 2019(9):21. doi:10.3390/metabo9020021.

Berreiros J. P., and V. S. Raykov. 2014. Lethal Lesions and Amputation Caused by Plastic Debris and Fishing Gear on the Loggerhead Turtle *Caretta* (Linnaeus, 1758). Three case reports from Terceira Island, Azores (NE Atlantic). *Marine Pollution Bulletin* 86:518–522.

Briggs, K. T., M. E. Gershwin, and D. W. Anderson. 1997. Consequences of petrochemical ingestion and stress on the immune system of seabirds. *ICES Journal of Marine Science* 54:718–725.

Browne, M. A., A. J. Underwood, M. G. Chapman, R. Williams, R. C. Thompson, and J. A. van Franeker. 2015. Linking Effects of Anthropogenic Debris to Ecological Impacts. *Proceedings of the Royal Society B* 282:20142929. Available: http://dx.doi.org/10.1098/rspb.2014.2929.

Bugoni, L., L. Krause, and M. V. Petry. 2001. Marine Debris and Human Impacts on Sea Turtles in Southern Brazil. *Marine Pollution Bulletin* 42(12):1330–1334.

Bureau of Ocean Energy Management (BOEM). 2019. National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf. Available: https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/IPFs-in-the-Offshore-Wind-Cumulative-Impacts-Scenario-on-the-N-OCS.pdf. Accessed: December 2020.

Camacho, M., O. P. Luzardo, L. D. Boada, L. F. L. Jurado, M. Medina, M. Zumbado, and J. Orós. 2013. Potential Adverse Health Effects of Persistent Organic Pollutants on Sea Turtles: Evidence from a Cross-Sectional Study on Cape Verde Loggerhead Sea Turtles. *Science of the Total Environment*.

Causon, Paul D., and Andrew B. Gill. 2018. Linking Ecosystem Services with Epibenthic Biodiversity Change Following Installation of Offshore Wind Farms. *Environmental Science and Policy* 89:340–347.

Claisse, Jeremy T., Daniel J. Pondella II, Milton Love, Laurel A. Zahn, Chelsea M. Williams, Jonathan P. Williams, and Ann S. Bull. 2014. Oil Platforms off California are among the Most Productive Marine Fish Habitats Globally. *Proceedings of the National Academy of Sciences of the United States of*

America 111(43):15462–15467. October 28, 2014. First published October 13, 2014. Available: https://doi.org/10.1073/pnas.1411477111. Accessed: March 2020.

Cook, A. S. C. P., and N. H. K. Burton. 2010. *A review of Potential Impacts of Marine Aggregate Extraction on Seabirds*. Marine Environment Protection Fund Project 09/P130. Available: https://www.bto.org/sites/default/files/shared_documents/publications/research-reports/2010/rr563.pdf. Accessed: February 25, 2020.

CSA Ocean Sciences, Inc. and Exponent. 2019. *Evaluation of Potential EMF Effects on Fish Species of Commercial or Recreational Fishing Importance in Southern New England*. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. OCS Study BOEM 2019-049.

Degraer, S., R. Brabant, B. Rumes, and L. Vigin, eds. 2019. Environmental Impacts of Offshore Wind Farms in the Belgian Part of the North Sea: Marking a Decade of Monitoring, Research and Innovation. Brussels: Royal Belgian Institute of Natural Sciences, OD Natural Environment, Marine Ecology and Management, 134 pp.

Dolbeer, R. A., M. J. Begier, P. R. Miller, J. R. Weller, and A. L. Anderson. 2019. *Wildlife Strikes to civil aircraft in the United States, 1990 – 2018*. Federal Aviation Administration National Wildlife Strike Database Serial Report Number 25. 95 pp. + Appendices.

Efroymson, R. A., W. Hodge Rose, S. Nemth, and G. W. Suter II. 2000. *Ecological Risk Assessment Framework for Low Altitude Overflights by Fixed-Wing and Rotary-Wing Military Aircraft*. Research sponsored by Strategic Environmental Research and Development Program of the U.S. Department of Defense under Interagency Agreement 2107-N218-S1. Publication No. 5010, Environmental Sciences Division, ORNL.

Fabrizio, M. C., J. P. Manderson, and J. P. Pessutti. 2014. Home Range and Seasonal Movements of Black Sea Bass (*Centropristis striat*a) during their Inshore Residency at a Reef in the Mid-Atlantic Bight. *Fishery Bulletin* 112:82–97 (2014). doi: 10.7755/FB.112.1.5.

Gall, S. C., and R. C. Thompson. 2015. The Impact of Marine Debris on Marine Life. *Marine Pollution Bulletin* 92:170–179.

Gill, A. B., I. Gloyne-Phillips, K. J. Neal, and J. A. Kimber. 2005. The Potential Effects of Electromagnetic Fields Generated by Sub-Sea Power Cables Associated with Offshore Wind Farm Developments on Electrically and Magnetically Sensitive Marine Organisms - A Review. Collaborative Offshore Wind Research into the Environment (COWRIE), Ltd, UK.

Greene, J. K., M. G. Anderson, J. Odell, and N. Steinberg (editors). 2010. *The Northwest Atlantic Marine Ecoregional Assessment: Species, Habitats and Ecosystems. Phase One*. The Nature Conservancy, Eastern U.S. Division, Boston, MA.

Gregory, M. R. 2009. Environmental Implications of Plastic Debris in Marine Settings – Entanglement, Ingestion, Smothering, Hangers-on, Hitch-Hiking, and Alien Invasion. *Philosophical Transactions of the Royal Society* B 364:2013–2025.

Guida, V., A. Drohan, H. Welch, J. McHenry, D. Johnson, V. Kentner, J. Brink, D. Timmons, and E. Estela-Gomez. 2017. *Habitat Mapping and Assessment of Northeast Wind Energy Areas*. U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2017-088.

Haney, J. C., P. G. R. Jodice, W. A. Montevecchi, and D. C. Evers. 2017. Challenges to oil spill assessments for seabirds in the deep ocean. *Archives of Environmental Contamination and Toxicology* 73:33–39.

Hann, Z. A., M. J. Hosler, and P. R. Mooseman, Jr. 2017. Roosting Habits of Two Lasiurus borealis (eastern red bat) in the Blue Ridge Mountains of Virginia. *Northeastern Naturalist* 24 (2):N15–N18.

Hawkins, A., and A. Popper. 2017. A Sound Approach to Assessing the Impact of Underwater Noise on Marine Fishes and Invertebrates. *ICES Journal of Marine Science* 74(3):635–651. doi:10.1093/icesjms/fsw205.

Hazel, J., I. R. Lawler, H. Marsh, and S. Robson. 2007. Vessel Speed Increases Collision Risk for the Green Turtle *Chelonia mydas*. *Endangered Species Research* 3:105–113

HDR. 2019. *Benthic Monitoring during Wind Turbine Installation and Operation at the Block Island Wind Farm, Rhode Island – Year 2. Final* Report to the U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. OCS Study BOEM 2019- 019. Available: https://espis.boem.gov/final%20reports/BOEM_2019-019.pdf. Accessed: February 12, 2020.

Hoarau, L., L. Ainley, C. Jean, S. Ciccione. 2014. Ingestion and Defecation of Marine Debris by Loggerhead Sea Turtles, from By-catches in the South-West Indian Ocean. *Marine Pollution Bulletin* 84:90–96.

Hüppop, O., J. Dierschke, K. Exo, E. Frerich, and R. Hill. 2006. Bird Migration and Potential Collision Risk with Offshore Wind Turbines. *Ibis* 148:90–109.

Hutchison, Zoë, Peter Sigray, Haibo He, Andrew Gill, John King, and Carol Gibson. 2018. Electromagnetic Field (EMF) Impacts on Elasmobranch (shark, rays, and skates) and American Lobster Movement and Migration from Direct Current Cables. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. OCS Study BOEM 2018-003.

Jensen, J. H., L. Bejder, M. Wahlberg, N. Aguilar Solo, M. Johnson, and P. T. Madsen. 2009. Vessel Noise Effects on Delphinid Communication. *Marine Ecology Progress Series* 395:161–175.

Kellar, N. M., T. R. Speakman, C. R. Smith, S. M. Lane, B. C. Balmer, M. L. Trego, K. N. Catelani, M. N. Robbins, C. D. Allen, R. S. Wells, E. S. Zolman, T. K. Rowles, and L. H. Schwacke. 2017. Low Reproductive Success Rates of Common Bottlenose Dolphins *Tursiops truncatus* in the Northern Gulf of Mexico Following the Deepwater Horizon Disaster (2010-2015). *Endangered Species Research* 33:1432–158.

Kerckhof, Francis, Bob Rumes, and Steven Degraer. 2019. About 'Mytilisation' and 'Slimeification': A Decade of Succession of the Fouling Assemblages on Wind Turbines off the Belgian Coast. In *Memoirs on the Marine Environment: Environmental Impacts of Offshore Wind Farms in the Belgian Part of the North Sea*, edited by Steven Degraer, Robin Brabant, Bob Rumes, and Laurence Vigin, pp. 73–84. Brussels: Royal Belgian Institute of Natural Sciences, OD Natural Environment, Marine Ecology and Management. Available: https://odnature.naturalsciences.be/downloads/mumm/windfarms/winmon_report_2019_final.pdf. Accessed: February 12, 2020.

Kirschvink, J. L. 1990. Geomagnetic Sensitivity in Cetaceans an Update with Live Strandings Recorded in the US. In *Sensory Abilities of Cetaceans*, edited by J. Thomas and R. Kastelein. Plenum Press, NY.

Kite-Powell, H. L., A. Knowlton, and M. Brown. 2007. *Modeling the Effect of Vessel Speed on Right Whale Ship Strike Risk*. Unpublished Report for NOAA/NMFS Project NA04NMF47202394. 8 pp.

Kraus, S. D., M. W. Brown, H. Caswell, C. W. Clark, M. Fujiwara, P. H. Hamilton, R. D. Kenney, A. R. Knowlton, S. Landry, C. A. Mayo, W. A. McLellan, M. J. Moore, D. P. Nowacek, D. A. Pabst, A. J. Read, and R. M. Rolland. 2005. North Atlantic Right Whales in Crisis. *Science* 309:561–562.

Kraus, S. D., S. Leiter, K. Stone, B. Wikgren, C. Mayo, P. Hughes, R. D. Kenney, C. W. Clark, A. N. Rice, B. Estabrook, and J. Tielens. 2016. *Northeast Large Pelagic Survey Collaborative Aerial and Acoustic Surveys for Large Whales and Sea Turtles. Final Report*. U.S. Department of the Interior, Bureau of Ocean Energy Management, Sterling, Virginia. OCS Study BOEM 2016-054.

Laist, D. W., A. R. Knowlton, J. G. Mead, A. S. Collet, and M. Podesta. 2001. Collisions between Ships and Whales. *Marine Mammal Science* 17(1):35–75.

Law, K. L., S. Morét-Ferguson, N. A. Maximenko, G. Proskurowski, E. E. Peacock, J. Hafner, and C. M. Reddy. 2010. Plastic Accumulation in the North Atlantic Subtropical Gyre. *Science* 329:1185–1188.

Luschi, P., S. Benhamou, C. Girard, S. Ciccione, D. Roos, J. Sudre, and S. Benvenuti. 2007. Marine Turtles use Geomagnetic Cues during Open Sea Homing. *Current Biology* 17:126–133.

Maggini, I., L. V. Kennedy, A. Macmillan, K. H. Elliot, K. Dean, and C. G. Guglielmo. 2017. Light oiling of feathers increases flight energy expenditure in a migratory shorebird. *Journal of Experimental Biology* 220:2372–2379.

Maryland Department of the Environment. 2023. Maryland's Climate Pollution Reduction Plan, Policies to Reduce Statewide Greenhouse Gas Emissions 60% by 2031 and Create a Path to Net-Zero by 2045. Available: https://mde.maryland.gov/programs/air/ClimateChange/Maryland%20Climate%20Reduction%20Plan/Maryland%27s%20Climate%20Pollution%20Reduction%20Plan%20-%20Final%20-%20Dec%2028%202023.pdf. Accessed: January 23, 2024.

Mazet, J. A. K., I. A. Gardner, D. A. Jessup, and L. J. Lowenstine. 2001. Effects of Petroleum on Mink Applied as a Model for Reproductive Success in Sea Otters. *Journal of Wildlife Diseases* 37(4):686–692.

McConnell, B. J., M. A. Fedak, P. Lovell, and P. S. Hammond. 1999. Movements and Foraging Areas of Grey Seals in the North Sea. *Journal of Applied Ecology* 36:573–590.

Miller, J. H., and G. R. Potty. 2017. Overview of Underwater Acoustic and Seismic Measurements of the Construction and Operation of the Block Island Wind Farm. *Journal of the Acoustical Society of America* 141(5):3993–3993. doi:10.1121/1.4989144.

Minerals Management Service (MMS). 2007. Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement. October. OCS EIS/EA MMS 2007-046. Available: https://www.boem.gov/Guide-To-EIS/. Accessed: July 3, 2018.

Mitchelmore, C. L., C. A. Bishop, and T. K. Collier. 2017. Toxicological Estimation of Mortality of Oceanic Sea Turtles Oiled during the Deepwater Horizon Oil Spill. *Endangered Species Research* 33:39–50.

Mohr, F. C., B. Lasely, and S. Bursian. 2008. Chronic Oral Exposure to Bunker C Fuel Oil Causes Adrenal Insufficiency in Ranch Mink. *Archive of Environmental Contamination and Toxicology* 54:337–347.

Moore, M. J., and J. M. van der Hoop. 2012. The Painful Side of Trap and Fixed Net Fisheries: Chronic Entanglement of Large Whales. *Journal of Marine Biology* 2012:Article ID 230653, 4 pp.

Moser, J., and G. R. Shepherd. 2009. Seasonal Distribution and Movement of Black Sea Bass (*Centropristis striata*) in the Northwest Atlantic as Determined from a Mark-Recapture Experiment. *J. Northw. Atl. Fish. Sci.* 40:17–28. doi:10.2960/J.v40.m638.

National Marine Fisheries Service (NMFS). 2015. Endangered Species Act (ESA) Section 7 Consultation Biological Opinion, Deepwater Wind: Block Island Wind Farm and Transmission System. June 5.

National Oceanic and Atmospheric Administration (NOAA). 2018. Biological Opinion on the Bureau of Ocean Energy Management's Issuance of Five Oil and Gas Permits for Geological and Geophysical Seismic Surveys off the Atlantic Coast of the United States, and the National Marine Fisheries Services' Issuance of Associated Incidental Harassment Authorizations. Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. 267 pp. + appendices.

National Oceanic and Atmospheric Administration (NOAA). 2020. *Section 7 Effect Analysis: Turbidity in the Greater Atlantic Region*. NOAA Greater Atlantic Regional Fisheries Office. Available: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-effect-analysis-turbidity-greater-atlantic-region.

National Science Foundation (NSF) and U.S. Geological Survey (USGS). 2011. Final Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for marine seismic research funded by the National Science Foundation or conducted by the U.S. Geological Survey. 514 pp. Available: https://www.nsf.gov/geo/oce/envcomp/usgs-nsf-marine-seismic-research/nsf-usgs-final-eis-oeis_3june2011.pdf.

Nelms, S. E., E. M. Duncan, A. C. Broderick, T. S. Galloway, M. H. Godfrey, M. Hamann, P. K. Lindeque, and Bendan J. Godley. 2016. Plastic and Marine Turtles: a Review and Call for Research. *ICES Journal of Marine Science* 73(2):165–181.

Normandeau Associates, Inc., Exponent, Inc., T. Tricas, and A. Gill. 2011. *Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species*. Final Report. U.S. Department of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement, Pacific OCS Region, Camarillo, CA. OCS Study BOEMRE 2011-09.

Pace, R. M., and G. K. Silber. 2005. Simple analysis of ship and large whale collisions: Does speed kill? Presentation at the Sixteenth Biennial Conference on the Biology of Marine Mammals, San Diego, CA, December 2005.

Paruk, J. D., E. M. Adams, H. Uher-Koch, K. A. Kovach, D. Long, IV, C. Perkins, N. Schoch, and D. C. Evers. 2016. Polycylic aromatic hydrocarbons in blood related to lower body mass in common loons. *Science of the Total Environment* 565:360–368.

Patenaude, N. J., W. J. Richardson, M. A. Smultea, W. R. Koski, and G. W. Miller. 2002. Aircraft Sound and Disturbance to Bowhead and Beluga Whales During Spring Migration in the Alaskan Beaufort Sea. *Marine Mammal Science* 18(2):309–335.

Popper, Arthur N., Anthony D. Hawkins, Richard R. Fay, David A. Mann, Soraya Bartol, Thomas J. Carlson, Sheryl Coombs, William T. Ellison, Roger L. Gentry, Michele B. Halvorsen, Svein Løkkeborg, Peter H. Rogers, Brandon L. Southall, David G. Zeddies, and William N. Tavolga. 2014. *Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report.* Prepared by ANSI - Accredited Standards Committee S3/SC1 and Registered with ANSI. ASAPress/Springer. ASA S3/SC1.4 TR-2014.

Roman, L., B. D. Hardesty, M. A. Hindell, and C. Wilcox. 2019. A quantitative analysis linking seabird mortality and marine debris ingestion. *Scientific Reports* 9(1):1–7.

Samuel, Y., S. J. Morreale, C. W. Clark, C. H. Greene, and M. E. Richmond. 2005. Underwater, Low-frequency Noise in a Coastal Sea Turtle Habitat. *Journal of the Acoustical Society of America* 117(3):1465–1472.

Schaub, A., J. Ostwald, and B. M. Siemers. 2008. Foraging bats avoid noise. *Journal of Experimental Biology* 211:3147–3180.

Schuyler, Q. A., C. Wilcox, K. Townsend, B. D. Hardesty, and N. J. Marshall. 2014. Mistaken Identity? Visual Similarities of Marine Debris to Natural Prey Items of Sea Turtles. *BMC Ecology* 14(14). 7 pp.

Secor, D. H., F. Zhang, M. H. P. O'Brien, and M. Li. 2018. Ocean Destratification and Fish Evacuation Caused by a Mid-Atlantic Tropical Storm. *ICES Journal of Marine Science* 76(2):573–584. Available: https://doi.org/10.1093/icesjms/fsx241.

Shigenaka, G., S. Milton, P. Lutz, R. Hoff, R. Yender, and A. Mearns. 2010. *Oil and Sea Turtles: Biology, Planning, and Response*. NOAA Office of Restoration and Response Publication. 116 pp.

Sigourney, D. B. C. D. Orphanides, J. M. Hatch. 2019. *Estimates of Seabird Bycatch in Commercial Fisheries off the East Coast of the United States from 2015-2016*. NOAA Technical Memorandum NMFS-NE-252. Woods Hole, Massachusetts. 27 pp.

Simmons, A. M., K. N. Horn, M. Warnecke, and J. A. Simmons. 2016. Broadband Noise Exposure Does Not Affect Hearing Sensitivity in Big Brown Bats (Eptesicus fuscus). *Journal of Experimental Biology* 219:1031–1040.

Smith, C. R., T. K. Rowles, L. B. Hart, F. I. Townsend, R. S. Wells, E. S. Zolman, B. C. Balmer, B. Quigley, M. Ivnacic, W. McKercher, M. C. Tumlin, K. D. Mullin, J. D. Adams, Q. Wu, W. McFee, T. K. Collier, and L. H. Schwacke. 2017. Slow Recovery of Barataria Bay Dolphin Health Following the Deepwater Horizon Oil Spill (2013-2014) with Evidence of Persistent Lung Disease and Impaired Stress Response. *Endangered Species Research* 33:127–142.

Smith, James, Michael Lowry, Curtis Champion, and Iain Suthers. 2016. A Designed Artificial Reef is among the Most Productive Marine Fish Habitats: New Metrics to Address Production Versus Attraction. *Marine Biology* 163:188.

Snoek, R., R. de Swart, K. Didderen, W. Lengkeek, and M. Teunis. 2016. *Potential Effects of Electromagnetic Fields in the Dutch North Sea.* Final Report submitted to Rijkswaterstaat Water, Verkeer en Leefmgeving.

Southall, B., A. Bowles, W. Ellison, J. Finneran, R. Gentry, C. Greene Jr., D. Kastak, D. Ketten, J. Miller, P. Nachtigall, W. Richardson, J. Thomas, and P. Tyack. 2007. Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. *Aquatic Mammals* 33(4):411–509.

Sullivan, L., T. Brosnan, T. K. Rowles, L. Schwacke, C. Simeone, and T. K. Collier. 2019. *Guidelines for Assessing Exposure and Impacts of Oil Spills on Marine Mammals*. NOAA Tech. Memo. NMFS-OPR-62, 82 pp.

Takeshita, R., L. Sullivan, C. Smith, T. Collier, A. Hall, T. Brosnan, T. Rowles, and L. Schwacke. 2017. The Deepwater Horizon Oil Spill Marine Mammal Injury Assessment. *Endangered Species Research* 33:96–106.

Taormina, B, J. Bald, A. Want, G. D. Thouzeau, M. Lejart, N. Desroy, and A. Carlier. 2018. A Review of Potential Impacts of Submarine Power Cables on the Marine Environment: Knowledge Gaps, Recommendations and Future Directions. *Renewable and Sustainable Energy Reviews* 96(2018):380–391.

Thomás, J., R. Guitart, R. Mateo, and J. A. Raga. 2002. Marine Debris Ingestion in Loggerhead Turtles, *Caretta*, from the Western Mediterranean. *Marine Pollution Bulletin* 44:211–216.

Thomsen, Frank, A. B. Gill, Monika Kosecka, Mathias Andersson, Michel André, Seven Degraer, Thomas Folegot, Joachim Gabriel, Adrian Judd, Thomas Neumann, Alain Norro, Denise Risch, Peter Sigray, Daniel Wood, and Ben Wilson. 2015. *MaRVEN – Environmental Impacts of Noise, Vibrations and Electromagnetic Emissions from Marine Renewable Energy*. 10.2777/272281.

Todd, V. L. G., I. B. Todd, J. C. Gardiner, E. C. N. Morrin, N. A. MacPherson, N. A. DiMarzio, and F. Thomsen. 2015. A Review of Impacts on Marine Dredging on Marine Mammals. *ICES Journal of Marine Science* 72(2):328–340.

Tougaard, J., L. Hermannsen, and P. T. Madsen. 2020. How loud is the underwater noise from operating offshore wind turbines? *Journal of the Acoustical Society of America* 148(5):2885–2893.

Tournadre, J. 2014. Anthropogenic Pressure on the Open Ocean: The Growth of Ship Traffic Revealed by Altimeter Data Analysis. *Geophysical Research Letters* 41:7924–7932. doi:10.1002/2014GL061786.

U.S. Department of the Navy (Navy). 2017. C*riteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)*. Technical report. Available: https://nwtteis.com/portals/nwtteis/files/technical_reports/Criteria_and_Thresholds_for_U.S._Navy_Acoustic_and_Explosive_Effects_Analysis_June2017.pdf.

U.S. Department of the Navy (Navy). 2018. *Hawaii-Southern California Training and Testing EIS/OEIS*. Available: https://www.hstteis.com/Documents/2018-Hawaii-Southern-California-Training-and-Testing-Final-EIS-OEIS/Final-EIS-OEIS.

Vanderlaan, A. S. M., and C. T. Taggart. 2007. Vessel Collisions with Whales: The Probability of Lethal Injury Based on Vessel Speed. *Marine Mammal Science* 23(1):144–156.

Vargo, S., P. Lutz, D. Odell, E. Van Vleet, and G. Bossart. 1986. *Effects of Oil on Marine Turtles. Final Report prepared for the Minerals Management Service (MMS).* 12 pp. Available: http://www.seaturtle.org/PDF/VargoS_1986a_MMSTechReport.pdf.

Vegter, A. C., M. Barletta, C. Beck, J. Borrero, H. Burton, M. L. Campbell, M. F. Costa, M. Eriksen, C. Eriksson, A. Estrades, K. V. K. Gilardi, B. D. Hardesty, J. A. Ivar do Sul, J. L. Lavers, B. Lazar, L. Lebreton, W. J. Nichols, C. A. Ribic, P. G. Ryan, Q. A. Schuyler, S. D. A. Smith, H. Takada, K. A. Townsend, C. C. C. Wabnitz, C. Wilcox, L. C. Young, and M. Hamann. 2014. Global Research Priorities to Mitigate Plastic Pollution Impacts on Marine Wildlife. *Endangered Species Research* 25:225–247.

Walker, M. M., C. E. Diebel, and J. L. Kirschvink. 2003. Detection and Use of the Earth's Magnetic Field by Aquatic Vertebrates. In *Sensory Processing in Aquatic Environments*, edited by S. P. Collin and N. J. Marshall, pp. 53–74. Spriner-Verlag, New York.

Wallace, B. P., B. A. Stacey, E. Cuevas, C. Holyake, P. H. Lara, A. C. J. Marcondes, J. D. Miller, H. Nijkamp, N. J. Pilcher, I. Robinson, N. Rutherford, and G. Shigenaka. 2010. Oil Spills and Sea Turtles: Documented Effects and Considerations for Response and Assessment Efforts. *Endangered Species Research* 41:17–37.

Weilgart, Lindy. 2018. The Impact of Ocean Noise Pollution on Fish and Invertebrates. Report for OceanCare. Switzerland. Available: https://www.oceancare.org/wp-content/uploads/2017/10/OceanNoise_FishInvertebrates_May2018.pdf. Accessed: April 21, 2020.

Werner, S., A. Budziak, J. van Franeker, F. Galgani, G. Hanke, T. Maes, M. Matiddi, P. Nilsson, L. Oosterbaan, E. Priestland, R. Thompson, J. Veiga, and T. Vlachogianni. 2016. *Harm Caused by Marine Litter. MSFD GES TG Marine Litter - Thematic Report*. JRC Technical report; EUR 28317 EN; doi:10.2788/690366.

Whitaker, J. O., Jr. 1998. Life History and Roost Switching in Six Summer Colonies of Eastern Pipistrelles in Buildings. *Journal of Mammalogy* 79(2):651–659.

This page intentionally left blank.

Attachment 2: Maximum-Case Scenario Estimates for Offshore Wind Projects

The following tables provide maximum-case scenario estimates of potential offshore wind project impacts assuming maximum buildout within the SouthCoast Wind EIS geographic analysis areas. BOEM developed these estimates based on offshore wind demand, as discussed in its 2019 study *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (BOEM 2019). Estimates disclosed in this EIS's Chapter 3, *Affected Environment and Environmental Consequences*, no action analyses were developed by summing acreage or number calculations across all lease areas noted as occurring within, or overlapping, a given geographic analysis area. This likely overestimates some impacts in cases where lease areas only partially overlap analysis areas. However, this approach was used to provide the most conservative estimate of future offshore wind development.

This page intentionally left blank.

Table D2-1. Offshore wind development activities on the U.S. East Coast: Projects and assumptions (Part 1, Turbine and Cable Design Parameters)

Region	Lease, Project, Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps geographic analysis area) [c]						Estimated Construction Schedule [d]	Turbine Number [e]	Generating Capacity (MW)	Offshore Export Cable Length (statute miles) [f]	Offshore Export Cable Installation Tool Disturbance Width (feet)	Interarray Cable Length (statute miles) [g]	Hub Height (feet) [h]	Rotor Diameter (feet) [h]	Height of Turbine (feet) [h]
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism									
ME	New England Aqua Ventus I (Maine state waters)	State Project					X		2023	2	11					450	520
	Total State Waters									**2**	**11**						
EXISTING AND ONGOING PROJECTS																	
NE	Block Island (state waters)	Built					X		Built	5	30	28	5	2	328	541	659
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP Approved (ROD issued 2021)	X	X	X		X	X	2024–2025	62	800	98	6.5	171	451	721	812
MA/RI	South Fork, OCS-A 0517	COP Approved (ROD issued 2021)	X		X		X	X	Built	12	132	139	6.5	24	358	543	614
MA/RI	Sunrise, OCS-A 0487	COP Approved (ROD issued 2024)	X		X		X	X	2024–2025	94	924	104.6	13	180	459	656	787
MA/RI	Revolution, part of OCS-A 0486	COP Approved (ROD issued 2023)	X		X		X	X	2024–2025	65	704	84	6.5	155	512	722	853
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])	COP Approved (ROD issued 2024)	X	X	X		X	X	2025	63	804	125	10	139	702	935	1,171
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])	COP Approved (ROD issued 2024)	X	X	X		X	X	2025 or later	65	1,725	226	10	201	702	935	1,171
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP Approved (ROD issued 2023)					X		2024–2026	54	816	46	5	134	525	853	951
NY/NJ	Empire Wind 2, part of OCS-A 0512	COP Approved (ROD issued 2023)					X		By 2030, spread over 2026–2030	84	1,260	30	5	166	525	853	951
NY/NJ	Ocean Wind 1, OCS-A 0498	COP Approved (ROD issued 2023)					X		By 2030, spread over 2026–2030	98	1,100	194[14]	7	190	512	788	906
NY/NJ	Atlantic Shores South, OCS-A 0499	COP Approved (ROD issued 2024)					X		2025-2028	195	2,837[13]	441	3.3	547	576	919	1,049
VA/NC	CVOW, OCS-A 0497	Built					X		Built	2	12	27	3.3	9	364	506	620
VA/NC	CVOW-C, OCS-A 0483	COP Approved (ROD issued 2023), SAP					X		2023–2024	176	2,587	338	16.4	300	489	761	869
	Total Existing and Ongoing Projects									**975**	**13,731**	**1,880.6**		**2,218**			
PLANNED PROJECTS																	

Region	Lease, Project, Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps geographic analysis area) [c]						Estimated Construction Schedule [d]	Turbine Number [e]	Generating Capacity (MW)	Offshore Export Cable Length (statute miles) [f]	Offshore Export Cable Installation Tool Disturbance Width (feet)	Interarray Cable Length (statute miles) [g]	Hub Height (feet) [h]	Rotor Diameter (feet) [h]	Height of Turbine (feet) [h]
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism									
Massachusetts/Rhode Island Region																	
MA/RI	SouthCoast Wind, OCS-A 0521	COP	X	X	X	X	X	X	2025–2031	147	2,400	1,179	6.5	497	605	919	1,066
MA/RI	Beacon Wind 1, part of OCS-A 0520	COP	X	X	X		X	X	2026–2029	78	1,230	233	6.5	186	591	984	1,083
MA/RI	Beacon Wind 2, part of OCS-A 0520	COP	X	X	X		X	X	2027–2030	77	1,100	202	6.5	187	591	984	1,083
MA/RI	Bay State Wind, part of OCS-A 0500	Planning	X		X		X	X	By 2030, spread over 2026–2030	94	1,128	139	6.5	172	492	722	853
MA/RI	OCS-A 0500 remainder	Planning	X		X		X	X	By 2030, spread over 2026–2030	116	1,392	200	7	240	492	722	853
MA/RI	OCS-A 0487 remainder	Planning	X		X		X	X				200	7		492	722	853
MA/RI	Vineyard Wind Northeast, OCS-A 0522	COP	X	X	X		X	X	2027–2030	160	2,400	532	33	221	787	1,050	1,312
	Total MA/RI Leases [b]									**671**	**9,650**	**2,654**		**1,480**			
New York/ New Jersey Region																	
NY/NJ	Ocean Wind 2, OCS-A 0532	Planning					X		By 2030, spread over 2026–2030	109	1,148	200	7	173	512	788	906
NY/NJ	Atlantic Shores North, OCS-A 0549	COP					X		2029-2032	157	2,400	751	3.3	466	576	968	1,049
NY/NJ	Bluepoint Wind, OCS-A 0537	Planning					X		2027–beyond 2030	80	7,404	200	7	120	492	722	853
NY/NJ	Attentive Energy, OCS-A 0538						X		By 2030, spread over 2026–2030	100		200	7	120	492	722	853
NY/NJ	Community Offshore Wind, OCS-A 0539	Planning					X		By 2030, spread over 2026–2030	145		200	7	120	492	722	853
NY/NJ	Atlantic Shores Offshore Wind Bight, OCS-A 0541	SAP					X		2027– beyond 2030	93		200	7	120	492	722	853
NY/NJ	Invenergy Wind Offshore, OCS-A 0542						X		2027– beyond 2030	97		200	7	120	492	722	853
NY/NJ	Vineyard Mid-Atlantic LLC, OCS-A 0544	COP					X		2027– beyond 2030	102		200	7	120	492	722	853
	Total NY/NJ Leases									**883**	**10,952**	**2,151**		**1,359**			
Delaware/Maryland Region																	
DE/MD	Skipjack, part of OCS-A 0519	COP					X		By 2030, spread over 2026–2030	16	191	40	6.5	23.7	492	722	822
DE/MD	US Wind/Maryland Offshore Wind, part of OCS-A 0490	COP					X		2025	121	2,000	145	6.5	152	528	820	938

Region	Lease, Project, Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps geographic analysis area) [c]						Estimated Construction Schedule [d]	Turbine Number [e]	Generating Capacity (MW)	Offshore Export Cable Length (statute miles) [f]	Offshore Export Cable Installation Tool Disturbance Width (feet)	Interarray Cable Length (statute miles) [g]	Hub Height (feet) [h]	Rotor Diameter (feet) [h]	Height of Turbine (feet) [h]
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism									
DE/MD	GSOE I, OCS-A 0482	Planning					X		By 2030, spread over 2025–2030	94	1,128	200	6.5	139.1	492	722	853
DE/MD	OCS-A 0519 remainder						X										
	Total DE/MD Leases									**231**	**4,448**	**585**		**453.9**			
Virginia/North Carolina/South Carolina Region																	
VA/NC	Kitty Hawk North, OCS-A 0508	COP					X		By 2030, spread over 2026–2030	69	1,242	112	30	149	574	935	1,042
VA/NC	Kitty Hawk South, OCS-A 0508	COP					X		By 2030, spread over 2026–2030	121	2,178	353	30	200	574	935	1,042
SC	TotalEnergies Renewables Wind, OCS-A 0545	Planning					X		By 2030, spread over 2026–2030	64	785	200	6.5	94.7	492	722	853
SC	Duke Energy Renewables Wind, OCS-A 0546	Planning					X		By 2030, spread over 2026–2030	64	788	200	6.5	94.7	492	722	853
	Total VA/NC/SC Leases									**318**	**4,993**	**865**		**538.4**			
Gulf of Mexico Region[3]																	
LA	RWE Offshore US Gulf, OCS-G 37334	Planning					X[4]		2030 or later	101	1,240	200	6.5	149	492	722	853
	Total Gulf of Mexico Leases									**101**	**1,240**	**200**		**149**			
	OCS Total (Planned)									**2,205**	**31,283**	**6,232**		**3,980**			
	OCS Total [i,j]									**3,182**	**45,025**	**8,113**		**6,198**			

[a] The spacing/layout for projects are as follows: NE State water projects include a single strand of WTGs and no OSP. For projects in the RI, MA, NY, NJ, DE, MD lease areas, a 1×1–nm grid spacing is assumed. For the CVOW Project, the spacing is 0.7 nm; and the Dominion commercial lease area off the coast of Virginia would utilize 0.5 nm average spacing, which is less than the 1×1–nm spacing due to the need to attain the state's goals.
[b] Because development could occur anywhere within the RI and MA lease areas and assumes a continuous 1x1–nm grid, the actual development for these projects is expected to be approximately 88% of the collective technical capacity. Under the scenario described in this appendix, the total area in the RI and MA lease areas is greater than the area needed to meet state demand. Therefore, if a project is not constructed, BOEM assumes that another future project would be constructed to fulfill the unmet demand.
[c] This column identifies lease areas that are applicable to each resource based on the geographic analysis areas.
[d] The estimated construction schedule is based on information known at the time of this analysis and could be different when an applicant submits a COP.
[e] The number of turbines for those lease areas without an announced number of turbines has been calculated based on lease size, a 1×1-nm grid spacing, and/or the generating capacity.
[f] BOEM assumes that each offshore wind development would have its own cable (both onshore and offshore) and that future projects would not utilize a regional transmission line. The length of offshore export cable for those lease areas without a known project size is assumed to include two offshore cables totaling 120 miles (193 kilometers). The offshore export cable would be buried a minimum of 4 feet (1.8 meters) but not more than 10 feet (3.1 meters).

[3] The Final Sale Notice for Commercial Leasing for Wind Power Development on the OCS in the Gulf of Mexico was published on July 21, 2023. An auction was held on August 29, 2023; where Lake Charles, OCS-G 37334, received a winning bid from RWE Offshore US Gulf, LLC. On July 29, 2024, BOEM published a RFCI for two wind energy areas in the Gulf Mexico. The RFCI was published in the *Federal Register,* 89 FR 60913, for a 45-day public comment period, which ended on September 12, 2024.
[4] Within the geographic analysis area for marine mammals and sea turtles only.

[g] If information for a future project could not be obtained from a COP, the length of interarray cabling is assumed to be the average amount per foundation based on the COPs submitted to date, which is 1.48 miles (2.4 kilometers). In addition, for those lease areas that require more than one OSP, it is assumed that an additional 6.2 miles (9.9 kilometers) of inter-link cable would be required to link the two OSPs. Interarray cable is assumed to be buried between 4 and 6 feet.

[h] The hub height, rotor diameter, and turbine height for lease areas is based on worst-case scenario for the resource area. Presentation of heights vary by COP and may be presented relative to MLLW, mean sea level, or height above highest astronomical tide.

[i] BOEM recognizes that the estimates presented within this analysis are likely high, conservative estimates; however, BOEM believes that this analysis is appropriately capturing the potential cumulative impacts and errs on the side of maximum impacts. Totals by lease area and by OCS may not fully sum due to rounding errors.

[j] New York's demand is not double-counted, this total comes from looking at New York's state demand, not adding up the potential of the areas because that would double-count New York.

CT = Connecticut; CVOW = Coastal Virginia Offshore Wind; DE = Delaware; FDR = Facility Design Report; FIR = Fabrication and Installation Report; MA = Massachusetts; MD = Maryland; NC = North Carolina; NE = New England; NJ = New Jersey; NY = New York; PPA = Power Purchase Agreement; RAP = research activities plan; RI = Rhode Island; SAP = Site Assessment Plan

Table D2-2. Offshore wind development activities on the U.S. East Coast: Projects and assumptions (Part 2, Seabed/Anchoring Disturbance and Scour Protection)

Region	Lease/Project/Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps analysis area) [c]						Estimated Foundation Number [c]	Foundation Footprint [d] (acres)	WTG Seabed Disturbance (Foundation + Scour Protection) (acres) [e]	Offshore Export Cable Seabed Disturbance (acres) [f]	Offshore Export Cable Operating Seabed Footprint (acres) [g]	Offshore Export Cable Hard Protection (acres) [h]	Anchoring Disturbance (acres) [i]	Interarray Construction Footprint/Seabed Disturbance (acres) [j]	Interarray Operating Footprint/ Seabed Disturbance (acres) [k]	Interarray Cable Hard Protection (acres) [l]
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism										
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP Approved (ROD issued 2021), PPA, SAP	X	X	X		X	X	63	1	33	69	77	35	4	129	90	22
MA/RI	South Fork, OCS-A 0517	COP Approved (ROD issued 2021), PPA, SAP	X		X		X	X	13	1	11	555	7	7	663	340	19	20
MA/RI	Sunrise, OCS-A 0487	COP, PPA	X		X		X	X	95	3	108	1,259	102	25	11	462	145	129
MA/RI	Revolution, part of OCS-A 0486	COP, PPA	X		X		X	X	102	10	72	125	40	36	10	245	146	0
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])	COP, PPA	X	X	X		X	X	64	2	86	263	22	22	34	222	92	129
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])	COP	X	X	X		X	X	82	3	98	243	32	32	50	321	117	14
MA/RI	SouthCoast Wind, OCS-A 0521	COP, PPA	X	X	X	X	X	X	149	4.9	578	2,480	472	247	442	1,408	213	122
MA/RI	Beacon Wind 1, part of OCS-A 0520	PPA, SAP	X	X	X		X	X	79	5	265	143	95	43	442	247	152	152
MA/RI	Beacon Wind 2, part of OCS-A 0520	SAP	X	X	X		X	X	78	5	265	143	95	43	442	247	152	152
MA/RI	Bay State Wind, part of OCS-A 0500	SAP	X		X		X	X	112	11	112	143	95	43	442	264	160	0
MA/RI	Vineyard Wind Northeast, OCS-A 0522		X	X	X		X	X										
MA/RI	OCS-A 0500 remainder		X		X		X	X	232	9	197	2,182	144	129	36	2,231	332	0
MA/RI	OCS-A 0487 remainder		X		X		X	X										
	Remaining MA/RI Lease Area Total [b]								344	20	309	2,325	239	171	478	2,495	492	0
	Total MA/RI Leases								**1,069**	**193**	**1,825**	**7,605**	**1,179**	**661**	**2,576**	**6,116**	**1,617**	**740**
	NY, NJ, DE, MD, NC, VA Leases								**2,025**	**69**	**1,706**	**143,333**	**1,381**	**914**	**496**	**28,657**	**3,029**	**442**
	OCS Total								**3,094**	**262**	**3,531**	**150,937**	**2,561**	**1,575**	**3,072**	**34,773**	**4,647**	**1,182**

[a] This column identifies lease areas that are applicable to each resource based on the geographic analysis areas.
[b] Because development could occur anywhere within the RI and MA lease areas and assumes a continuous 1x1–nm grid, the actual development for these projects is expected to be approximately 88% of the collective technical capacity. Under the scenario described in this appendix, the total area in the RI and MA lease areas is greater than the area needed to meet state demand. Therefore, if a project is not constructed, BOEM assumes that another future project would be constructed to fulfill the unmet demand.
[c] The estimated number of foundations is the total number of turbines plus OSP. If information for a future project could not be obtained from a publicly available COP, it is assumed that for every 50 turbines there would be one OSP installed.
[d] If information for a future project could not be obtained from a publicly available COP, the foundation footprint is assumed to be 0.04 acre, which is based on the largest monopile reported (12 MW) for all lease areas.
[e] The seabed disturbance with the addition of scour protection was calculated based on scour protection expected in submitted COPs. If information for a future project could not be obtained from a publicly available COP, it is assumed that for all lease areas that a 12-MW foundation with addition of scour protection would be 0.85 acre per foundation.
[f] Offshore export cable seabed bottom disturbance is assumed to be due to installation of the export cable, the use of jack-up vessels, and the need to perform dredging. If information for a future project could not be obtained from a publicly available COP, export cable seabed disturbance assumed to be 6.06 acres per mile.
[g] If information for a future project could not be obtained from a publicly available COP, the offshore export cable operating seabed footprint assumed to be 0.4 acre per mile.
[h] If information for a future project could not be obtained from a publicly available COP, the offshore export cable hard protection is assumed to be similar to Vineyard Wind 1 Project, which is 0.357 acre per mile of offshore export cable.
[i] If information for a future project could not be obtained from a publicly available COP, anchoring disturbance for other lease areas is assumed to be a rate equal to 0.10 acre per mile of offshore export cable.
[j] If information for a future project could not be obtained from a publicly available COP, interarray construction seabed disturbance is assumed to be 6.06 acres per mile.
[k] If information for a future project could not be obtained from a publicly available COP, the interarray operating footprint is assumed to be a rate equal to the average amount per foundation of 1.43 acres per foundation.
[l] If information for a future project could not be obtained from a publicly available COP, the interarray cable hard protection is assumed to be zero.
DE = Delaware; MA = Massachusetts; MD = Maryland; NC = North Carolina; PPA = Power Purchase Agreement; NJ = New Jersey; NY = New York; RI = Rhode Island; VA = Virginia

Table D2-3. Offshore wind development activities on the U.S. East Coast: Projects and assumptions (Part 3, Gallons of Coolant, Oils, Lubricants, and Diesel Fuel)

Region	Lease/Project/Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps analysis area) [a]						Total Coolant Fluids in WTGs (gallons)	Total Coolant Fluids in OSP or ESP (gallons)	Total Oils and Lubricants in WTGs (gallons)	Total Oils and Lubricants in OSP or ESP (gallons)	Total Diesel Fuel in WTGs (gallons)	Total Diesel Fuel in OSP or ESP (gallons)
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism						
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP Approved (ROD issued 2021), PPA, SAP	X	X	X		X	X	42,300	46	383,000	123,559	79,300	5,696
MA/RI	South Fork, OCS-A 0517	COP Approved (ROD issued 2021), PPA, SAP	X		X		X	X	41,208	23	69,732	80,045	9,516	52,834
MA/RI	Sunrise, OCS-A 0487	COP, PPA	X		X		X	X	350,268	23	307,326	199,956	80,886	24,304
MA/RI	Revolution, part of OCS-A 0486	COP, PPA	X		X		X	X	343,400	0	330,300	0	79,300	0
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])	COP, PPA	X	X	X		X	X	314,470	4,226	165,106	371,956	98,271	10,935
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])	COP	X	X	X		X	X	475,826	9,510	249,798	557,934	146,087	24,604
MA/RI	SouthCoast Wind, OCS-A 0521	COP, PPA	X	X	X	X	X	X	73,500	1,500	433,650	755,000	132,300	200,000
MA/RI	Beacon Wind 1, part of OCS-A 0520 [b]	PPA, SAP	X	X	X		X	X	38,970	795	229,922	400,302	70,146	106,040
MA/RI	Beacon Wind 2, part of OCS-A 0520 [b]	SAP	X	X	X		X	X	38,477	785	227,011	395,235	69,258	104,698
MA/RI	Bay State Wind, part of OCS-A 0500 [b]	SAP	X		X		X	X	55,248	1,128	325,965	567,517	99,447	150,336
MA/RI	Vineyard Wind Northeast, OCS-A 0522 [b]		X	X	X		X	X	114,443	2,336	675,213	1,175,570	205,997	311,409
MA/RI	OCS-A 0500 remainder [b]		X		X		X	X						
MA/RI	OCS-A 0487 remainder [b]		X		X		X	X						
	Remaining MA/RI Lease Area Total [c]								169,691	3,463	1,001,179	1,743,087	305,444	461,745
	Total MA/RI Leases								**1,888,110**	**20,372**	**3,397,024**	**4,627,074**	**1,070,508**	**990,856**
	NY, NJ, DE, MD, NC, VA Leases								**2,200,905**	**19,231**	**5,452,042**	**4,000,436**	**1,141,917**	**1,505,955**
	OCS Total								**4,089,015**	**39,603**	**8,849,066**	**8,627,510**	**2,212,425**	**2,496,811**

[a] This column identifies lease areas that are applicable to each resource based on the geographic analysis areas.
[b] Quantities of coolant, oil and lubricants, and diesel fuel are scaled to SouthCoast Wind based on number turbines and OSP foundations.
[c] Because development could occur anywhere within the RI and MA lease areas and assumes a continuous 1x1–nm grid, the actual development for these projects is expected to be approximately 88% of the collective technical capacity. Under the scenario described in this appendix, the total area in the RI and MA lease areas is greater than the area needed to meet state demand. Therefore, if a project is not constructed, BOEM assumes that another future project would be constructed to fulfill the unmet demand.
ESP = electrical service platform; DE = Delaware; MA = Massachusetts; MD = Maryland; NC = North Carolina; PPA = Power Purchase Agreement; NJ = New Jersey; NY = New York; RI = Rhode Island; VA = Virginia

Table D2-4. Offshore wind development activities on the U.S. East Coast: Projects and assumptions (Part 4, OCS Construction and Operation Emissions)

Region	Lease/Project/Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps analysis area) [a]						Nitrogen oxides	Volatile organic compounds	Carbon monoxide	Particulate matter, 10 microns or less	Particulate matter, 2.5 microns or less	Sulfur dioxide	Carbon dioxide
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism							
									Construction Emissions (Total) – Tons						
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP Approved (ROD issued 2021), PPA, SAP	X	X	X		X	X	5,064	123	1,139	176	169	38	325,127
MA/RI	South Fork, OCS-A 0517	COP Approved (ROD issued 2021), PPA, SAP	X		X		X	X	1,451	59	284	49	47	33	97,026
MA/RI	Sunrise, OCS-A 0487	COP, PPA	X		X		X	X	5,876	138	2,441	108	108	6	637,986
MA/RI	Revolution, part of OCS-A 0486	COP, PPA	X		X		X	X	22,488	439	5,702	756	730	67	1,712,429
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])	COP, PPA	X	X	X		X	X	6,074	128	1,402	223	216	36	404,287
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])	COP	X	X	X		X	X	6,906	147	1,608	277	268	41	471,961
MA/RI	SouthCoast Wind, OCS-A 0521	COP, PPA	X	X	X	X	X	X	39,964	1,589	8,284	2,897	1,566	1,556	2,607,026
MA/RI	Beacon Wind 1 and 2, part of OCS-A 0520	PPA, SAP	X	X	X		X	X	26,330	1,055	2,929	577	461	653	1,603,031
MA/RI	Bay State Wind, part of OCS-A 0500 [b]	SAP	X		X		X	X	29,905	1,189	6,199	2,168	1,172	1,164	1,950,836
MA/RI	Vineyard Wind Northeast, OCS-A 0522 [b]		X	X	X		X	X							
MA/RI	OCS-A 0500 remainder [b]		X		X		X	X	61,713	2,454	12,792	4,474	2,418	2,403	4,025,816
MA/RI	OCS-A 0487 remainder [b]		X		X		X	X							
	Remaining MA/RI Lease Area Total [c]								91,618	3,643	18,991	6,641	3,590	3,567	5,976,651
Total Air Quality Analysis Area – Total Construction Emissions									205,771	7,321	42,780	11,705	7,155	5,997	13,835,524
									Operations Emissions (Annual) – Tons per year						
MA/RI	Vineyard Wind 1 part of OCS-A 0501	COP Approved (ROD issued 2021), PPA, SAP	X	X	X		X	X	71	2	18	2	2	0	5,487
MA/RI	South Fork, OCS-A 0517	COP Approved (ROD issued 2021), PPA, SAP	X		X		X	X	281	6	58	10	10	2	18,894
MA/RI	Sunrise, OCS-A 0487	COP, PPA	X		X		X	X	590	14	246	11	11	1	64,145
MA/RI	Revolution, part of OCS-A 0486	COP, PPA	X		X		X	X	1,066	16	263	35	34	1	73,349
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])	COP, PPA	X	X	X		X	X	412	7	101	14	13	1	35,179

Region	Lease/Project/Lease Remainder [a]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps analysis area) [a]						Nitrogen oxides	Volatile organic compounds	Carbon monoxide	Particulate matter, 10 microns or less	Particulate matter, 2.5 microns or less	Sulfur dioxide	Carbon dioxide
			Air Quality, Water Quality, Navigation	Benthic	Other Marine Uses (excluding research surveys & navigation)	Marine Archaeology	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Visual, Recreation & Tourism							
MA/RI	New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])	COP	X	X	X		X	X	419	7	102	14	13	1	42,376
MA/RI	SouthCoast Wind, OCS-A 0521	COP, PPA	X	X	X	X	X	X	729	13	180	24	19	28	46,925
MA/RI	Beacon Wind 1 and 2, part of OCS-A 0520	PPA	X	X	X		X	X	563	18	97	11	11	5	65,257
MA/RI	Bay State Wind, part of OCS-A 0500 [b]	SAP	X		X		X	X	546	10	135	18	14	21	35,114
MA/RI	Vineyard Wind Northeast, OCS-A 0522 [b]		X	X	X		X	X							
MA/RI	OCS-A 0500 remainder [b]		X		X		X	X	1,126	20	278	37	29	43	72,462
MA/RI	OCS-A 0487 remainder [b]		X		X		X	X							
	Remaining MA/RI Lease Area Total [c]								1,671	30	413	55	44	64	107,576
Total Air Quality Analysis Area – Annual Operations Emissions									**5,802**	**113**	**1,477**	**176**	**156**	**103**	**459,188**

[a] This column identifies lease areas that are applicable to each resource based on the geographic analysis areas.
[b] Emissions are scaled to SouthCoast Wind based on number turbines.
[c] Because development could occur anywhere within the RI and MA lease areas and assumes a continuous 1x1–nm grid, the actual development for these projects is expected to be approximately 88% of the collective technical capacity. Under the scenario described in this appendix, the total area in the RI and MA lease areas is greater than the area needed to meet state demand. Therefore, if a project is not constructed, BOEM assumes that another future project would be constructed to fulfill the unmet demand.
MA = Massachusetts; RI = Rhode Island; PPA = Power Purchase Agreement

This page intentionally left blank.

References Cited

Bureau of Ocean Energy Management (BOEM). 2019. National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf. Available: https://www.boem.gov/sites/default/files/environmental-stewardship/Environmental-Studies/Renewable-Energy/IPFs-in-the-Offshore-Wind-Cumulative-Impacts-Scenario-on-the-N-OCS.pdf. Accessed: December 2020.

This page intentionally left blank.