Appendix D: Planned Activities Scenario

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D.1 Ongoing and Planned Activities Scenario

This appendix describes the other ongoing and planned activities that could occur within the geographic analysis area for each resource and potentially contribute to baseline conditions and trends for resources considered in the Final Programmatic Environmental Impact Statement (PEIS). The baseline conditions and trends described here serve as the basis for analysis of the No Action Alternative and cumulative impacts. The analysis of the action alternatives includes the potential biological, socioeconomic, physical, and cultural impacts that could result from wind energy development activities in the six New York Bight (NY Bight) lease areas, as well as the change in those impacts that could result from implementing avoidance, minimization, mitigation, and monitoring (AMMM) measures for the NY Bight lease areas.

The geographic analysis area varies for each resource as described in the individual resource sections of Chapter 3, *Affected Environment and Environmental Consequences*. Impacts could occur from the start of construction of the NY Bight projects through decommissioning. The Bureau of Ocean Energy Management (BOEM) anticipates that construction of the NY Bight projects would begin between 2026 and 2030. The decommissioning phase is anticipated to be around 35 years after construction is completed. 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 within the area of impact of the NY Bight projects. 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 six NY Bight projects 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 nautical miles (miles used specifically for marine navigation). This appendix uses statute miles more commonly and refers to them simply as *miles*, whereas nautical miles (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 within the geographic analysis area for each resource topic analyzed in the Final PEIS. Projects or actions that are considered speculative per the definition provided in 43 Code of Federal Regulations (CFR) 46.30[1] are noted in subsequent tables but excluded from the cumulative impact analysis in Chapter 3.

Ongoing and planned activities and environmental stressors described in this section consist of: (1) other offshore wind energy development activities; (2) undersea transmission lines, gas pipelines, and other submarine cables (e.g., telecommunications); (3) tidal energy projects; (4) 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 other planned offshore wind energy development activities on the Atlantic Outer Continental Shelf (OCS) to determine reasonably foreseeable cumulative effects measured by installed power capacity. Table D2-1 in Attachment D2 represents the status of projects as of August 2024. The methodology for developing the planned activities scenario is the same as for the Vineyard Wind 1 (OCS-A 0501) project and details of the scenario development are described in the Vineyard Wind 1 Final Environmental Impact Statement (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)[2] and Construction and Operations Plan (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 their lease areas during the 5-year site assessment term to collect required geophysical information for siting of a meteorological tower, two buoys, and

[1] 43 CFR 46.30 – Reasonably foreseeable planned 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 planned actions do not include those actions that are highly speculative or indefinite.

[2] On May 15, 2024, BOEM issued the final Renewable Energy Modernization Rule (89 *Federal Register* 42602), which among other things eliminated the site assessment plan requirement for met buoys, which are most commonly used for site assessment activities. However, met buoys would continue to require U.S. Army Corps of Engineers (USACE) permits given the USACE's jurisdiction over obstructions deployed in U.S. navigable waters under Section 10 of the Rivers and Harbors Act.

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).

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[1]

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	Bats
	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.

[1] The May 15, 2024 Renewable Energy Modernization Rule defers and extends the required time periods for meeting certain geotechnical survey requirements, such as engineering site-specific surveys (e.g., boreholes, vibracores, grab samplers, cone penetrometer tests, and other penetrative methods), until after COP approval but before construction.

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 will use buoys instead of towers (BOEM 2021d). 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 on the OCS consisting of one to three meteorological buoys per SAP (Table D2-1 in Attachment D2). Site assessment would likely take place starting within 1 to 2 years of lease execution, because preparation of a 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

Table D-2 depicts construction of offshore wind projects from Maine to South Carolina.[3] Also included are all the projects currently in various stages of planning within BOEM's offshore leases from Massachusetts to South Carolina. Projected construction dates for each offshore wind project are listed in Table D2-1 in Attachment D2, 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 2023 and 2030; (2) the number of operational turbines in each region at the beginning of each year between 2021 and 2030; and (3) the total number of active construction locations and operational turbines across the Atlantic OCS by year.

BOEM assumes planned offshore wind projects will include the same or similar components as the NY Bight projects: wind turbine generators (WTGs), offshore and onshore cable systems, offshore substations (OSSs), onshore operations and maintenance (O&M) facilities, and onshore interconnection facilities. BOEM further assumes that other planned offshore wind projects will employ the same or similar construction and installation, O&M, and conceptual decommissioning activities as the NY Bight projects. 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 within a particular lease area may occur in phases over long periods of time. Research currently being conducted in combination with data gathered regarding physical, biological, socioeconomic, and cultural resources during development of initial offshore wind projects in the United States could affect the design and implementation of future projects, as could advancements in technology. For the analysis of ongoing and planned activities, the ongoing and planned projects included in Table D2-1 in Attachment D2 are analyzed in Chapter 3 of the Final PEIS.

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[3] Within this Draft PEIS, BOEM analyzes Ocean Wind 1 (OCS-A 0498) as an ongoing offshore wind project and Ocean Wind 2 (OCS-A 0532) as a planned offshore wind project. On October 31, 2023, Orsted publicly announced their decision to cease development of Ocean Wind 1 and Ocean Wind 2. However, Ocean Wind LLC (the lessee for Ocean Wind 1) has not withdrawn their COP for lease OCS-A 0498, and so BOEM has analyzed the project as described in the approved COP. On February 29, 2024, pursuant to 30 CFR § 585.418, BOEM approved a 2-year suspension of the operations term of Ocean Wind LLC's commercial lease (Renewable Energy Lease Number OCS-A 0498), lasting until February 28, 2026. This suspension was approved in response to the lessee's January 19, 2024, request for a suspension of the operations term for the lease, submitted pursuant to Section 8(p)(5) of the Outer Continental Shelf Lands Act, 43 U.S Code § 1337(p)(5) and BOEM's implementing regulations at 30 CFR § 585.416. Orsted North America Inc. (the lessee for Ocean Wind 2) has not relinquished or reassigned lease OCS-A 0532; therefore, BOEM has analyzed development of the lease area consistent with the assumptions identified in this appendix.

In January 2024, Empire Offshore Wind, LLC (the lessee for Empire Wind 1 and 2) announced it was terminating the Offshore Wind Renewable Energy Certificate (OREC) Agreement for the Empire Wind 2 project. Empire Offshore Wind, LLC has not informed BOEM of any material changes to the activities approved in its COP. Therefore, BOEM has analyzed development of the lease area in this Final PEIS consistent with the assumptions identified in Appendix D.

Table D-2. Offshore wind project construction schedule (dates shown as of August 2024)[1]

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	-	-	-	-	-	2	-	-	-	-	-
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	-	-	-	-	-	-
South Fork Wind, OCS-A 0517	-	-	-	13	-	-	-	-	-	-	-
CVOW-Pilot, OCS-A 0497	2	-	-	-	-	-	-	-	-	-	-
Revolution Wind, part of OCS-A 0486	-	-	-	-	67	-	-	-	-	-	-
Ocean Wind 1, OCS-A 0498	-	-	-	-	-	-	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])[2]	-	-	-	-	-	64	-	-	-	-	-
New England Wind, OCS-A 0534 and portion of OCS-A 0501 (Phase 2 [i.e., Commonwealth Wind])[2]	-	-	-	-	-	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	**7**	**0**	**0**	**13**	**459**	**130**	**186**	**0**	**0**	**0**	**0**
Estimated O&M Total	**0**	**7**	**7**	**7**	**20**	**479**	**609**	**795**	**795**	**795**	**795**

Project/Region	Number of Foundations										
	Before 2021	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030 and Beyond
PLANNED PROJECTS											
Massachusetts/Rhode Island Region											
SouthCoast Wind, OCS-A 0521	-	-	-	-	-	149	-	-	-	-	-
Beacon Wind 1, part of OCS-A 0520[3]	-	-	-	-	-	-	78	-	-	-	-
Beacon Wind 2, part of OCS-A 0520[3]	-	-	-	-	-	-	-	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**	**0**	**149**	**293**	**239**	**0**	**0**	**0**
Estimated O&M Total	**0**	**0**	**0**	**0**	**0**	**0**	**149**	**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	-	-	-	-
NY Bight lease areas (OCS-A 0537, OCS-A 0538, OCS-A 0539, OCS-A 0541, OCS-A 0542, and OCS-A 0544)[1]	-	-	-	-	-	-	1,125	-	-	-	-
Estimated New York/New Jersey Construction	**0**	**0**	**0**	**0**	**0**	**0**	**1,433**	**0**	**0**	**158**	**0**
Estimated O&M Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1,433**	**1,433**	**1,433**	**1,591**
Delaware/Maryland Region											
Skipjack, OCS-A 0519	-	-	-	-	-	-	17	-	-	-	-
US Wind/Maryland Offshore Wind, OCS-A 0490	-	-	-	-	-	125	-	-	-	-	-
GSOE I, OCS-A 0482	-	-	-	-	-	-	96	-	-	-	-
OCS-A 0519 remainder	-	-	-	-	-	-		-	-	-	-

Project/Region	Number of Foundations										
	Before 2021	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030 and Beyond
Estimated 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**
South Atlantic Region											
Kitty Hawk North, OCS-A 0508	-	-	-	-	-	-	70	-	-	-	-
Kitty Hawk South, OCS-A 0508	-	-	-	-	-	-	123	-	-	-	-
TotalEnergies Renewables Wind, OCS-A 0545	-	-	-	-	-	-	65	-	-	-	-
Duke Energy Renewables Wind, OCS-A 0546	-	-	-	-	-	-	65	-	-	-	-
Estimated Annual South Atlantic Construction Total	**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**
Total											
Estimated Total Construction	**7**	**0**	**0**	**13**	**459**	**406**	**2,348**	**239**	**0**	**158**	**0**
Estimated O&M Total	**7**	**7**	**7**	**7**	**20**	**479**	**885**	**3,233**	**3,472**	**3,472**	**3,630**

[1] 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.
[2] 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.
[3] 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; NE = Northeast

D.2.2 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, and identifies the types of actions and activities to be considered in a cumulative impacts scenario. These IPFs and their relationships were used in the Final PEIS analysis of cumulative impacts, and BOEM decided which IPF applied to which resource. The study identifies actions and activities that may affect the same physical, biological, economic, or cultural resources as renewable energy projects and states that such actions and activities may have the same IPFs as offshore wind projects.

As discussed in the BOEM (2019) study, reasonably foreseeable activities other than offshore wind projects may also affect the same resources as the six NY Bight projects 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 NY Bight projects.

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

There are 27 submarine telecommunication cables (18 active and 9 out of service) within the vicinity of the NY Bight lease areas. National Oceanic and Atmospheric Administration (NOAA) nautical charts identify multiple sewer pipelines, stormwater outfalls, and intake structures along the coast of New Jersey and New York that begin onshore and extend offshore.

There are six in-service pipelines within the vicinity of the NY Bight lease areas. The Williams Transco pipeline, which supplies a significant amount of natural gas to New York, is located in the nearshore waters between New Jersey and New York (NYSERDA 2017). A gas pipeline is buried in the northern New York Harbor utility corridor, two gas pipelines and one petroleum product pipeline are buried in the southern New York Harbor utility corridor, and the deeply tunneled replacement Brooklyn-Staten Island water siphon in the New Jersey Harbor.

The New Jersey Board of Public Utilities (NJBPU) and the New York State Public Service Commission (NYSPSC) have proposed transmission systems to which offshore wind lessees could connect. In November 2020, NJBPU asked PJM Interconnection, L.L.C. (PJM) to incorporate New Jersey’s offshore wind goals into the Regional Transmission Planning Process, the state agreement approach (SAA) regulatory pathway. Through a competitive procurement, NJBPU awarded a transmission solution to Mid-Atlantic Offshore Development, LLC’s and Jersey Central Power & Light Company’s jointly submitted Larrabee Tri-Collector Solution to create a single onshore point of interconnection to the PJM high-voltage transmission system at the Larrabee Collector Station. The Larrabee Collector Station will enable interconnection of 3,742 megawatts (MW) of offshore wind generation.[4] As an extension of the SAA and PJM's Regional Transmission Planning Process and separate from its procurement of new offshore wind generation, NJBPU issued a solicitation for construction of the Prebuild Infrastructure (PBI), which is the infrastructure between the identified landing point at Sea Girt National Guard Training Center in New Jersey and the point of interconnection at the Larrabee Collection Station, a distance of approximately 12 miles. PBI will be funded through the Federal Energy Regulatory Commission's (FERC) transmission rates and will be developed, owned, and operated by a transmission system developer.

The New York State Energy Research and Development Authority (NYSERDA) has identified 21 potential onshore points of interconnection for planned offshore wind cables to interconnect to the existing New York State transmission grid (NYSERDA 2017). NYSERDA has more recently advanced efforts for the development and future use of coordinated transmission infrastructure. In June 2023, the New York State Public Service Commission initiated a competitive process[5] for the submission of proposals to build at least 4,700 MW, and up to 8,000 MW of transmission capacity to serve the State's 9,000-MW target (referred to as the New York City Public Policy Transmission Need) in an effort to develop offshore transmission infrastructure capable of collecting energy generated at multiple offshore platforms and delivering it to onshore interconnection points. Awards are anticipated to be issued in 2025.

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

D.2.4 Tidal Energy Projects

BOEM is not aware of any ongoing or planned tidal energy projects in the NY Bight. See the South Fork Wind Farm (OCS-A 0517) and South Fork Export Cable Project Final EIS (BOEM 2021b) for descriptions of other tidal projects that are more distant from the NY Bight projects in Maine and Massachusetts.

D.2.5 Dredging and Port Improvement Projects

The representative ports identified for potential use by the NY Bight projects in New York and New Jersey are: Port of Albany, Port of Coeymans, Brooklyn Navy Yard, South Brooklyn Marine Terminal, Howland Hook/Port Ivory, Arthur Kill Terminal, Paulsboro Marine Terminal, and New Jersey Wind Port. Some dredging projects have also been proposed or studied at ports that may be used by the NY Bight projects in New York and New Jersey, and are either in operation or are considered reasonably foreseeable:

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[4] In March 2023, the State of New Jersey issued an offshore wind solicitation with a requirement for projects to interconnect at the Larrabee site. In January 2024, NJBPU awarded a combined 3,742 MW of offshore wind capacity to Invenergy and energyRE's Leading Light Wind Project and Attentive Energy LLC's Attentive Energy Two Project.

[5] Order Addressing Public Policy Requirements for Transmission Planning Purposes, Case 22-E-0633 (June 22, 2023), https://www.nyiso.com/documents/20142/1406395/PSC-Order-NYC-PPTN.pdf.

- Port Ivory is undeveloped, and all new infrastructure is necessary in order to prepare the site for use as a staging and installation facility. The following improvements are discussed in NYSERDA's 2018 Ports Assessment: Port Ivory Pre-front End Engineering Design Report (NYSERDA 2019d):
  - Demolish and dispose of existing asphalt and concrete pavement and structures on site.
  - Clear and grub the site of unmaintained vegetation (e.g., trees, bushes).
  - Install marine structures along the waterfront edges of the site, to provide at least two heavy load wharves to load and unload components.
  - Improve the ground-bearing capacity and grade areas within the site.
  - Install surface treatment (i.e., crushed stone) within laydown areas of the site.
  - Dredge the berthing area to provide sufficient depth for design vessels to safely access the site.
- The Port of Albany is to be used as a manufacturing or fabrication facility. The following improvements are discussed in NYSDERA's 2018 Ports Assessment: Port of Albany-Rensselaer Pre-front End Engineering Design Report (NYSERDA 2019a):
  - Clear and grub the site of unmaintained vegetation (e.g., trees, bushes, etc.).
  - Install marine structures along the waterfront edge of the site, to provide at least two heavy load wharves to load and unload components.
  - Improve the ground-bearing capacity and grade areas within the site.
  - Stabilize the shoreline in order to allow live loads to be applied closer to the crest of the existing shoreline slopes.
  - Install surface treatment (i.e., crushed stone) within laydown areas of the site.
  - Dredge the berthing area to provide sufficient depth for design vessels to safely access the site.
- The Port of Coeymans is currently primarily developed and is anticipating offshore wind projects. The following improvements are discussed in NYSDERA's 2018 Ports Assessment: Port of Coeymans Pre-front End Engineering Design Report (NYSERDA 2019b):
  - Clear and grub unmaintained areas.
  - Install one heavy load quay along the northeastern shoreline.
  - Grade existing site's waterfront area and upland area, as well as the portion of land in between these zones.
  - Install a retaining wall between the westerly and northerly extents that will tie into the site's existing slopes to remain.

- Improve the ground-bearing capacity across the waterfront portion of the site by placing crushed rock above existing grade.
- Dredge berth area to allow safe vessel access to the site.

- The South Brooklyn Marine Terminal is an operational marine terminal. The following improvements are discussed in NYSDERA's 2018 Ports Assessment: South Brooklyn Marine Terminal Pre-front End Engineering Design Report (NYSERDA 2019c) (groundbreaking occurred in June 2024, and the improvements are currently under construction):
  - Demolish existing buildings and the rail spur on the 39th Street Pier to increase available laydown area and facilitate ground-bearing capacity improvements.
  - Install two heavy load quays, including along the northwest end of the 39th Street Pier and along the southwest end of the 39th Street Pier.
  - Stabilize the 35th Street Pier Revetment to increase the load capacity.
  - Grade existing site.
  - Improve the ground-bearing capacity across the site by placing crushed stone fill above the existing grade.
  - Dredge berth areas to allow safe vessel access to the site.
- The Brooklyn Navy Yard is anticipating major improvements and developments with approximately 5.1 million square feet (.47 million square meters) of vertical manufacturing space, and development of a series of open space and connectivity improvements aimed at integrating the Yard with the surrounding neighborhoods (Brooklyn Navy Yard 2023).
- Arthur Kill Terminal has received $48 million in federal grants to construct Arthur Kill Terminal as an offshore wind staging and assembly coastal seaport on Staten Island (Empire State Development 2022). The New York City Department of Planning released the Final EIS for the project on May 31, 2024.
- General Electric has proposed plans to build a new factory for offshore wind turbine components at its Port of Coeymans site (ESG Review 2023).
- The Paulsboro Marine Terminal is currently receiving improvements, which will aim to support the offshore wind industry as it is being developed as a facility to manufacture and ship monopile foundations for construction of wind turbines off the coast of New Jersey (Jacobs 2022). Some of the improvements are construction of mooring dolphins, dredging, and upland placement of dredged material, and two fabrication buildings in which steel plate welding, roll bending, and circumferential welding will take place (Jacobs 2022).

- The State of New Jersey is planning to build an offshore wind port on the eastern shore of the Delaware River in Lower Alloways Creek, Salem County, approximately 7.5 miles (12 kilometers) southwest of the city of Salem. The New Jersey Economic Development Authority is leading the development of the project on behalf of the state, working alongside key departments and agencies such as the Governor's Office, the Department of the Treasury, and NJBPU. The development plan includes dredging the Delaware River Channel, and construction commenced in September 2021 with a targeted completion date of late 2023 (New Jersey Wind Port 2021; Salem County 2021). The Delaware River Channel dredging project provides deepening of the existing Delaware River Federal Navigation Channel, bend widening, partial deepening of the Marcus Hook anchorage, and relocation and addition of aids to navigation. The deeper channel will allow for more efficient transportation of containerized, dry and liquid bulk, break bulk, roll-on/roll-off, and project cargoes to and from Delaware River ports (USACE 2022b).
- In 2018, two New Jersey Department of Transportation projects, High Bar Harbor channel and Barnegat Light Stake channel, both near Barnegat Inlet in Ocean and Long Beach Townships, New Jersey, underwent dredging of approximately 39,150 cubic yards and 3,230 cubic yards (29,932 cubic meters and 2,470 cubic meters), respectively, to maintain the depths of these channels. Maintenance dredging for both projects is authorized until December 2025 and is expected to occur before the permits expire (USACE 2015a, 2015b). Barnegat Light is the primary commercial seaport on Long Beach Island and is the homeport to approximately 36 commercial vessels. Barnegat Light's two commercial docks are home to several scallop vessels, longliners, and a fleet of smaller inshore gillnetters.
- The U.S. Army Corps of Engineers (USACE) has received numerous permit applications for private dock, boat lift, and bulkhead repairs in Barnegat Bay, New Jersey (USACE 2022a).

D.2.6 Marine Minerals Use and Ocean Dredged Material Disposal

There are no active OCS lease areas for marine minerals within the other uses geographic analysis area (refer to Section 3.6.7, *Other Uses (Marine Minerals, Military Use, Aviation, Scientific Research and Surveys)*) (BOEM 2018). New York has multiple potential sand resource areas, in state and federal waters, along the coast of Long Island for beach renourishment projects. Within federal waters, there are an additional four potential federal sand resource areas. In New York, there are four identified dredge areas (Marine Cadastre 2023).

In New Jersey, the closest previous lease in BOEM's Marine Minerals Program for sand borrow areas for beach replenishment is known as the D2 borrow area, offshore near Harvey Cedars, Surf City, Long Beach Township, Ship Bottom, and Beach Haven (Lease Number OCS-A-050; executed July 1, 2014). The lessee (USACE and the New Jersey Department of Environmental Protection [NJDEP]) was approved through September 20, 2018, for the use of up to 10,000,000 cubic yards (7,645,550 cubic meters) of material to be used for the Long Beach Island Coastal Storm Risk Management Project, Barnegat Inlet to Little Egg Inlet. At present, there are 15 USACE beach renourishment projects in the USACE North Atlantic Division, which includes the New York and Philadelphia Districts, that may target OCS sand

resources (NJDEP pers. comm. 2023). The New York District projects include Sandy Hook to Barnegat Inlet in addition to the Raritan Bay Flood Control Projects of Keansburg, Port Monmouth, Union Beach and Highlands. The Philadelphia District projects include Manasquan Inlet to Barnegat Inlet, Barnegat Inlet to Little Egg Inlet, Brigantine Inlet to Great Egg Inlet (Brigantine), Brigantine Inlet to Great Egg Inlet (Absecon Island), Great Egg Inlet to Pecks Beach, Great Egg Inlet to Townsends Inlet, Townsends Inlet to Cape May Inlet, Hereford Inlet to Cape May Inlet, Cape May Inlet to Lower Township, and Lower Township to Cape May Point. In addition to the OCS sand resource needs for these projects, USACE has additional beach renourishment projects currently targeting sand resources in state waters/inlets.
U.S. Environmental Protection Agency (USEPA) Region 2 is responsible for designating and managing ocean disposal sites for materials offshore in the region of the NY Bight projects. USACE issues permits for ocean disposal sites; all ocean sites are for the disposal of dredged material permitted or authorized under the Marine Protection, Research, and Sanctuaries Act (16 U.S. Code [USC] 1431 et seq. and 33 USC 1401 et seq.).

D.2.7 National Security and Military Use

The Offshore Narragansett Bay Range Complex primarily consists of surface sea space and subsurface space off the coasts of Massachusetts, Rhode Island, and New York. As part of the range complex, the Narragansett Bay Operating Area extends from the shoreline seaward to approximately 180 nm (333 kilometers) from land at its farthest point (Empire 2022). The complex is controlled by the Fleet Area Control and Surveillance Facility at Virginia Capes Naval Air Station Oceana. The Navy installations primarily operating in this complex are in New London, Connecticut, and Newport, Rhode Island.

The Narragansett Bay Warning Area is in the western portion of the Offshore Narragansett Bay Range Complex and is designated for operations where limitations may be imposed on aircraft not participating in operations. The Narragansett Bay Warning Area is actively used for U.S. Navy subsurface and surface training and testing activities and to prepare submarines and their crews for formal voyages. Additionally, this Warning Area is used to support special-use airspace, flight testing, surface-to-air gunnery exercises using conventional ordnance, antisubmarine warfare exercises, and air-intercept training (Empire 2022).

The Atlantic City Complex is located in waters adjacent to the coasts of New Jersey and New York. The range complex is used for training and testing exercises for the U.S. Atlantic Fleet and supports training and testing by other services, primarily the U.S. Air Force. The AEGIS Combat Systems Center, controlled by the Fleet Area Control and Surveillance Facility Virginia Capes, Naval Air Station, Oceana, also conducts operations in the Atlantic City Complex. The United States Coast Guard (USCG) Air Station Atlantic City, located at the Atlantic City International Airport in Egg Harbor, New Jersey, supports a range of USCG operations, including search and rescue, port security, and marine environmental protection services.

Four danger zones/restricted areas—defined as a “water area (or areas) used for target practice, bombing, rocket firing or other especially hazardous operations, normally for the armed forces”—are in the vicinity of the NY Bight lease areas. The danger zones/restricted areas in the area are at the mouth of the New York Harbor, at the Naval Weapons Station Earle in Sandy Hook Bay, in the New York Harbor adjacent to the Stapleton Naval Station, and at the Coast Guard Rifle Range off the coast of Cape May (NOD 2022).

There are two Weapons Training Areas operated by the USCG offshore New York and New Jersey within the geographic analysis area. These training areas are used for proficiency training in law enforcement operations (BOEM 2016) and for small caliber weapons training, generally from small vessels that transit during the day to the training area.

D.2.8 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. 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 offshore wind projects in the NY Bight, multiple additional fairways and a new anchorage may be established to route existing vessel traffic around wind energy projects (USCG 2021). One new regional maritime highway project received funding from the Maritime Administration. A new barge service (Davisville/Brooklyn/Newark Container-on-Barge Service) is proposed to run twice each week in state waters between Newark, New Jersey, and Brooklyn, New York.

D.2.9 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 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.2.9.1 Directed Take Permits for Scientific Research and Enhancement

NMFS issues permits for research on protected species for scientific purposes. These scientific research permits include the authorization of directed take for activities such as capturing animals and taking measurements and biological samples to study their health, tagging animals to study their distribution and migration, photographing and counting animals to get population estimates, taking animals in poor health to an animal hospital, and filming animals. NMFS also issues permits for enhancement purposes; these permits are issued to enhance the survival or recovery of a species or stock in the wild by taking actions that increase an individual's or population's ability to recover in the wild. Scientific research and enhancement permits have been issued previously for satellite, acoustic, and multi-sensor tagging studies on large and small cetaceans; research on reproduction, mortality, health, and conservation issues for North Atlantic right whales (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.2.9.2 Fisheries Use and Management

NMFS implements regulations to manage commercial and recreational fisheries in federal waters, including those within the NY Bight lease areas; the State of New Jersey and the State of New York regulate commercial fisheries in their state waters (within 3 nm [5.6 kilometers] of the coastline). The NY Bight overlaps two of NMFS's eight regional councils to manage federal fisheries: the Mid-Atlantic Fishery Management Council (MAFMC), which includes New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina; and the New England Fishery Management Council (NEFMC), which includes Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut (NEFMC 2016). The councils manage species with many Fishery Management Plans (FMPs) that are frequently updated, revised, and amended and coordinate with each other to jointly manage species across jurisdictional boundaries (MAFMC 2019). Many of the fisheries managed by the councils are fished for in state waters or outside of the Mid-Atlantic region, so the council works with the Atlantic States Marine Fisheries

Commission (ASMFC). ASMFC is composed of the 15 Atlantic coast states and coordinates the management of marine and anadromous resources found in the states' marine waters. In addition, the 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)
New York	*New York Ocean Action Plan 2017–2027*: adaptive management plan (NYSDEC 2017) New York State filed a petition with NOAA, NMFS, and MAFMC to demand that commercial fluke allocations be revised to provide fishers with equitable access to summer flounder. NMFS announced specifications for the summer flounder, scup, and black sea fisheries. This action is intended to inform the public of the specifications for the 2023 fishing year for summer flounder, scup, and black sea bass. This rule shows the state-by-state allowable commercial fishing quotas (88 *Federal Register* 11 January 3, 2023).
Long Island Regional Development Council	East Hampton Shellfish Hatchery project will consolidate the hatchery's municipal hatchery and nursing facilities. Haskell's seafood facility in East Quogue is proposed to become a fully functioning seafood processing plant.
New Jersey	NJDEP Division of Fish and Wildlife Marine Fisheries Management Rule Amendment Proposal with amendments to rules governing crab and lobster management, commercial Atlantic menhaden fishery, marine fisheries, and fishery management in New Jersey was published in the March 1, 2021, *New Jersey Register* (New Jersey Division of Fish and Wildlife 2021).

D.2.10 Global Climate Change

Climate change results primarily from the increasing concentration of greenhouse gases (GHGs) in the atmosphere, which causes planet-wide physical, chemical, and biological changes, substantially altering 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* (Minerals Management Service 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 re-radiate 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 re-radiated back into space has slowed, 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 WTG switchgears and OSS high-voltage and medium-voltage gas-insulated switchgears.

The Intergovernmental Panel on Climate Change (IPCC) released a special report in October 2018 that compared risks associated with an increase of global warming of 1.5°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). High global temperatures increase the amount of sea level rise by the end of the century, with a projected relative sea level rise of 2.0 to 7.2 feet (0.6 to 2.2 meters) along the contiguous United States 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 the NARW 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 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* also discusses in detail the potential impacts of global climate change on protected species that occur within the NY Bight 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
New York	
Order Adopting a Clean Energy Standard (State of New York Public Service Commission 2016)	Requirement that 50% of New York's electricity come from renewable energy sources by 2030.
New York State Energy Plan 2015; 2017 Biennial Report to 2015 Plan (NYSERDA 2015, 2017a)	Requires 40% reduction in GHG from 1990 levels, 50% electricity to come from renewable energy resources, and a 600-trillion-British-thermal-unit increase in statewide energy efficiency.
Governor Cuomo State of the State Address 2017, 2018, 2021	2017: Set offshore wind energy development goal of 2,400 MW by 2030 (Governor's Office 2017). 2018: Procurement of at least 800 MW of offshore wind power between two solicitations in 2018 and 2019; new energy efficiency target for investor-owned utilities to more than double utility energy efficiency progress by 2025; energy storage initiative to achieve 1,500 MW of storage by 2025 and up to 3,000 MW by 2030 (Office of the Attorney General 2018; Windpower Engineering & Development 2018). 2021: The governor's 2021 agenda—Reimagine | Rebuild | Renew—establishes a goal of building out the renewable energy program. The agenda notes the development of two new offshore wind farms more than 20 miles offshore of Long Island, as well as the creation of dedicated offshore port facilities and additional transmission capacity development.
Governor Kathy Hochul State of the State Address (2022)	2022: Announced NYSERDA's third offshore wind procurement to be initiated in 2022; the procurement is expected to result in at least 2 gigawatts (GW) of new offshore wind projects. 2022: Announced a $500 million infrastructure investment to develop offshore wind manufacturing and supply chain infrastructure. 2022: Announced a legislative proposal to ensure all new building construction reaches zero emissions by 2027, and to develop 2 million electrified or electrification-ready homes by 2030.
New York State Offshore Wind Master Plan (2017) (NYSERDA 2017) and Master Plan 2.0 (under development)	Grants NYSERDA ability to award 25-year long-term contracts for projects ranging from approximately 200 MW to approximately 800 MW, with an ability to award larger quantities if sufficiently attractive proposals are received. Each proposer is also required to submit at least one proposal of approximately 400 MW. Initial bids were received in early 2019. The State of New York's initial Master Plan included a comprehensive suite of studies and public engagement to determine the most responsible and cost-effective pathways for developing offshore wind energy off of New York State. Master Plan 2.0 will provide a plan for the future of offshore wind development, including in deeper waters off the state's coast.
New York State Clean Water, Clean Air, and Green Jobs Environmental Bond Act (Bond Act)	The Bond Act funding will support new and expanded projects across the State to safeguard drinking water sources, reduce pollution, and protect communities and natural resources from climate change.

Plans and Policies	Summary/Goal
The Climate Leadership and Community Protection Act (CLCPA), enacted on July 18, 2019, signed into law in July 2019, and effective January 1, 2020	The act establishes economy-wide targets to reduce GHG emissions by 40% of 1990 levels by 2030 and 85% of 1990 levels by 2050. Establishes a goal of 9.0 GW of offshore wind generation by 2035. The CLCPA requires that 70 percent of New York State's electricity come from renewable sources by 2030 and 100 percent of electricity come from zero-emission sources by 2040. In addition, the CLCPA requires that New York reduce statewide greenhouse gas emissions to at least 40 percent below 1990 levels by 2030 and at least 85 percent below 1990 levels by 2050.
New Jersey	
Executive Order 28: Measures to Advance New Jersey's Clean Energy Economy (2018)	Sets target of total conversion of the state's energy production profile to 100% clean energy sources on or before January 1, 2050.
New Jersey Energy Master Plan (State of New Jersey 2019, 2020)	Updated in 2019, the plan outlines key strategies to reach the State of New Jersey's goal of 100 percent clean energy by 2050, including accelerating development of offshore wind.
Executive Order 100: Protecting Against Climate Threats (PACT); Land Use Regulations and Permitting (2020)	Establishes a GHG monitoring and reporting program, establishes criteria to govern and reduce emissions, and integrates climate change considerations, such as sea level rise, into regulatory and permitting programs.
Executive Order 307: Increase Offshore Wind Goal to 11,000 Megawatts by 2040 (2022)	Establishes a goal of 11,000 MW of offshore wind energy generation by 2040.

Table D-5. Resiliency plans and policies

Plans and Policies	Summary
New York	
Community Risk and Resiliency Act of 2014	Enacted in 2014, the Act includes five major provisions: 1) Official Sea-level Rise Projections, 2) Consideration of future physical climate risk, 3) Smart Growth Public Infrastructure Policy Act Criteria, 4) Guidance on Natural Resilience Measures, and 5) Model Local Laws Concerning Climate Risk. As of 2019, New York State Department of Environmental Conservation (NYSDEC) is in the process of developing a State Flood Risk Management Guidance document for state agencies (NYSDEC n.d.).
NY Rising Community Reconstruction Program (2018)	$20.4 million in projects on Long Island to help flood-prone communities plan and prepare for extreme weather events as they continue projects to recover from Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee. Three projects were announced for Suffolk County and five for Nassau County (Governor's Office 2018).
NYS Smart Growth Program	Community planning and development program with an overall approach of development and conservation strategies that help protect the health and natural environment by making communities more attractive, economically stronger, socially diverse, and resilient to climate change. The Smart Growth policies help communities contribute to both mitigating and adapting to climate change. New York State Department of State administers a portion of the State Smart Growth grant program. More information here: https://dos.ny.gov/nys-smart-growth-program.

Plans and Policies	Summary
New York Water Resources Management	New York encourages community planning at the watershed level. Watershed planning allows communities to integrate water and land resource protection and restoration with growth management at the local and regional level, balancing environmental and economic factors to encourage a healthier, more resilient watershed. New York State provides community assistance in the development and implementation of watershed management plans. More information here: https://dos.ny.gov/water-resources-management.
Local Waterfront Revitalization Program	The Local Waterfront Revitalization Program is New York State's primary program for working in partnership with waterfront communities across New York State. Local Waterfront Revitalization Programs begin with a planning process and are approved at three levels of government (local, state, and federal). Once approved, municipalities are eligible for implementation funds. More information here: https://dos.ny.gov/local-waterfront-revitalization-program.
New York City Watershed Program	The New York City Watershed Program provides technical support for local governments and regional groups in the New York City Watershed. The program provides a regional forum to aid in the long term protection of New York City's drinking water, and the economic vitality of the Upstate Watershed communities. More information here: https://dos.ny.gov/new-york-city-watershed-program.
OneNYC 2050	OneNYC 2050 is a strategy to address challenges facing New York City's future, including addressing climate change. Examples from the strategy include committing to carbon neutrality by 2050 and undertaking comprehensive projects to mitigate climate risk.
NYC Comprehensive Waterfront Plan	Every 10 years, New York City restarts a formal process of thinking collectively about New York City's waterfront and creating a vision for the next decade and beyond. The 2021 Plan, New York City's third Comprehensive Waterfront Plan, puts forth new strategies for an equitable, resilient and healthy waterfront in the face of climate change.
NY and NJ Harbor and Tributaries Focus Area Feasibility Study (HATS)	In response to coastal storms that have had severe impacts on the North Atlantic Coast, USACE is investigating measures to manage future flood risk in ways that support the long-term resilience and sustainability of the coastal ecosystem and surrounding communities, and reduce the economic costs and risks associated with flood and storm events. In support of this goal, USACE completed the North Atlantic Coast Comprehensive Study, which identified nine high-risk, focus areas on the north Atlantic Coast for further in-depth analysis into potential coastal storm risk management measures. One of the nine areas identified was the New York–New Jersey Harbor and Tributaries study area.
New Jersey	
New Jersey Draft Climate Change Resilience Strategy (NJDEP 2021)	This is New Jersey's first statewide climate resiliency strategy and was released as a draft in April 2021. The *Draft Climate Change Resilience Strategy* develops a framework for policy, regulatory, and operational changes to support the resilience of New Jersey's communities, economy, and infrastructure. It includes 125 recommended actions across the following six priority areas: build resilient and healthy communities, strengthen the resilience of New Jersey's ecosystems, promote coordinated governance, invest in information, increase public understanding, promote climate-informed investments and innovative financing, and develop a coastal resilience plan.

D.2.11 Oil and Gas Activities

The NY Bight lease areas are in the North Atlantic Planning Area of the OCS Oil and Gas Leasing Program (National OCS Program). On September 8, 2020, the White House issued a presidential memorandum for the Secretary of the Interior on the withdrawal of certain areas of the United States OCS from leasing disposition for 10 years, including the areas currently designated by BOEM as the South Atlantic and Straits of Florida Planning Areas (The White House 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 (The 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. Existing leases in the withdrawn areas are not affected. On September 29, 2023, the U.S. Department of the Interior announced the availability of the 2024–2029 National Outer Continental Shelf Oil and Gas Leasing Proposed Final Program and corresponding Final Programmatic Environmental Impact Statement. The 2024–2029 Proposed Final Program includes three potential OCS oil and gas lease sales in the Gulf of Mexico. It does not include sales in any other BOEM OCS planning area. On December 14, 2023, the Secretary of the Interior approved the 2024–2029 National Outer Continental Shelf Oil and Gas Leasing Proposed Final Program and signed the corresponding Record of Decision (ROD).

BOEM issues geophysical and geotechnical (G&G) permits to obtain data for hydrocarbon exploration and production; locate and monitor marine mineral resources; aid in locating sites for alternative energy structures and pipelines; identify possible human-made, seafloor, or geological hazards; and locate potential archaeological and benthic resources. G&G surveys are typically classified into categories by equipment type and survey technique. There are currently no such permits under review for areas offshore New York and New Jersey (BOEM 2021c).

Several liquefied natural gas ports are on the East Coast of the United States. Table D-6 lists existing, approved, 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 2022a, 2022b).

Table D-6. Liquefied natural gas terminals in the Eastern United States

Terminal Name	Type	Company	Jurisdiction	Distance from NY Bight Lease areas (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

Terminal Name	Type	Company	Jurisdiction	Distance from NY Bight Lease areas (approximate)	Status
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 2022a; 2022b.
DOMAC = Distrigas of Massachusetts LLC; 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.2.12 Onshore Development Activities

Onshore development activities that may contribute to cumulative impacts include visible infrastructure such as onshore wind turbines, buildings (such as offices, retail, and multi-use spaces) and cell towers, port development, transportation projects, onshore coastal developments near landfall locations, 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 planned onshore development activities

Type	Description
Local planning documents	Atlantic County Planning Board Master Plan (Atlantic County 2018) Camden County Comprehensive Plan (Camden County 2014) Cape May County Comprehensive Plan (Cape May County 2022) City of Atlantic City Master Plan (City of Atlantic City 2016) City of New York 2021–2025 Consolidated Plan (NYC Planning 2021) City of Ocean City Master Plan Reexamination Report (City of Ocean City 2019) City of Rensselaer Comprehensive Plan (City of Rensselaer 2006) City of Sea Isle City 2017 Master Plan Reexamination Report (City of Sea Isle City 2017) Creating Resilience: A Planning Initiative, City of Long Beach Comprehensive Plan (City of Long Beach 2018) Gloucester County Community Vision for Gloucester County (Gloucester County 2015) Hudson County Master Plan Re-Examination Report (Hudson County 2016) King County Comprehensive Plan (King County 2016) Monmouth County Planning Board Master Plan (Monmouth County 2016) Nassau County Master Plan (Nassau County Planning Department 2010) Ocean County Master Plan Amendments (Ocean County 2016, Ocean County 2018) Ocean County Planning Board Comprehensive Master Plan (Ocean County 2011)

Type	Description
	Staten Island Comprehensive Economic Development Strategy 2020 (Staten Island Economic Development Corporation 2020) Salem County Growth Management Element of the Comprehensive County Master Plan (Salem County 2015) Suffolk County Comprehensive Master Plan 2035 (Suffolk County 2015) The City of Albany Comprehensive Plan 2030 (City of Albany 2012) Town of Brunswick Draft Comprehensive Plan (Town of Brunswick 2013) Township of Burlington Comprehensive Plan (Township of Burlington 2008) Township of Egg Harbor Community Development Plan for Business Districts / Economic Development Element (Egg Harbor Township 2017) Township of Union Master Plan (Township of Union 2021)
Onshore wind projects	According to the U.S. Geological Survey, there are three onshore wind projects within 40 miles of the NY Bight lease areas. The Bayonne Wind Energy Project consists of one 1.5 MW turbine with a tip height 103.60 meters and rotor diameter of 77 meters; Jersey Atlantic Wind Farm consists of five 1.5 MW turbines with a tip height of 118.6 meters and rotor diameter of 77.0 meters (Hoen et al. 2021). Additionally, there is one unnamed onshore wind project in Sunset Park, Brooklyn that consists of one turbine. The specifications of that turbine are unknown.
Development projects	As part of New York State's $100 billion infrastructure project, $5.6 billion will go to transform the Long Island Railroad to improve system connectivity. Within Suffolk County, the following stations will receive funds for upgrades: Brentwood, Deer Park, East Hampton, Northport, Ronkonkoma, Stony Brook, Port Jefferson, and Wyandanch. The East Hampton historic Long Island Railroad Station will undergo upgrades and modernizations (Metropolitan Transit Authority 2017; Press Release Point 2017). Additional plans for transit-oriented design and highway improvements are planned in Suffolk County in state and county planning documents. The Fire Island Inlet to Montauk Point Project is a $1.2 billion project by USACE, NYSDEC, and Long Island, New York, municipalities to engage in inlet management; beach, dune, and berm construction; breach response plans; raising and retrofitting 4,400 homes; road-raising; groin modifications; and coastal process features. Within Suffolk County, portions of the Towns of Babylon, Islip, Brookhaven, Southampton, and East Hampton; 12 incorporated villages along Long Island's south shore (mainland); Fire Island National Seashore; and the Poospatuck and Shinnecock Indian Reservations will be involved in this project (USACE 2018). A $2.7 million development project has been proposed for the former site of Bader Field, Atlantic City, adjacent to the Atlantic City estuary. The 143-acre Bader Field, now vacant, was the site of the first airport in the United States. The proposed development would include a 2.44-mile (4-kilometer) auto course, about 2,000 units of housing in various price ranges, a retail promenade, and other auto-themed attractions (Associated Press 2022). As part of a comprehensive flood-control strategy, Ocean City, New Jersey, is spending $25 million through 2025 to build new pumping stations, drainage systems, berms and retention walls, and new elevated road construction to control flooding in low-lying areas (City of Ocean City 2021a, 2021b). Additionally, there are several planned federal and state hurricane and storm damage reduction, beach nourishment, coastal storm risk management, flood and coastal storm damage reduction, and ecosystem restoration projects planned along coastal New Jersey (NJDEP 2022).
Port studies/ upgrades	The State of New Jersey is planning to build an offshore wind port on the eastern shore of the Delaware River in Lower Alloways Creek, Salem County, approximately 7.5 miles southwest of the city of Salem. The port site is adjacent to Public Service Electric & Gas's (PSE&G's) Hope Creek Nuclear Generating Station. The New Jersey Economic Development

Type	Description
	Authority (NJEDA) is leading the development of the project on behalf of the state, working alongside key departments and agencies such as the Governor's Office, the Department of the Treasury, and NJBPU. Construction commenced in 2021 with a targeted completion date of late 2023. The development plan includes construction of a heavy-lift wharf with a dedicated delivery berth and an installation berth that can accommodate jack-up vessels, a 30-acre marshalling area for component assembly and staging, a dedicated overland heavy-haul transportation corridor, and potential for additional laydown areas. NJEDA estimates the project will cost $300 to $400 million (New Jersey Wind Port 2021). Both the Atlantic Shores South (OCS-A 0499) and Ocean Wind 2 (OCS-A 0532) projects have committed to building a nacelle assembly facility at the New Jersey Wind Port. The nacelle houses the components that convert the mechanical energy of the rotating blades into electrical energy and is the highest value-added offshore wind component. Atlantic Shores plans to partner with MHI Vestas for this facility while Ocean Wind will collaborate with General Electric (NJBPU 2021). In 2020, the State of New Jersey announced a $250 million investment in a manufacturing facility to build steel components for offshore wind turbines at the Port of Paulsboro on the Delaware River in New Jersey (New Jersey State 2020). Construction on the facility began in January 2021, with production anticipated to begin in 2023 (New Jersey Business 2020). Both the Atlantic Shores South and Ocean Wind 2 projects will utilize the foundation manufacturing facility at the Port of Paulsboro (NJBPU 2021). Ports in New York may require upgrades to support the offshore wind industry developing in the northeastern United States. Upgrades may include onshore developments or underwater improvements (such as dredging). In December 2017, NYSERDA issued an offshore wind master plan that assessed 54 distinct waterfront sites along the New York Harbor and Hudson River and 11 distinct areas with multiple small sites along the Long Island coast. Twelve waterfront areas and five distinct areas were singled out for "potential to be used or developed into facilities capable of supporting OSW projects" (Table 26, NYSERDA 2017). Nearly all identified sites would require some level of infrastructure upgrade (from minimal to significant) depending on offshore wind activities intended for the site. Particular sites of interest include Red Hook-Brooklyn, South Brooklyn Marine Terminal, and the Port of Coeymans (NYSERDA 2017). For additional information regarding specific proposed improvements to these ports, see Capital Region Economic Development Council 2018, American Association of Port Authorities 2016, Rulison 2018, and NYCEDC 2018. New York State has proposed port improvements that include the governor's 2021 agenda "Reimagine | Rebuild | Renew," which includes upgrades to create five dedicated port facilities for offshore wind, including the following: • The nation's first offshore wind tower manufacturing facility, to be built at the Port of Albany • An offshore wind turbine staging facility and O&M hub to be established at the South Brooklyn Marine Terminal • Increasing the use of the Port of Coeymans for cutting-edge turbine foundation manufacturing • Buttressing ongoing O&M out of Port Jefferson and Port of Montauk Harbor in Long Island

Attachment D1: Ongoing and Planned Non-Offshore-Wind Activity Analysis

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 planned non-offshore-wind activities.

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Accidental releases: Fuel/ fluids/hazmat	Accidental releases of air toxics or hazardous air pollutants (HAPs) are due to potential chemical spills. Ongoing releases would 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 would be due to potential chemical spills. See Table D1-23 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases. These may lead to short-term periods of toxic pollutant emissions through evaporation. Air quality impacts would be short term and limited to the local area at and around the accidental release location.
Air emissions: Construction and decommissioning	Air emissions originate from combustion engines and electric power generated by burning fuel. These activities are regulated under the Clean Air Act (CAA) to meet set standards. Air quality has generally improved over the last 35 years; however, some areas in the Northeast have experienced a decline in air quality over the last 2 years. Some areas of the Atlantic coast remain in nonattainment for ozone, with the source of this pollution from power generation. Many of these states have made commitments toward cleaner energy goals to improve this, and offshore wind is part of these goals. Primary processes and activities that can affect the air quality impacts are expansions and modifications to existing fossil fuel power plants, onshore and offshore activities involving renewable energy facilities, and various construction activities. The construction, operation, and decommissioning of offshore wind projects would produce GHG emissions (nearly all CO_2) that can contribute to climate change; however, these contributions would be minuscule compared to aggregate global emissions. CO_2 is relatively stable in the atmosphere and generally mixed uniformly throughout the troposphere and stratosphere; therefore, the impact of GHG emissions does not depend upon the source location. Increasing energy production from offshore wind projects will likely decrease GHGs emissions by replacing energy from fossil fuels.	The largest air quality impacts over the next 35 years would occur during the construction phase of any one project; however, projects will be required to comply with the CAA. During the limited construction and decommissioning phases, emissions may occur that are above *de minimis* thresholds and will require offsets and mitigation. Primary emission sources would be increased commercial vehicular traffic, air traffic, public vehicular traffic, and combustion emissions from construction equipment and fugitive emissions from construction-generated dust. As projects come online, power generation emissions overall would decline, and the industry as a whole would have a net benefit on air quality.
Air emissions: O&M		Activities associated with O&M of onshore wind projects would have a proportionally very small contribution to emissions compared to the construction and installation and decommissioning activities over the next 35 years. Emissions would largely be due to commercial vehicular traffic and operation of emergency diesel generators. Such activity would result in short-term, intermittent, and widely dispersed emissions and small air quality impacts.
Air emissions: Power generation emissions reductions		Many Atlantic states have committed to clean energy goals, with offshore wind being a large part of that. Other reductions include transitioning to onshore wind and solar. The No Action Alternative without implementation of other planned onshore 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.
Air emissions: GHGs		Development of planned onshore wind projects would produce a small overall increase in GHG emissions over the next 35 years. However, these contributions would be very small compared to the aggregate global emissions. The impact on climate change from these activities would be very small. As more projects come online, there would be some reduction in GHG emissions from modifications of existing fossil fuel facilities to reduce power generation. Overall, it is anticipated that there would be no cumulative impact on global warming as a result of onshore wind project activities.
Accidental releases: Fuel/ fluids/hazmat	Accidental releases of air toxics or hazardous air pollutants (HAPs) are due to potential chemical spills. Ongoing releases would 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 would be due to potential chemical spills. See Table D1-23 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases. These may lead to short-term periods of toxic pollutant emissions through evaporation. Air quality impacts would be short term and limited to the local area at and around the accidental release location.

hazmat = hazardous materials

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Noise: Pile-driving	Noise from pile-driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded and would result in high-intensity, low-exposure-level, long-term, but localized intermittent risk to bats in nearshore waters. Direct impacts are not expected to occur, as recent research has shown that bats may be less sensitive to temporary threshold shifts (TTS) than other terrestrial mammals (Simmons et al. 2016). Indirect impacts (i.e., displacement from potentially suitable habitats) could occur because 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 a 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 35 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 a 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 35 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.	Planned 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 non-offshore-wind activities and the associated impact-producing factors for benthic resources

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Accidental releases: Fuel/ fluids/hazmat	See Table D1-23 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 35 years would increase the risk of accidental releases. See the previous cell and Table D1-23 on water quality for details.
Accidental releases: Invasive species	Invasive species are periodically released accidentally during ongoing activities, including the discharge of ballast water and bilge water from marine vessels. The impacts on benthic resources (e.g., competitive disadvantage, smothering) depend on many factors, but can be noticeable, widespread, and permanent.	No future activities were identified within the geographic analysis area other than ongoing activities.
Accidental releases: Trash and debris	Ongoing releases of trash and debris occur from onshore sources, fisheries use, dredged material ocean disposal, marine minerals extraction, marine transportation, navigation and traffic, survey activities and cables, and 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.
Cable emplacement and maintenance	Cable maintenance activities infrequently disturb benthic resources and cause temporary increases in suspended sediment; these disturbances would be localized 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 Sub-IPFs of Seabed profile alterations and Sediment deposition and burial.)	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 (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 localized and 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 of, 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 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.
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 on 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.
Electric and magnetic fields and cable heat	Electromagnetic fields (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.
Noise: Onshore/offshore construction	See Table D1-10 on finfish, invertebrates, and essential fish habitat (EFH). Detectable impacts of construction noise on benthic resources rarely, if ever, overlap from multiple sources.	See Table D1-10 on finfish, invertebrates, and EFH. Detectable impacts of construction noise on benthic resources would rarely, if ever, overlap from multiple sources.

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Noise: G&G	See Table D1-10 on finfish, invertebrates, and EFH. Detectable impacts of G&G noise on benthic resources rarely, if ever, overlap from multiple sources.	See Table D1-10 on finfish, invertebrates, and EFH. Detectable impacts of G&G noise on benthic resources would rarely, if ever, overlap from multiple sources.
Noise: O&M	See Table D1-10 on finfish, invertebrates, and EFH.	See Table D1-10 on finfish, invertebrates, and EFH.
Noise: Pile-driving	Noise from pile-driving occurs periodically in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Noise transmitted through water or through the seabed can cause injury or mortality of 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 localized and temporary, and they 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 35 years, they would be localized and temporary, and they would 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 Table D1-10 on finfish, invertebrates, and EFH.	See Table D1-10 on finfish, invertebrates, and EFH.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear are periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb, injure, or kill benthic resources, creating small, short-term, localized impacts.	Future new cables would present additional risk of gear loss, resulting in small, short-term, localized impacts (disturbance, injury).
Presence of structures: Hydrodynamic disturbance	See Table D1-10 on finfish, invertebrates, and EFH.	See Table D1-10 on finfish, invertebrates, and EFH.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, continuously create uncommon relief in a mostly sandy seascape. Structure-oriented fishes are attracted to these locations. Increased predation upon benthic resources by structure-oriented fishes can adversely affect populations and communities of benthic resources. These impacts are localized and permanent.	New cables installed in the geographic analysis area over the next 35 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 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 localized 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 or complex habitat. Benthic species dependent on hard-bottom habitat can benefit on a constant basis, although the new habitat can also be colonized by invasive species (e.g., certain tunicate species). Structures are periodically added, resulting in the conversion of existing soft-bottom and hard-bottom habitat to the new hard-structure habitat.	See above for quantification and timing. Any new towers, buoys, 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.

hazmat = hazardous materials

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Accidental releases: Fuel/ fluids/hazmat	See Table D1-23 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 cause feather oiling can lead to sublethal effects that include changes in flight efficiencies and result in increased energy expenditure during daily and seasonal activities including chick provisioning, commuting, courtship, foraging, long-distance migration, predator evasion, and territory defense (Maggini et al. 2017). These impacts rarely result in population-level impacts.	See Table D1-23 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 35 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 35 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.
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, with no biologically significant impacts on individuals or populations.
Lighting: 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 35 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.
Lighting: 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, with no biologically significant impacts on individuals or populations.
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.
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.

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned 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. 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 behavioral responses could range from escape behavior to mild annoyance, but no individual injury or mortality would be expected.
Noise: Vessels	Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, and scientific and academic research vessels. Sub-surface noise from vessels could disturb diving birds foraging for prey below the surface. The consequence to birds would be similar to that of 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 localized and can be short term to permanent. Fish aggregation 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 35 years, would likely require hard protection atop portions of the cables (see the "Cable emplacement and maintenance" IPF). 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 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 35 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 35 years would not be expected to cause 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. 2022). 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 would 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 non-offshore-wind activities and the associated impact-producing factors for coastal habitat and fauna

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Accidental release and discharge	See Table D1-23 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 coastal resources. The chemicals with potential to sink or dissolve rapidly often dilute to non-toxic levels before they affect coastal resources. The corresponding impacts on coastal resources are rarely noticeable.	Gradually increasing vessel traffic over the next 35 years would increase the risk of accidental releases. See the previous cell and Table D1-23 on water quality for details.
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 coastal benthic resources, as well as physical damage to their habitats. All impacts are localized; turbidity is temporary; injury and mortality is permanent for individuals but populations would recover 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 for coastal habitat and fauna other than ongoing activities.
Cable emplacement and maintenance	Cable maintenance activities infrequently disturb coastal resources and cause temporary increases in suspended sediment; these disturbances would be localized and limited to the emplacement corridor. New cables are infrequently added near shore. Cable emplacement/maintenance activities injure and kill coastal 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.	No future activities were identified within the geographic analysis area for coastal habitat and fauna other than ongoing activities.
Electric and magnetic fields and cable heat	Electromagnetic fields (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 coastal benthic resources is likely undetectable.	No future activities were identified within the geographic analysis area for coastal habitat and fauna other than ongoing activities.
Light	Buoys, towers, and onshore structures with lights can attract coastal fauna. Onshore structures like houses and ports emit a great deal more light than offshore buoys and towers. 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.
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 behavioral responses could range from avoidance behavior to mild annoyance, but no individual injury or mortality would be expected.
Presence of structures	See Table D1-3 on benthic resources.	See Table D1-3 on benthic resources.
Land disturbance: Onshore construction	Onshore residential, commercial, and industrial development are expected to continue at current trends. Construction activities may result in loss of coastal habitat and temporary or permanent displacement and injury to or mortality of individual animals, but population-level effects would not 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 but would not be expected to result in injury or mortality of individuals.
Land disturbance: Onshore land use changes	Ongoing development of onshore properties, especially shoreline parcels, periodically causes the conversion of onshore coastal habitats to become developed space. 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.
Traffic: Vehicle collisions	Vehicle collisions may result in injury to or mortality of individual animals, but population-level effects would not be expected.	Impacts from vehicle collisions with wildlife are expected to continue and to occur at the current rate.

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned 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 35 years due to offshore military operations, survey activities, commercial vessel traffic, and 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 localized 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 localized, 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, O&M	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 are difficult to generalize, but impacts are localized and temporary. Infrequent offshore trenching could occur in connection with cable installation. These disturbances are temporary and localized, and they extend only a short distance beyond the emplacement corridor. Low levels of elevated noise from operational WTGs are 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, localized 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 35 years. Impacts from construction, operations, and maintenance would likely be small and localized 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 and localized, and they 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 35 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 localized 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 or through the seabed can cause injury or mortality of 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, localized impacts on commercial fisheries and for-hire recreational fishing. The extent depends on pile size, hammer energy, and local acoustic conditions.	No future activities were identified within the geographic analysis area for commercial fisheries and for-hire recreational fishing, 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 undergoing continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 35 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 35 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 localized impacts on fish populations. Port expansions could also increase vessel traffic and competition for dockside services, which could affect fishing vessels.
Presence of structures: Navigation hazard and allisions	Structures within and near the cumulative lease areas that pose potential navigation hazards include buoys and shoreline developments such as docks and ports. An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. Two types of allisions occur: drift and powered. A drift allision generally occurs when a vessel is powered down due to operator choice or power failure. A powered allision generally occurs when an operator fails to adequately control their vessel movements or is distracted.	No known reasonably foreseeable structures are proposed to be located in the geographic analysis area that could affect commercial fisheries. Vessel allisions with non-offshore-wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures. The lost gear, moved by currents, can disturb habitats and potentially harm individuals, creating small, localized, short-term impacts on fish, but likely no impacts at a fishery level.	No future activities were identified within the geographic analysis area for commercial fisheries and for-hire recreational fishing, other than ongoing activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
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 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 localized and can be short term to permanent. Fish aggregation may be considered adverse, beneficial, or neutral. Commercial and for-hire recreational fishing can occur near these structures. For-hire recreational fishing is more popular, as commercial mobile fishing gear risks snagging on the structures.	New cables, installed incrementally in the geographic analysis area over the next 20 to 35 years, would likely require hard protection atop portions of the route (see "Cable emplacement/ and maintenance" IPF). 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 and 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 localized 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 35 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 commercial fisheries and for-hire recreational fishing, 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 commercial fisheries and for-hire recreational fishing, 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 non-offshore-wind activities and the associated impact-producing factors for cultural resources

Associated IPF: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Accidental releases: Fuel/fluids/ hazmat	See Table D1-23 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 or seafloor sediments can cause impacts on cultural resources because resources are affected by the released chemicals as well as the ensuing cleanup activities.	Gradually increasing vessel traffic over the next 35 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 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 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 affect 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 affect 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.
Cable emplacement and maintenance	Infrequent cable maintenance activities disturb the seafloor and could cause impacts on submerged archaeological resources. These disturbances would be localized 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); 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.
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); 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.
Land disturbance: Onshore construction	Onshore construction activities can affect archaeological resources by damaging or removing resources.	Future activities that could result in terrestrial land disturbance impacts include onshore residential, commercial, industrial, and military development activities in the central Atlantic, particularly those proximate to offshore ECCs and interconnection facilities. Onshore construction would continue at current rates.
Lighting: 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.

Associated IPF: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Lighting: 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 or cultural significance of the resource is associated with uninterrupted nighttime skies or periods of darkness. Any tall structure (e.g., commercial building, radio antenna, large satellite dishes) 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.
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.

hazmat = hazardous materials

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Cable emplacement and maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be localized and limited to emplacement corridors. There are six existing power cables in the geographic analysis area for demographics, employment, and economics.	Future new cables would disturb the seafloor and cause temporary increases in suspended sediment resulting in infrequent, localized, short-term impacts over the next 35 years.
Land disturbance: Onshore construction	Onshore development activities support local population growth, employment, and economics. 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.
Lighting: 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.
Lighting: 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.
Noise: Cable laying/ trenching	Infrequent trenching for pipeline and cable-laying activities emit noise. These disturbances are temporary and localized 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 35 years for repair or new installation of underground infrastructure.
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 and localized 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: 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 undergoing continual upgrades and maintenance. The New Jersey Wind Port is being developed and the Paulsboro Marine Terminal is being upgraded specifically to support the construction of offshore wind energy facilities.	Ports would need to perform maintenance and upgrade facilities over the next 35 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 35 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 Aggregating Devices (FADs). Recreational and commercial fishing can occur near the FADs, although recreational fishing is more popular, because commercial mobile fishing gear is more likely to snag on FADs.	Reasonably foreseeable activities (non-offshore-wind) would not result in additional offshore structures.
Presence of structures: Habitat conversion	Structures, including foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly flat seascape. Structure-oriented species thus benefit on a constant basis.	Reasonably foreseeable activities (non-offshore-wind) would not result in additional offshore structures.
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure, because vessels need to avoid both the structure and each other.	Vessel traffic, overall, is not expected to meaningfully increase over the next 35 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.
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.

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
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 35 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 are anticipated.

FAD = fish aggregating device

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Air emissions: Construction/ decommissioning	Ongoing population growth and new development within the geographic analysis area is likely to increase traffic, with resulting increases in emissions from motor vehicles. Some new industrial development may result in emission-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 developments may include emission-producing industry and new developments 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: O&M	Ongoing population growth and new development within the geographic analysis area is likely to increase traffic, with resulting increase in emissions from motor vehicles. Some new industrial development may result in emission-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 developments may include emission-producing industry and new developments 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.
Cable emplacement and maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be localized 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 35 years.
Land disturbance: Erosion and sedimentation	Potential erosion and sedimentation from development and construction are 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.
Lighting: 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.
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 and localized, and they extend only a short distance beyond the work area.	No future activities were identified within the geographic analysis area other than ongoing activities.
Noise: Trenching	Infrequent trenching for pipeline and cable-laying activities emits noise. These disturbances are temporary and localized, and they 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 35 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 undergoing continual upgrades and maintenance. The New Jersey Wind Port is being developed and the Paulsboro Marine Terminal is 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 35 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 geographic analysis area.

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Accidental releases: Fuel/ fluids/hazmat	See Table D1-23 for a quantitative analysis of these risks. Ongoing releases are frequent/chronic. Impacts, including mortality, decreased fitness, and contamination of habitat, are localized and temporary, and rarely affect populations.	See Table D1-23 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 35 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 resulting impacts on invertebrates and finfish depend on many factors but can be widespread and permanent, especially if the invasive species becomes established and outcompetes native species. 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 finfish, invertebrates, and essential fish habitat, 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 35 years due to offshore military operations, survey activities, commercial vessel traffic, and 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, and 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.
Cable emplacement and maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances are localized and 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 localized 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.
Cable emplacement/ 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 finfish, invertebrates, and essential fish habitat, 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 localized and 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 finfish, invertebrates, and essential fish habitat, other than ongoing activities.
Discharge/intakes	Water quality impacts from ongoing onshore and offshore activities affect nearshore habitats, and accidental spills can occur from pipeline or marine shipping. Invasive species can be accidentally released in the discharge of ballast water and bilge water from marine vessels.	No future activities were identified within the geographic analysis area for finfish, invertebrates, and essential fish habitat, other than ongoing activities.
Electric and magnetic fields and cable heat	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.
Gear utilization	Abandoned or lost fishing gear remains in the aquatic environment for extended time periods, often entangling or trapping mobile invertebrate and fish species. Based on data from NOAA, bycatch affects many species throughout the geographic analysis area—most notably, windowpane flounder, blueback herring, shark species, and hake species. The majority of bycatch is a result of open area scallop trawls, large-mesh otter trawls, conch pots, and fish traps (NOAA 2019).	Future pre-construction, construction, and post-construction fisheries monitoring surveys for ongoing and planned non-offshore-wind projects would continue to harvest finfish and macroinvertebrates. These surveys could include trawl surveys (affecting finfish and squid) and clam dredge surveys (ocean quahog and surfclam). Trawl and gillnet surveys for fisheries monitoring would likely result in direct on fish, invertebrates, and essential fish habitat and has the potential to result in injury and mortality, reduced fecundity, and delayed or aborted spawning migrations.

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Lighting: 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 geographic analysis area.
Lighting: 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.
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 localized and temporary. See also sub-IPF for Noise: Pile-driving.	Noise from construction nearshore 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 35 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 of 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 localized and temporary.
Noise: O&M	Some finfish and invertebrates may be able to hear the continuous underwater noise of operational WTGs. As measured at the Block Island Wind Farm, this low-frequency noise 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), sound pressure levels (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, localized impacts.	New or expanded marine minerals extraction and commercial fisheries may intermittently increase noise during their O&M over the next 35 years. Impacts would likely be small and localized.
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 or through the seabed can cause injury or mortality of 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 finfish, invertebrates, and essential fish habitat, 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 and localized 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 35 years, temporary, and localized, and would 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.	Vessels would continue to be a noise source within the geographic analysis area.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also undergoing continual upgrades and maintenance, including dredging. Port utilization is expected to increase over the next 35 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, cruise industry) and may continue to increase in the foreseeable future. In addition, the general trend along the coast from Virginia to Maine is that port activity will increase modestly. The ability of ports to receive the increase may require port modifications, leading to localized 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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
		impacts on EFH for certain species 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 finfish, invertebrates, and essential fish habitat, other than ongoing activities.
Presence of structures: Hydrodynamic disturbance	Human-made 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 localized 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 35 years, would likely require hard protection atop portions of the route (see the Cable emplacement/maintenance IPF). Any new towers, buoys, or piers would also create uncommon relief in a mostly sandy seascape. Structure-oriented fishes could be attracted to these locations. Abundance of certain fishes may increase. These impacts are localized and may be permanent.
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 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 geographic analysis area over the next 20 to 35 years, would likely require hard protection atop portions of the route (see Cable emplacement/maintenance). Any new towers, buoys, or piers would also create uncommon relief in a mostly sandy seascape. Structure-oriented species would benefit (Claisse et al. 2014; Smith et al. 2016); however, the diversity may decline over time as early colonizers are replaced by successional communities dominated by blue mussels and anemones (Degraer et al. 2019 [Chapter 7]). Soft bottom is the dominant habitat type from Cape Hatteras to the Gulf of Maine (over 60 million acres) and species that rely on this habitat would not likely experience population-level impacts (Guida et al. 2017; Greene et al. 2010).
Presence of structures: Migration disturbances	Human structures in the marine environment (e.g., shipwrecks, artificial reefs, and oil platforms) can attract finfish and invertebrates that approach the structures during their migrations. This could slow migrations. However, temperature is expected to be a bigger driver of habitat occupation and species movement than structure is (Moser and Shepherd 2009; Fabrizio et al. 2014; Secor et al. 2018). There is no evidence to suggest that structures pose a barrier to migratory animals.	The infrequent installation of future new structures in the marine environment over the next 35 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 D1-5 on coastal habitats.	See other sub-IPFs within the Presence of structures IPF. See Table D1-5 on coastal habitats.

AC = alternating current; DC = direct current; hazmat = hazardous materials

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned 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 hazmat that could be released.	Ongoing onshore construction projects involve vehicles and equipment that use fuel, fluids, or hazmat could result in an accidental release. Intensity and extent would vary depending on the size, location, and materials involved in the release.
Lighting: 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 undergoing continual upgrades and maintenance. The New Jersey Wind Port is being developed and the Paulsboro Marine Terminal is 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 meteorological 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.
Traffic	Onshore construction is not anticipated to noticeably add to the traffic of the local roadway system.	Onshore ongoing and planned development would likely disrupt road traffic for a short period of time depending on the type of development.

hazmat = hazardous materials

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Accidental releases: Fuel/fluids/hazmat	See Table D1-23 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 individual fitness, including adrenal effects, hematological effects, liver effects, lung disease, poor body condition, skin lesions, and several other health effects 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 (Table D1-10).	See Table D1-23 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 35 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 individual fitness, including adrenal effects, hematological effects, liver effects, lung disease, poor body condition, skin lesions, and several other health effects 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 (Table D1-10).
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, localized, 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 tract, disease, injury, and malnutrition (Baulch and Perry 2014). However, it is difficult to link physiological effects on individuals to population-level impacts (Browne et al. 2015).	As population and vessel traffic increase gradually over the next 35 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 interactions, as well as blockage of the digestive tract, disease, injury, and malnutrition (Baulch and Perry 2014).
Cable emplacement and maintenance	Cable maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances will be localized and generally limited to the emplacement corridor. Data are not available regarding marine mammal avoidance of localized turbidity plumes; however, Todd et al. (2015) suggest that because some marine mammals often live in turbid waters and some species of mysticetes and sirenians employ feeding methods that create sediment plumes, some species of marine mammals have a tolerance for increased turbidity. Similarly, McConnell et al. (1999) documented movements and foraging of gray seals in the North Sea. One tracked individual was blind in both eyes, but otherwise healthy. Despite the individual's blindness, observed movements were typical of the other study individuals, indicating that visual cues are not essential for gray seal foraging and movement (McConnell et al. 1999). 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 temporary and short term. Turbidity associated with increased sedimentation may result in temporary, short-term impacts on marine mammal prey species (Table D1-10).	The impact on water quality from accidental sediment suspension during cable emplacement is temporary and short term. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any negative impacts would be temporary and short term. Turbidity associated with increased sedimentation may result in temporary, short-term impacts on some marine mammal prey species (Table D1-10).
Electric and magnetic fields and cable heat	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 impacts on marine mammals would not be expected.
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 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 has 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 Incidental Harassment Authorization to minimize impacts on marine mammals.	No future activities were identified within the marine mammal geographic analysis area for marine mammals, other than ongoing activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
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 marine mammals are 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 (permanent threshold shifts [PTS]/temporary threshold shifts [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, and 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: Vessels	Ongoing activities that contribute to this sub-IPF include commercial shipping, recreational and fishing vessels, scientific and academic research vessels, and 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 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). Because lower frequencies propagate farther away from the sound source compared to higher frequencies, low frequency cetaceans (LFC) 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. No stock or population-level effects would be expected.
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). Similarly, aircraft have the potential to disturb hauled-out seals if aircraft overflights occur within 2,000 feet (610 meters) of a haul-out area (Efroymson et al. 2000). However, this disturbance would be temporary and short term, and result in minimal energy expenditure. These brief responses would be expected to dissipate once the aircraft has left the area.	Future low-altitude aircraft activities such as survey activities and navy training operations could result in short-term responses of marine mammals to aircraft noise. 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.
Noise: Cable laying/trenching	Noise from cable laying could periodically occur in the geographic analysis area.	No future activities were identified within the marine mammal geographic analysis area for marine mammals, other than ongoing activities.
Noise: Turbines	Marine mammals would be able to hear the continuous underwater noise of operational WTGs. As measured at the Block Island Wind Farm, this low-frequency noise barely exceeds ambient levels at 164 feet (50 meters) from the WTG base. Based on the results of Thomsen et al. (2015) and Kraus et al. (2016), 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.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also undergoing 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 suspension during port expansion activities is temporary and short term and would be similar to those described under the Cable emplacement/maintenance IPF above.	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from Virginia to Maine is that port activity will increase modestly. The ability of ports to receive the increase in larger ships will require port modifications. Future channel-deepening activities are being undertaken to accommodate deeper-draft vessels for the Panama Canal Locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long-term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use, 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. Currently bridge foundations and the Block Island Wind Farm may be considered artificial reefs and may have higher	No future activities were identified within the marine mammal geographic analysis area for marine mammals, other than ongoing activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
	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.	
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 Island Wind Farm 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 nearshore coastal waters has 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 OSS 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 Farm, but given that there are only five 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, 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 of high consequence, the patchy distribution of marine mammals makes stock or population-level effects unlikely (Navy 2018).

μT = microtesla; AC = alternating current; hazmat = hazardous materials

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned 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 increases commensurate with any increase in tankers visiting ports. Deep-draft visits to major ports are expected to increase as well, increasing the potential for an emergency need to anchor and creating navigational hazards for other vessels. Recreational 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 undergoing 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 35 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 with 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 navigational 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 “Anchoring” IPF.	See “Anchoring” IPF.
Cable emplacement/maintenance	Within the geographic analysis area for navigation and vessel traffic, existing cables may require access for maintenance activities. Infrequent cable maintenance activities may cause temporary increases in vessel traffic and navigational complexity.	Future new cables would cause temporary increases in vessel traffic during installation or maintenance, resulting in infrequent, localized, short-term impacts over the next 35 years. Care would need to be taken by vessels that are crossing the cable routes during these activities.
Traffic: Aircraft	USCG Search and Rescue (SAR) helicopters are the main aircraft that may be flying at low enough heights to risk interaction with WTGs. USCG SAR aircraft need to fly low enough that they can spot objects in the water.	SAR operations could be expected to increase with any increase in vessel traffic. However, as vessel traffic volume is not expected to increase appreciably, neither should SAR operations. Final PEIS Section 3.6.6 provides a discussion of navigation impacts on fishing vessel traffic.
Traffic: Vessels	See “Presence of structures: Navigation hazard” sub-IPF.	See “Presence of structures: Navigation hazard” sub-IPF.
Traffic: Vessels, collisions	See “Presence of structures: Navigation hazard” sub-IPF.	See “Presence of structures: Navigation hazard” sub-IPF.

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Presence of structures: Allisions	Existing stationary facilities that present allision risks include buoys used to mark inlet approaches, channels, shoals (NOAA 2021), 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 used to mark inlet approaches, channels, shoals (NOAA 2021), 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 geographic analysis area. Onshore development activities are anticipated to continue with additional proposed communication 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 geographic analysis area. Onshore development activities are anticipated to continue with additional proposed communication 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 Final PEIS Section 3.6.6. Vessel activities associated with offshore wind in the cumulative lease areas are currently limited to site assessment surveys.	Continued vessel traffic in the region, as described in Final PEIS Section 3.6.6.
Traffic: Vessels, collisions	Current vessel traffic in the region is described in Final PEIS Section 3.6.6. Vessel activities associated with offshore wind in the cumulative lease areas are currently limited to site assessment surveys.	Continued vessel traffic in the region is described in Final PEIS Section 3.6.6.

FAD = fish aggregating device

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned 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 (61 meters) in height.	No future non-offshore-wind stationary structures were identified within the offshore geographic analysis area. Onshore development activities are anticipated to continue with additional proposed communication 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 (61 meters) in height.	No future non-offshore-wind stationary structures were identified within the offshore geographic analysis area. Onshore development activities are anticipated to continue with additional proposed communication towers.

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned 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 used to mark inlet approaches, channels, 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 non-offshore-wind activities and the associated impact-producing factors for other uses: marine minerals

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Presence of structures: Space-use conflicts	Existing structures within the cumulative lease areas create potential space-use conflicts with marine mineral and sand borrow areas.	Reasonably foreseeable non-offshore-wind structures could have a small, long-term effect on marine mineral extraction.
Presence of structures: Cable infrastructure	Marine mineral extraction typically occurs within 8 miles of the shoreline, limiting adverse impacts on the offshore export cable routes.	Future cable installation would require consultation with the BOEM Marine Minerals Program.

Table D1-18. Summary of non-offshore-wind activities and the associated impact-producing factors for other uses: radar systems

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned 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. Existing wind developments in the area include the Jersey-Atlantic Wind Farm in Atlantic City, New Jersey.	Reasonably foreseeable non-offshore-wind structures proposed for construction in the offshore wind lease areas that could affect radar systems have not been identified.

Table D1-19. Summary of non-offshore-wind activities and the associated impact-producing factors for other uses: scientific research and surveys

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Presence of structures: Navigation hazards	Stationary structures are limited in the open ocean environment of the geographic analysis area and include meteorological 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.

Table D1-20. Summary of non-offshore-wind activities and the associated impact-producing factors for recreation and tourism

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned 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 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.
Cable emplacement and maintenance	Infrequent cable maintenance activities disturb the seafloor and cause temporary increases in suspended sediment; these disturbances would be localized 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.
Lighting: 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.
Lighting: 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/ maintenance	Existing cables may require access for maintenance activities. Infrequent cable maintenance activities may cause temporary increases in vessel traffic and navigational complexity for recreational vessels.	Future new cables would cause temporary increases in vessel traffic during installation or maintenance, resulting in infrequent, localized, short-term impacts over the next 35 years. Care would need to be taken by vessels that are crossing the cable routes during these activities.
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 and localized 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.
Presence of structures: Allisions	An allision occurs when a moving vessel strikes a stationary object. The stationary object can be a buoy, a port feature, or another anchored vessel. The likelihood of allisions is expected to continue at or near current levels.	Vessel allisions with non-offshore-wind stationary objects should not increase meaningfully without a substantial increase in vessel congestion.
Presence of structures: Entanglement, gear loss, gear damage	Commercial and recreational fishing gear is periodically lost due to entanglement with existing buoys, pilings, hard protection, and other structures.	No future activities were identified within the recreation and tourism geographic analysis area other than ongoing activities.
Presence of structures: Fish aggregation	Structures, including tower foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly flat seascape. Structure-oriented fishes are attracted to these locations. Recreational and commercial fishing can occur near these aggregation locations, although recreational fishing is more popular because commercial mobile fishing gear is more likely to snag on structures.	Reasonably foreseeable activities (non-offshore-wind) would not result in additional offshore structures.
Presence of structures: Habitat conversion	Structures, including foundations, scour protection around foundations, and various means of hard protection atop cables, create uncommon relief in a mostly flat seascape. Structure-oriented species thus benefit on a constant basis.	Reasonably foreseeable activities (non-offshore-wind) would not result in additional offshore structures.

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Presence of structures: Navigation hazard	Vessels need to navigate around structures to avoid allisions, especially in nearshore areas. This navigation becomes more complex when multiple vessels must navigate around a structure, because vessels need to avoid both the structure and each other.	Vessel traffic, overall, is not expected to meaningfully increase over the next 35 years. The presence of navigational 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 projects are minor features such as buoys.	Non-offshore-wind structures that could be viewed in conjunction with the offshore components of the projects 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 35 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 D1-21. Summary of non-offshore-wind activities and the associated impact-producing factors for sea turtles

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Accidental releases: Fuel/ fluids/hazmat	See Table D1-23 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. 2021) 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. 2021; Vargo et al. 1986). Additionally, accidental releases may result in impacts on sea turtles due to effects on prey species (Table D1-10).	See Table D1-23 for a quantitative analysis of these risks. Gradually increasing vessel traffic over the next 35 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. 2021; 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. 2021; Vargo et al. 1986). Additionally, accidental releases may result in impacts on sea turtles due to effects on prey species (Table D1-10).
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, localized, 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 has 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, and 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, localized, 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).
Cable emplacement and maintenance	Cable maintenance activities disturb bottom sediments and cause temporary increases in suspended sediment; these disturbances will be localized and generally limited to the emplacement corridor. Data are not available regarding effects of suspended sediments on adult and juvenile sea turtles, although elevated suspended sediments may cause individuals to alter normal movements and behaviors. However, these changes are expected to be too small to be detected (NOAA 2020). Sea turtles would be expected to swim away from the sediment plume. Elevated turbidity is most likely to affect sea turtles if a plume causes a barrier to normal behaviors, but no impacts would be expected due to swimming through the plume (NOAA 2020). Turbidity associated with increased sedimentation may result in short-term, temporary impacts on sea turtle prey species (Table D1-10).	The impact on water quality from accidental sediment suspension during cable emplacement is short term and temporary. If elevated turbidity caused any behavioral responses such as avoidance of the turbidity zone or changes in foraging behavior, such behaviors would be temporary, and any impacts would be short term and temporary. Turbidity associated with increased sedimentation may result in short-term, temporary impacts on some sea turtle prey species (Table D1-10).
Electric and magnetic fields and cable heat	EMFs emanate constantly from installed telecommunication and electrical power transmission cables. Sea turtles appear to have a detection threshold of magnetosensitivity and behavioral responses to field intensities ranging from 0.0047 to 4000 µT for loggerhead turtles, and 29.3 to 200 µT for green turtles, with other species likely similar due to anatomical, behavioral, and life history similarities (Normandeau et al. 2011). Juvenile or adult sea	During operations, future new cables would produce EMF. Submarine power cables in the geographic analysis area for sea turtles are assumed to be installed with appropriate shielding and burial depth to reduce potential EMF to low levels (MMS 2007: Section 5.2.7). 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.

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
	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; 2020). 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).	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 impacts on sea turtles would not be expected.
Lighting: Vessels	Ocean vessels such as ongoing commercial vessel traffic, recreational and fishing activity, and 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 attraction or avoidance behavior of sea turtles. These short-term impacts are expected to be of low intensity and occur infrequently.
Lighting: 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, which 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.
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: Impact and vibratory 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 or through the seabed can result in high-intensity, low-exposure-level, and long-term but localized intermittent risk to sea turtles. Impacts, potentially including behavioral responses, masking, TTS, and PTS, would be localized in nearshore waters. Data regarding threshold levels for impacts on sea turtles from sound exposure during pile-driving are very limited, and no regulatory threshold criteria have been established for sea turtles. Based on current literature, the following thresholds are used to assess impacts on turtles: • Potential mortal injury: SEL_{24h} 210 dB re 1 µPa^2 s or greater than Lpk 207 dB re 1 µPa (Popper et al. 2014) • PTS: SEL_{24h} 204 dB re 1 µPa^2 s, Lpk 232 dB re 1 µPa (Finneran et al. 2017) • TTS: SEL_{24h} 189 dB re 1 µPa^2 s, Lpk 226 dB re 1 µPa (Finneran et al. 2017) • Behavioral harassment: SPL 175 dB re 1 µPa (Finneran et al. 2017)	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.
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. (2007) suggest that sea turtles' ability to detect approaching vessels is primarily vision-dependent, not acoustic. Sea turtles may respond to vessel approach or noise with a startle response (diving or swimming away) and a temporary stress response (NSF and USGS 2011). Samuel et al. (2005) indicated that vessel noise could have an effect on sea turtle behavior, especially their submergence patterns.	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.
Noise: Drilling	Noise from drilling prior to pile-driving could occur in nearshore areas when piers, bridges, pilings, and seawalls are installed or upgraded. Drilling activities used prior to pile-driving activities to remove soil or boulders from inside the piles in cases of pile refusal may produce SPL of 140 dB re µPa at 3,280 ft (Austin et al. 2018). This would exceed the continuous noise threshold of 120 dB re 1 µPa (Table 3.7-3) beyond 3,000 ft, but these events are expected to be short term, which limits the sea turtles potentially present during construction. While behavioral responses may occur from drilling, they are not expected to be long lasting or biologically significant to sea turtle populations.	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.
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	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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
	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.	response (NSF and USGS 2011; Samuel et al. 2005). These brief responses would be expected to dissipate once the aircraft has left the area.
Port utilization: Expansion	The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also undergoing 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 impacts on water quality from sediment suspension during port expansion activities are short term and temporary, and would be similar to those described under the Cable emplacement/maintenance IPF above.	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from Virginia to Maine is that port activity will increase modestly. The ability of ports to receive the increase in larger ships will require port modifications. Future channel-deepening activities are being undertaken to accommodate deeper-draft vessels for the Panama Canal Locks. The additional traffic and larger vessels could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future. Additional impacts associated with the increased risk of vessel strikes could also occur (see the Traffic: Vessel collisions sub-IPF below).
Presence of structures: Entanglement or ingestion of lost fishing gear	The Mid-Atlantic region has more than 130 artificial reefs. Currently, bridge foundations and the Block Island Wind Farm 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 Farm 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 nearshore 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 Farm (five WTGs) and Coastal Virginia Offshore Wind pilot project (two 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.
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. In the United States, the percentage of strandings of loggerhead sea turtles attributed to vessel strikes increased from approximately 10% in the 1980s to a record high of 20.5% in 2004 (NMFS and USFWS 2007). Sea turtles are most susceptible to vessel collisions in coastal waters, where they forage from May through November. Vessel speed may exceed 10 knots in such waters, and evidence suggests that they cannot reliably avoid being struck by vessels exceeding 2 knots (Hazel et al. 2007).	Vessel traffic associated with non-offshore-wind development has the potential to result in an increased collision risk. While these impacts would be of high consequence, the patchy distribution of sea turtles makes stock or population-level effects unlikely (Navy 2018).
Gear utilization	A primary threat to sea turtles is their unintended capture in fishing gear, which can result in drowning or cause injuries that lead to mortality (e.g., swallowing hooks). For example, trawl fishing is among the greatest continuing primary threats to the loggerhead turtle (NMFS and USFWS 2019), and sea turtles are also caught as bycatch in other fishing gear, including longlines, gillnets, hook and line, pound nets, pot/traps, and dredge fisheries. A	No future activities were identified within the geographic analysis area for sea turtles other than ongoing activities.

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
	substantial impact of commercial fishing on sea turtles is the entrapment or entanglement that occurs with a variety of fishing gear.	

μPa = micropascal; μT = microtesla; AC = alternating current; L_{pk} = peak sound pressure level in units of decibels referenced to 1 micropascal; SEL_{24h} = sound exposure level over 24 hours (in units of decibels referenced to 1 micropascal squared second).

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

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Accidental releases	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.	Planned 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	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.
Lighting	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.
Presence of structures	Buoys are the only existing stationary structures within the offshore viewshed of the projects. 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	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 non-offshore-wind activities and the associated impact-producing factors for water quality

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned 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 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 into the offshore was fewer than 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 35 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 35 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 limited to the emplacement corridor or localized.	Suspension of sediments may continue to occur infrequently over the next 35 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 localized, 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.

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Port utilization: Expansion	Between 1992 and 2012, global shipping traffic increased fourfold (Tournadre 2014). The U.S. OCS is no exception to this trend, and growth is expected to continue as human population increases. In addition, the general trend along the coastal region from Virginia to Maine is that port activity will increase modestly. The ability of ports to receive the increase in larger ships will require port modifications, which, along with additional vessel traffic, could have impacts on water quality through increases in suspended sediments and the potential for accidental discharges. The increased sediment suspension could be long-term depending on the vessel traffic increase. Certain types of vessel traffic have increased recently (e.g., ferry use and cruise industry) and may continue to increase in the foreseeable future.	The general trend along the coastal region from Virginia to Maine is that port activity will increase modestly over the next 35 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 localized but, depending on the hydrologic conditions, have the potential to affect water quality through the formation of sediment plumes.	Impacts associated with the presence of structures include temporary sediment disturbance during maintenance. This sediment suspension would lead to interim and localized impacts.
Discharges/intakes	Discharges affect water quality by introducing nutrients, chemicals, and sediments to the water. There are regulatory requirements related to prevention and control of discharges, accidental spills, and 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 regulates the disposal permits issued by USACE. The impact on water quality from sediment suspension during these future activities would be short term and localized.
Land disturbance: Erosion and sedimentation	Ground-disturbing activities may lead to unvegetated 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 unvegetated or unstable soils. Precipitation events could mobilize these soils, leading to erosion and sedimentation effects and turbidity. 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 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 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.

hazmat = hazardous materials

Table D1-24. Summary of non-offshore-wind activities and the associated impact-producing factors for wetlands

Associated IPFs: Sub-IPFs	Ongoing Activities	Planned Activities Intensity/Extent
Accidental releases: Fuel/oil	Onshore construction activities are a potential source of wetland water contamination from heavy equipment oil leaks or accidental spills. Precipitation events could potentially mobilize the soils into nearby wetlands, leading to alteration of water quality.	Onshore construction activities would require heavy equipment use and HDD activities, and potential spills could occur because of an inadvertent release from the machinery or during refueling activities. Applicants would develop and implement a Spill Prevention, Control, and Countermeasure Plan to minimize impacts on water quality (prepared in accordance with applicable NJDEP and NYSDEC regulations). Minor and short-term impacts are unlikely to affect wetland water quality.
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. 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 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 are 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.

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Attachment D2: 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 NY Bight PEIS 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 the Final PEIS's Chapter 3, No Action Alternative 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 planned offshore wind development.

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Table D2-1. Offshore wind development activities on the U.S. East Coast: projects and assumptions (part 1, turbine and cable design parameters) August 2024

Region	Lease, Project, Lease Remainder[1]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps geographic analysis area)[3]								Estimated Construction Schedule[4]	Turbine Number[5]	Generating Capacity (MW)	Offshore Export Cable Length (statute miles)[6]	Offshore Export Cable Installation Tool Disturbance Width (feet)	Interarray Cable Length (statute miles)[7]	Hub Height (feet)[8]	Rotor Diameter (feet)[8]	Height of Turbine (feet)[8]
			Air Quality and GHG Emissions, Water Quality, Navigation and Vessel Traffic	Benthic Resources	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Coastal Habitat and Fauna	Demographics, Employment, and Economics; Environmental Justice	Cultural Resources	Other Marine Uses (excluding research surveys & navigation)	Scenic and Visual Resources, Recreation & Tourism									
ME	Aqua Ventus (Maine state waters)	State Project			X						2025	2	11					450	520
	Total Other State Waters											**2**	**11**						
EXISTING AND ONGOING PROJECTS																			
MA/RI	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						2024-2025	62	800	98	6.5	171	451	721	812
MA/RI	South Fork Wind, OCS-A 0517	Built			X						Built	12	132	139	6.5	24	358	543	614
VA/NC	CVOW Pilot, OCS-A 0497	Built			X						Built	2	12	27	3.3	9	364	506	620
MA/RI	Revolution Wind, part of OCS-A 0486	COP Approved (ROD issued 2023)			X						2024–2025	65	704	84	6.5	155	512	722	853
NY/NJ	Ocean Wind 1, OCS-A 0498	COP Approved (ROD issued 2023), PPA, SAP	X	X	X	X	X	X	X	X	By 2030, spread over 2026–2030	98	1,100	194	7	190	512	788	906
MA/RI	Sunrise Wind, OCS-A 0487	COP Approved (ROD issued 2024)			X						2024–2025	94	934	104.6	13	180	459	656	787
MA/RI	New England Wind, OCS-A 0534, and portion of OCS-A 0501 (Phase 1 [i.e., Park City Wind])	OP Approved (ROD issued 2024)			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])	OP Approved (ROD issued 2024)			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	X	X	X	X	X	X	X	2024–2026	54	816	46	5	133	525	853	951
NY/NJ	Empire Wind 2, part of OCS-A 0512	COP Approved (ROD issued 2023)	X	X	X	X	X	X	X	X	By 2030, spread over 2026–2030	84	1,260	30	5	166	525	853	951
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											**780**	**1976**	**1439.6**		**1670**			
PLANNED PROJECTS																			
Massachusetts/Rhode Island Region																			
MA/RI	SouthCoast Wind, OCS-A 0521	COP			X						2025	147	2,400	1,179	6.5	497	605	919	1,066
MA/RI	Beacon Wind, part of OCS-A 0520 (Phase 1)	COP			X						2026–2029	77	1,230	202	6.5	187	591	984	1,083

Region	Lease, Project, Lease Remainder[1]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps geographic analysis area)[3]								Estimated Construction Schedule[4]	Turbine Number[5]	Generating Capacity (MW)	Offshore Export Cable Length (statute miles)[6]	Offshore Export Cable Installation Tool Disturbance Width (feet)	Interarray Cable Length (statute miles)[7]	Hub Height (feet)[8]	Rotor Diameter (feet)[8]	Height of Turbine (feet)[8]
			Air Quality and GHG Emissions, Water Quality, Navigation and Vessel Traffic	Benthic Resources	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Coastal Habitat and Fauna	Demographics, Employment, and Economics; Environmental Justice	Cultural Resources	Other Marine Uses (excluding research surveys & navigation)	Scenic and Visual Resources, Recreation & Tourism									
MA/RI	Beacon Wind, part of OCS-A 0520 (Phase 2)	COP			X						2027–2030	78	1,100	202	6.5	187	591	984	1,083
MA/RI	Bay State Wind, part of OCS-A 0500	Planning			X						By 2030, spread over 2026–2030	94	1,128	139	6.5	148	492	722	853
MA/RI	OCS-A 0500 remainder	Planning			X						By 2030, spread over 2026–2030	116	1,392	200	7	240	492	722	853
MA/RI	OCS-A 0487 remainder	Planning			X						By 2030, spread over 2026–2030			200	7		492	722	853
MA/RI	Vineyard Northeast Wind OCS-A 0522	COP			X						2027–2030	160	2,400	532	33	221	787	1,050	1,312
	Total MA/RI Leases[2]											**672**	**9,650**	**2,654**		**1,480**			
New York/New Jersey Region																			
NY/NJ	Atlantic Shores South, OCS-A 0499[10]	COP Approved (ROD issued 2024)	X	X	X	X	X	X	X	X	2025–2028	195	2,837	441	3.3	547	576	919	1,049
NY/NJ	Atlantic Shores North, OCS-A 0549	COP	X	X	X	X	X	X	X	X	2029-2032	157	2,400	528	3.3	446	576	968	1,049
NY/NJ	Ocean Wind 2, part of OCS- A 0532	Planning	X	X	X	X	X	X	X	X	By 2030, spread over 2026-2030	109	1,148	200	7	173	512	788	906
NY/NJ	NY Bight lease areas (OCS-A 0537, OCS-A 0538, OCS-A 0539, OCS-A 0541, OCS-A 0542, and OCS-A 0544)	Planning	X	X	X	X	X	X	X	X	Start between 2026 and 2030 (construction may extend beyond 2030)	1,103[11]	NA	1,772[12]	131[13]	1,582[14]	NA	1,214[15]	1,312[16]
	Total NY/NJ Leases											**1,564**	**6,385**	**2,941**		**2,748**			
Maryland/Delaware Region																			
DE/MD	Skipjack, part of OCS-A 0519	COP			X						By 2030, spread over 2026–2030	16	192	40	6.5	23.7	492	722	822
DE/MD	US Wind/Maryland Offshore Wind Project, part of OCS-A 0490	COP			X						2025	121	2,000	145	6.5	152	528	820	938
DE/MD	GSOE I, OCS-A 0482	Planning	X		X						By 2030	94	1,128	200	6.5	139.12	492	722	853
DE/MD	OCS-A 0519 remainder	Planning			X						By 2030 or later		1,128	200	6.5	139.12	492	722	853
	Total DE/MD Leases											**231**	**4,448**	**585**		**453.94**			

Region	Lease, Project, Lease Remainder[1]	Status	Geographic Analysis Area (X denotes lease area is within or overlaps geographic analysis area)[3]								Estimated Construction Schedule[4]	Turbine Number[5]	Generating Capacity (MW)	Offshore Export Cable Length (statute miles)[6]	Offshore Export Cable Installation Tool Disturbance Width (feet)	Interarray Cable Length (statute miles)[7]	Hub Height (feet)[8]	Rotor Diameter (feet)[8]	Height of Turbine (feet)[8]
			Air Quality and GHG Emissions, Water Quality, Navigation and Vessel Traffic	Benthic Resources	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Coastal Habitat and Fauna	Demographics, Employment, and Economics; Environmental Justice	Cultural Resources	Other Marine Uses (excluding research surveys & navigation)	Scenic and Visual Resources, Recreation & Tourism									
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 Wind 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**			
	OCS Total (PLANNED)[9]											**2,785**	**25,476**	**7,045**		**5,220**			
	OCS Total[9]											**3,565**	**27,463**	**8,485**		**6,890**			

[1] The spacing/layout for projects are as follows: NE State water projects include a single strand of WTGs and no OSS. For projects in the RI, MA, NY, NJ, DE, and 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.
[2] 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 73% 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.
[3] This column identifies lease areas that are applicable to each resource based on the geographic analysis areas.
[4] The estimated construction schedule is based on information known at the time of this analysis and could be different when an applicant submits a COP.
[5] 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, or the generating capacity.
[6] 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).
[7] 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 OSS, it is assumed that an additional 6.2 miles (9.9 kilometers) of interlink cable would be required to link the two OSSs. Interarray cable is assumed to be buried between 4 and 6 feet (1.2 and 1.8 meters).
[8] 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.
[9] 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.
[10] Atlantic Shores South consists of two energy facilities (Project 1 and Project 2). Project 1 would have a capacity of 1,510 MW; Project 2's capacity is not yet determined, but Atlantic Shores has a goal of 1,327 MW.
[11] Total turbines across all six NY Bight lease areas provided by the lessees. These are estimates used for analysis purposes only and do not reflect the actual number of turbines that may be constructed in each NY Bight lease area.
[12] Total export cable length is the anticipated total across all six NY Bight lease areas as calculated by BOEM based upon information provided by the lessees.
[13] Cable disturbance width based on max value of the RPDE.
[14] Total interarray cable length is the anticipated total across all six NY Bight lease areas provided by the lessees.
[15] Rotor diameter based on max value of the RPDE.
[16] Height of turbine based on max value of the RPDE.
CT = Connecticut; CVOW = Coastal Virginia Offshore Wind; DE = Delaware; FDR = Facility Design Report; FIR = Fabrication and Installation Report; GSOE = Garden State Offshore Energy; MA = Massachusetts; MD = Maryland; NA = not applicable; 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; SC = South Carolina; VA = Virginia

Table D2-2. Offshore wind development activities on the U.S. East Coast: projects and assumptions (part 2, seabed/anchoring disturbance and scour protection) August 2024[1]

Region	Lease/Project/Lease Remainder	Status	Geographic Analysis Area (X denotes lease area is within or overlaps analysis area)[2]								Estimated Foundation Number[3]	Foundation Footprint[3] (acres)[3]	WTG Seabed Disturbance (Foundation + Scour Protection) (acres)[4]	Offshore Export Cable Seabed Disturbance (acres)[5]	Offshore Export Cable Operating Seabed Footprint (acres)[6]	Offshore Export Cable Hard Protection (acres)[7]	Anchoring Disturbance (acres)[8]	Interarray Construction Footprint/Seabed Disturbance (acres)[9]	Interarray Operating Footprint/ Seabed Disturbance (acres)[10]	Interarray Cable Hard Protection (acres)[11]
			Air Quality and GHG Emissions, Water Quality, Navigation and Vessel Traffic	Benthic Resources	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Coastal Habitat and Fauna	Demographics, Employment, and Economics; Environmental Justice	Cultural Resources	Other Marine Uses (excluding research surveys & navigation)	Scenic and Visual Resources, Recreation & Tourism										
NY/NJ	Atlantic Shores South, OCS-A 0499	COP, ROD	X	X	X		X	X	X	X	211	21	289	294	294	294	714	282	301	301
NY/NJ	Atlantic Shores North, OCS-A 0549	COP	X	X	X		X	X	X	X	166	25	190	3,393	393	393	416	2,162	301	301
NY/NJ	Ocean Wind 1, OCS-A 0498	COP Approved (ROD issued 2023), PPA	X	X	X		X	X	X	X	101	4	84	1,935[12]	78	94	19	1,850[13]	144	77
NY/NJ	Ocean Wind 2, OCS-A 0532	PPA	X	X	X		X	X	X	X	111	17	130	170	24	24	292.8	887	219	0
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP, ROD, COP approval	X	X	X		X	X	X	X	58	1.14	52.44	368	37	33	9	534	82	26
NY/NJ	Empire Wind 2, part of OCS-A 0512	COP, ROD, COP approval	X	X	X		X	X	X	X	91	2	82.80	360	24	32	9	633	129	32
NY/NJ	NY Bight lease areas (OCS-A 0537, OCS-A 0538, OCS-A 0539, OCS-A 0541, OCS-A 0542, and OCS-A 0544)		X	X	X	X	X	X	X	X	1,125[14]	NA	NA	28,137[15]	NA	NA	NA	25,120[16]	NA	NA
	Total NY/NJ Leases										**1,863**	**70**	**828**	**226,234**	**850**	**870**	**1,460**	**214,631**	**1,176**	**737**
	Total MA, RI, DE, MD, NC, SC, VA Leases										**1,817**	**333**	**4,065**	**13,912**	**0**	**898**	**4,395**	**39,161**	**1,924**	**671**
	OCS Total										**3,680**	**403**	**4,893**	**240,146**	**850**	**1,768**	**5,855**	**253,792**	**3,100**	**1,408**

[1] BOEM recognizes that the estimates presented within this cumulative analysis are likely high, conservative estimates; however, BOEM believes that this analysis is appropriately capturing the potential cumulative impacts and errs on the side of maximum impacts.
[2] This column identifies lease areas that are applicable to each resource based on the geographic analysis areas.
[3] The estimated number of foundations is the total number of turbines plus OSSs and met towers. 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 OSS installed.
[3] BOEM used the estimated foundation footprint acreage provided in the COP (if available). If not available, BOEM used this formula: foundation footprint = 0.26 acre * foundation number.
[4] The WTG seabed disturbance with the addition of scour protection was calculated based on scour protection expected in submitted COPs. If not available, BOEM used this formula: (1 acre * foundation #) + foundation footprint.
[5] BOEM used the estimated offshore export cable seabed disturbance provided in the COP (if available). If not available, BOEM used this formula: ([COP export cable length OR estimated export cable length)] * 5,280 feet/mile * installation tool disturbance width)/(43,560 square feet/acre)
[6] BOEM used the estimated offshore export cable footprint provided in the COP (if available). If not available, BOEM used this formula: ([COP export cable length OR estimated export cable length] * 5,280 feet/mile * 1 foot)/(43,560 square feet/acre).
[7] BOEM used the estimated offshore export cable hard protection area provided in the COP (if available). If not available, BOEM used this formula: ([COP export cable length OR estimated export cable length] * 5,280 feet/mile * 0.10 * 9.8 feet) / (43,560 square feet/acre).
[8] BOEM used the estimated anchoring disturbance area provided in the COP (if available). If not available, BOEM used this formula: (COP export cable length OR estimated export cable length) * (the corresponding subregion total COP anchoring disturbance per export cable length total).
[9] BOEM used the estimated interarray construction footprint/seabed disruption area provided in the COP (if available). If not available, BOEM used this formula: foundation # * (the corresponding subregion total COP interarray construction seabed disruption per foundation total).
[10] BOEM used the estimated interarray operating footprint/seabed disruption area provided in the COP (if available). If not available, BOEM used this formula: foundation # * (the corresponding subregion total COP interarray operating seabed disruption per foundation total).
[11] BOEM used the estimated interarray hard protection area provided in the COP (if available). If not available, BOEM assumed the interarray cable hard protection to be zero.
[12] Includes disturbance from offshore export cables and substation interconnector cables. Assumes an 82-foot-wide corridor would be disturbed per cable, based on the Ocean Wind 1 COP.
[13] Assumes an 82-foot-wide corridor would be disturbed, based on the Ocean Wind 1 COP.
[14] Total foundations are the anticipated number of WTG and OSS across all six NY Bight lease areas provided by the lessees. These are estimates used for analysis purposes only and do not reflect the actual number of foundations that may be constructed in each NY Bight lease area.
[15] Calculated based on maximum length of export cable of 1,772 miles and 131 maximum feet (width) of disturbance from the RPDE.
[16] Calculated based on maximum length of interarray cable of 1,582 miles and 131 maximum feet (width) of disturbance from the RPDE.
NJ = New Jersey; NA = not applicable; NY = New York; PPA = Power Purchase Agreement

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) August 2024[1]

Region	Lease/Project/Lease Remainder	Status	Geographic Analysis Area (X denotes lease area is within or overlaps analysis area)[2]								Total Coolant Fluids in WTGs (gallons)[3]	Total Coolant Fluids in OSS or ESP (gallons)[4]	Total Oils and Lubricants in WTGs (gallons)[5]	Total Oils and Lubricants in OSS or ESP (gallons)[6]	Total Diesel Fuel in WTGs (gallons)[7]	Total Diesel Fuel in OSS or ESP (gallons)[8]
			Air Quality and GHG Emissions, Water Quality, Navigation and Vessel Traffic	Benthic Resources	Birds, Bats, Marine Mammals, Sea Turtles, Finfish, Invertebrates, EFH, Fisheries, Research Surveys	Coastal Habitat and Fauna	Demographics, Employment, and Economics; Environmental Justice	Cultural Resources	Other Marine Uses (excluding research surveys & navigation)	Scenic and Visual Resources, Recreation & Tourism						
NY/NJ	Atlantic Shores South, OCS-A 0499[9]	COP, ROD	X	X	X	X	X	X	X	X	820,000	37,960	606,200	750,020	80,000	280,000
NY/NJ	Atlantic Shores North OCS-A 0549	COP (unpublished), SAP	X	X	X	X	X	X	X	X	643,700	9,150	530,817	557,850	62,800	20,000
NY/NJ	Ocean Wind 1, OCS-A 0498	COP Approved (ROD issued 2023)	X	X	X		X	X	X	X	39,690	0	187,964	238,707	77,714	158,502
NY/NJ	Ocean Wind 2, OCS-A 0532	PPA	X	X	X		X	X	X	X	336,184	7,248	424,821	232,948	45,437	3,070
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP Approved (ROD issued 2023)	X	X	X		X	X	X	X	49,704	0	285,684	158,503	0	7,925
NY/NJ	Empire Wind 2, part of OCS-A 0512	COP Approved (ROD issued 2023)	X	X	X		X	X	X	X	78,480	0	451,080	158,503	0	7,925
NY/NJ	NY Bight lease areas (OCS-A 0537, OCS-A 0538, OCS-A 0539, OCS-A 0541, OCS-A 0542, and OCS-A 0544)	Planning	X	X	X	X	X	X	X	X	NA	NA	NA	NA	NA	NA
	Total NY/NJ Leases										**1,967,758**	**54,358**	**2,486,566**	**2,096,531**	**265,951**	**477,422**
	Total MA, RI, DE, MD, NC, SC, VA Leases										**4,528,301**	**107,378**	**7,882,431**	**5,396,469**	**1,171,257**	**1,041,998**
	OCS Total										**6,496,059**	**161,736**	**10,368,997**	**7,493,000**	**1,437,208**	**1,519,420**

[1] BOEM recognizes that the estimates presented within this cumulative analysis are likely high, conservative estimates; however, BOEM believes that this analysis is appropriately capturing the potential cumulative impacts and errs on the side of maximum impacts.
[2] This column identifies lease areas that are applicable to each resource based on the geographic analysis areas.
[3] BOEM estimated the total coolant fluids in WTGs using this formula: (sum of all coolants provided in the COP [any material used as a coolant, not including water]) * turbine #.
[4] BOEM estimated the total coolant fluids in OSSs or ESPs using this formula: (sum of all coolants provided in the COP [any material used as a coolant, not including water]) * ESP/OSS #.
[5] BOEM estimated the total oils and lubricants in WTGs using this formula: (sum of all oils & lubricants provided in the COP) * turbine #.
[6] BOEM estimated the total oils and lubricants in OSSs or ESPs using this formula: (sum of all oils & lubricants provided in the COP) * turbine #.
[7] BOEM estimated the total diesel fuel in WTGs using this formula: (sum of all diesel fuel provided in the COP) * turbine #.
[8] BOEM estimated the total diesel fuel in OSSs or ESPs using this formula: (sum of all diesel fuel provided in the COP) * ESP/OSS #.
[9] Atlantic Shores South may include up to 10 small OSSs, up to 5 medium OSSs, or up to 4 large OSSs. The total values for diesel fuel, coolants, and oils/lubricants for Atlantic Shores OSS in Table D.A-3 are based on 4 large OSSs; 4 large OSSs would result in larger volumes of diesel fuel, coolants, and oils/lubricants than would 10 small OSSs or 5 medium OSSs. The total values for 10 small OSSs for Atlantic Shores South would be 75,000 gallons diesel fuel, 381,600 gallons oils/lubricants, and 15,060 coolants. The total values for 5 medium OSSs would be 60,000 gallons diesel fuel, 563,825 gallons oils/lubricants, and 15,010 gallons coolants.
[10] Quantities of coolant, oil and lubricants, and diesel fuel are scaled to Ocean Wind 1 based on number of turbines and OSSs.
ESP = electrical service platform; NA = not applicable; NJ = New Jersey; NY = New York; PPA = Power Purchase Agreement

Table D2-4. Offshore wind development activities on the U.S. East Coast: projects and assumptions (part 4, OCS construction and operation emissions) August 2024

Region	Lease/Project/Lease Remainder	Status	Air Quality and GHG Emissions Geographic Analysis Area[1]	2023	2024	2025	2026	2027	2028	2029	2030	Beyond 2030
Nitrogen oxides (tons)												
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP Approved (ROD issued 2023)	X		3,855	3,855	3,855	479	479	479	479	479
NY/NJ	Empire Wind 2, part of OCS-A 0512	COP Approved (ROD issued 2023)	X				2,505	2,505	2,505	2,505	2,505	479
NY/NY	Ocean Wind 1, OCS-A 498	COP Approved (ROD issued 2023)	X				2,235	2,235	2,235	2,235	2,235	159
NY/NY	Ocean Wind 2, OCS-A 0532	Planning	X				1,033	1,033	1,033	1,033	1,033	327
NY/NY	Atlantic Shores North, OCS-A 0499 remainder	COP	X							1,059	1,059	1,059
NY/NY	Atlantic Shores South, OCS-A 0499	COP Approved (ROD issued 2024)	X			880	880	880	880	519	519	519
NY/NY	NY Bight lease areas (OCS-A 0537, OCS-A 0538, OCS-A 0539, OCS-A 0541, OCS-A 0542, and OCS-A 0544)	Planning	X	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 5,221 Six Projects: 31,325	One Project: 5,221 Six Projects: 31,325	One Project: 5,221 Six Projects: 31,325	One Project: 5,221 Six Projects: 31,325	One Project: 5,221 Six Projects: 31,325	One Project: 227 Six Projects: 1,362
	Total Air Quality Analysis Area			**0**	**3,855**	**4,735**	**41,833**	**38,457**	**38,457**	**39,155**	**39,155**	**4,384**
Volatile organic compounds (tons)												
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP Approved (ROD issued 2023)	X		172	172	172	21	21	21	21	21
NY/NJ	Empire Wind 2, part of OCS-A 0512	COP Approved (ROD issued 2023)	X				111	111	111	111	111	21
NY/NY	Ocean Wind 1, OCS-A 498	COP Approved (ROD issued 2023)	X				59	59	59	59	59	4
NY/NJ	Ocean Wind 2, OCS-A 0532	Planning	X				66	66	66	66	66	4
NY/NJ	Atlantic Shores North, OCS-A 0499 remainder	COP	X							25	25	25
NY/NJ	Atlantic Shores South, OCS-A 0499	COP Approved (ROD issued 2024)	X			10	10	10	10	9	9	9
NY/NJ	NY Bight lease areas (OCS-A 0537, OCS-A 0538, OCS-A 0539, OCS-A 0541, OCS-A 0542, and OCS-A 0544)	Planning	X	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 151 Six Projects: 906	One Project: 151 Six Projects: 906	One Project: 151 Six Projects: 906	One Project: 151 Six Projects: 906	One Project: 151 Six Projects: 906	One Project: 5 Six Projects: 30
	Total Air Quality Analysis Area			**0**	**172**	**182**	**1,324**	**1,173**	**1,173**	**1,197**	**1,197**	**114**
Carbon monoxide (tons)												
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP Approved (ROD issued 2023)	X		1,109	1,109	1,109	228	228	228	228	228

Region	Lease/Project/Lease Remainder	Status	Air Quality and GHG Emissions Geographic Analysis Area[1]	2023	2024	2025	2026	2027	2028	2029	2030	Beyond 2030
NY/NJ	Empire Wind 2, part of OCS-A 0512	COP Approved (ROD issued 2023)	X				756	756	756	756	756	228
NY/NY	Ocean Wind 1, OCS-A 498	COP Approved (ROD issued 2023)	X				431	431	431	431	431	40
NY/NJ	Ocean Wind 2, OCS-A 0532	Planning	X				203	203	203	203	203	77
NY/NJ	Atlantic Shores North, OCS-A 0499 remainder	COP	X							267	267	267
NY/NJ	Atlantic Shores South, OCS-A 0499	COP Approved (ROD issued 2024)	X			126	126	126	126	121	121	121
NY/NJ	NY Bight lease areas (OCS-A 0537, OCS-A 0538, OCS-A 0539, OCS-A 0541, OCS-A 0542, and OCS-A 0544)	Planning	X	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 1,111 Six Projects: 6,666	One Project: 1,111 Six Projects: 6,666	One Project: 1,111 Six Projects: 6,666	One Project: 1,111 Six Projects: 6,666	One Project: 1,111 Six Projects: 6,666	One Project: 52 Six Projects: 312
	Total Air Quality Analysis Area			**0**	**1,109**	**1,235**	**9,291**	**8,410**	**8,410**	**8,672**	**8,672**	**1,273**
Particulate matter, 10 microns or less (tons)												
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP Approved (ROD issued 2023)	X		111	111	111	13	13	13	13	13
NY/NJ	Empire Wind 2, part of OCS-A 0512	COP Approved (ROD issued 2023)	X				72	72	72	72	72	13
NY/NY	Ocean Wind 1, OCS-A 498	COP Approved (ROD issued 2023)	X	0			73	73	73	73	73	6
NY/NJ	Ocean Wind 2, OCS-A 0532	Planning	X				37	37	37	37	37	11
NY/NJ	Atlantic Shores North, OCS-A 0499 remainder	COP	X							62	62	62
NY/NJ	Atlantic Shores South, OCS-A 0499	COP Approved (ROD issued 2024)	X			18	18	18	18	17	17	17
NY/NJ	NY Bight lease areas (OCS-A 0537, OCS-A 0538, OCS-A 0539, OCS-A 0541, OCS-A 0542, and OCS-A 0544)	Planning	X	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 105 Six Projects: 632	One Project: 105 Six Projects: 632	One Project: 105 Six Projects: 632	One Project: 105 Six Projects: 632	One Project: 105 Six Projects: 632	One Project: 5 Six Projects: 30
	Total Air Quality Analysis Area			**0**	**111**	**129**	**943**	**845**	**845**	**906**	**906**	**152**
Particulate matter, 2.5 microns or less (tons)												
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP Approved (ROD issued 2023)	X		107	107	107	12	12	12	12	12
NY/NJ	Empire Wind 2, part of OCS-A 0512	COP Approved (ROD issued 2023)	X				69	69	69	69	69	12
NY/NY	Ocean Wind 1, OCS-A 498	COP Approved (ROD issued 2023)	X	0			70	70	70	70	70	5

Region	Lease/Project/Lease Remainder	Status	Air Quality and GHG Emissions Geographic Analysis Area[1]	2023	2024	2025	2026	2027	2028	2029	2030	Beyond 2030
NY/NJ	Ocean Wind 2, OCS-A 0532	Planning	X				31	31	31	31	31	10
NY/NJ	Atlantic Shores North, OCS-A 0499 remainder	COP Approved (ROD issued 2024)	X							34	34	34
NY/NJ	Atlantic Shores South, OCS-A 0499	COP, PPA, SAP	X			22	22	22	22	15	16	16
NY/NJ	NY Bight lease areas (OCS-A 0537, OCS-A 0538, OCS-A 0539, OCS-A 0541, OCS-A 0542, and OCS-A 0544)	Planning	X	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 101 Six Projects: 605	One Project: 101 Six Projects: 605	One Project: 101 Six Projects: 605	One Project: 101 Six Projects: 605	One Project: 101 Six Projects: 605	One Project: 4 Six Projects: 24
	Total Air Quality Analysis Area			**0**	**107**	**129**	**904**	**809**	**809**	**836**	**837**	**113**
Sulfur dioxide (tons)												
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP Approved (ROD issued 2023)	X		74	74	74	7	7	7	7	7
NY/NJ	Empire Wind 2, part of OCS-A 0512	COP Approved (ROD issued 2023)	X				47	47	47	47	47	7
NY/NY	Ocean Wind 1, OCS-A 498	COP Approved (ROD issued 2023)	X	0			23	23	23	23	23	1
NY/NJ	Ocean Wind 2, OCS-A 0532	Planning	X				8	8	8	8	8	1
NY/NJ	Atlantic Shores North, OCS-A 0499 remainder	COP	X							5	5	5
NY/NJ	Atlantic Shores South, OCS-A 0499	COP Approved (ROD issued 2024)	X			2	2	2	2	1	1	1
NY/NJ	NY Bight lease areas (OCS-A 0537, OCS-A 0538, OCS-A 0539, OCS-A 0541, OCS-A 0542, and OCS-A 0544)	Planning	X	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 203 Six Projects: 1,217	One Project: 203 Six Projects: 1,217	One Project: 203 Six Projects: 1,217	One Project: 203 Six Projects: 1,217	One Project: 203 Six Projects: 1,217	One Project: 9 Six Projects: 54
	Total Air Quality Analysis Area			**0**	**74**	**76**	**1,371**	**1,304**	**1,304**	**1,308**	**1,308**	**76**
Carbon dioxide (tons)												
NY/NJ	Empire Wind 1, part of OCS-A 0512	COP Approved (ROD issued 2023)	X		255,028	255,028	255,028	45,918	45,918	45,918	45,918	45,918
NY/NJ	Empire Wind 2, part of OCS-A 0512	COP Approved (ROD issued 2023)	X				171,384	171,384	171,384	171,384	171,384	45,918
NY/NY	Ocean Wind 1, OCS-A 498	COP Approved (ROD issued 2023)	X				131,263	131,263	131,263	131,263	131,263	11,752
NY/NJ	Ocean Wind 2, OCS-A 0532	Planning	X				65,195	65,195	65,195	65,195	65,195	21,891

Region	Lease/Project/Lease Remainder	Status	Air Quality and GHG Emissions Geographic Analysis Area[1]	2023	2024	2025	2026	2027	2028	2029	2030	Beyond 2030
NY/NJ	Atlantic Shores North, OCS-A 0499 remainder	COP	X							99,893	99,893	99,893
NY/NJ	Atlantic Shores South, OCS-A 0499	COP Approved (ROD issued 2024)	X			34,839	34,839	34,839	34,839	33,566	33,566	33,566
NY/NJ	NY Bight lease areas (OCS-A 0537, OCS-A 0538, OCS-A 0539, OCS-A 0541, OCS-A 0542, and OCS-A 0544)	Planning	X	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 0 Six Projects: 0	One Project: 306,793 Six Projects: 1,840,758	One Project: 306,793 Six Projects: 1,840,758	One Project: 306,793 Six Projects: 1,840,758	One Project: 306,793 Six Projects: 1,840,758	One Project: 306,793 Six Projects: 1,840,758	One Project: 12,505 Six Projects: 75,030
	Total Air Quality Analysis Area			**0**	**255,028**	**289,867**	**2,498,467**	**2,289,357**	**2,289,357**	**2,387,977**	**2,387,977**	**333,968**

[1] This column identifies lease areas that are applicable to each resource based on the geographic analysis areas.

Note: Emissions for NY Bight were calculated based upon RPDE values using the BOEM Wind Tool model. Emissions for NY Bight Six Projects were calculated as six times the values for One Project. Based on input from the lessees, the calculated emissions for Six Projects are likely to be conservative (tending to overestimate emissions). Emissions for Ocean Wind 2 and Atlantic Shores North are scaled from Ocean Wind 1 and Atlantic Shores South, respectively, based on number of turbines and estimated construction schedule.

NJ = New Jersey; NY = New York; PPA = Power Purchase Agreement

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Attachment D3: References Cited

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