# Appendix G. Assessment of Resources with Minor (or Lower) Adverse Impacts

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# G.1. Introduction

To focus on the impacts of most concern in the main body of this Draft EIS, BOEM has included the analysis of resources with no greater than **minor** adverse impacts below. These include air quality; bats; birds; coastal habitat and fauna; demographics, employment, and economics; recreation and tourism; sea turtles; and wetlands. Those resources with potential impact ratings greater than **minor** are included in Draft EIS Chapter 3.

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# 3.4. Air Quality

This section discusses potential impacts on air quality from the proposed Projects, alternatives, and ongoing and planned activities in the air quality geographic analysis area. The air quality geographic analysis area, as shown on Figure 3.4-1, includes the airshed within 25 miles (40 kilometers) of the Wind Farm Development Area (corresponding to the OCS permit area) and the airshed within 15.5 miles (25 kilometers) of onshore construction areas and ports that may be used for the Projects.

## 3.4.1 Description of the Affected Environment for Air Quality

The overall geographic analysis area for air quality covers portions of northeastern New Jersey, New York City, and western Long Island; the area around the Port of Albany, New York; and over the ocean southeast of New York Harbor. This area includes the air above the Wind Farm Development Area and adjacent OCS area, the offshore and onshore export cable routes, the onshore substations, the construction staging areas, the onshore construction and proposed Project-related sites, and the ports used to support proposed Project activities. In addition, some construction-related activity could occur in the Corpus Christi, Texas area. COP Section 4.3 (Empire 2022) provides further description of the air quality geographic analysis area. Appendix I provides information on climate and meteorological conditions in the Project region.

Air quality within a region is measured in comparison to the National Ambient Air Quality Standards (NAAQS), which are standards established by USEPA pursuant to the CAA (42 USC 7409) for several common pollutants, known as criteria pollutants, to protect human health and welfare. The criteria pollutants are CO, lead, nitrogen dioxide ($NO_2$), ozone, $PM_{10}$, $PM_{2.5}$, and $SO_2$. New York, New Jersey, and Texas have established ambient air quality standards (AAQS) that are similar to the NAAQS. COP Table 4.3-1 (Empire 2022) shows the NAAQS. Emissions of lead from Project-associated sources would be negligible because lead is not a component of liquid or gaseous fuels; accordingly, lead is not analyzed in this EIS. Ozone is not emitted directly but is formed in the atmosphere from precursor chemicals, primarily $NO_X$ and VOC, in the presence of sunlight. Potential impacts of a project on ozone levels are evaluated in terms of $NO_X$ and VOC emissions.

USEPA designates all areas of the country as attainment, nonattainment, or unclassified for each criteria pollutant. An attainment area is an area where all criteria pollutant concentrations are within all NAAQS. A nonattainment area does not meet the NAAQS for one or more pollutants. Unclassified areas are those where attainment status cannot be determined based on available information and are regulated as attainment areas. An area can be in attainment for some pollutants and nonattainment for others. If an area was nonattainment at any point in the last 20 years but is currently attainment or is unclassified, then the area is designated a maintenance area. Nonattainment and maintenance areas are required to prepare a State Implementation Plan (SIP), which describes the region's program to attain and maintain compliance with the NAAQS. The attainment status of an area can be found at 40 CFR 81 and in the USEPA Green Book, which the agency revises from time to time (USEPA 2021a). Attainment status is determined through evaluation of air quality data from a network of monitors.

The nearest onshore areas to the offshore Wind Farm Development Area are the New York City boroughs of Brooklyn, Queens, and Staten Island; the southern portion of Nassau County and the southwestern portion of Suffolk County, New York; and the northeastern portion of Monmouth County, New Jersey. Project emissions potentially could occur during construction or operations in the following nonattainment and maintenance areas:

- New York-Northern New Jersey-Long Island Area, NY-NJ-CT Ozone Nonattainment Area (2008 and 2015 NAAQS)

- New York-Northern New Jersey-Long Island Area, NY-NJ-CT Carbon Monoxide Maintenance Area (1971 NAAQS)
- New York County, NY $PM_{10}$ Nonattainment Area (1987 Annual NAAQS)
- New York-Northern New Jersey-Long Island Area, NY-NJ-CT $PM_{2.5}$ Maintenance Area (1997 Annual NAAQS)
- New York-Northern New Jersey-Long Island Area, NY-NJ-CT $PM_{2.5}$ Maintenance Area (2006 24-Hour NAAQS)

The nonattainment and maintenance areas include port facilities that the Projects could use for construction or operations including the SBMT, New York. More distant ports that may be used include the Port of Albany, New York, the Port of Coeymans, New York, and Corpus Christi, Texas, which are in areas designated attainment for all pollutants.[1] Figure 3.4-2 displays the nonattainment and maintenance areas that intersect the geographic analysis area.

The CAA prohibits federal agencies from approving any activity that does not conform to a SIP. This prohibition applies only with respect to nonattainment or maintenance areas (i.e., areas that were previously nonattainment and for which a maintenance plan is required). Conformity to a SIP means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of such standards. The activities for which BOEM has authority are outside of any nonattainment or maintenance area and therefore not subject to the requirement to show conformity. All other federal agencies responsible for approval, permitting, or financing of project components within any nonattainment or maintenance area associated with the Projects should complete their own analysis to determine if conformity applies to their decisions.

The CAA defines Class I areas as certain national parks and wilderness areas where very little degradation of air quality is allowed. Class I areas consist of national parks larger than 6,000 acres and wilderness areas larger than 5,000 acres that were in existence before August 1977. Projects subject to federal air quality permits are required to notify the federal land managers responsible for designated Class I areas within 62 miles (100 kilometers) of a project.[2] The federal land manager identifies appropriate air quality–related values for the Class I area and evaluates the impact of the Projects on air quality–related values. The nearest Class I area to the Projects is the Brigantine Wilderness Area in New Jersey, about 67 miles (108 kilometers) southwest of the Projects.

The CAA amendments directed USEPA to establish requirements to control air pollution from OCS oil- and gas-related activities along the Pacific, Arctic, and Atlantic Coasts and along the U.S. Gulf Coast off Florida, east of 87° 30′ west longitude. The OCS Air Regulations (40 CFR 55) establish the applicable air pollution control requirements, including provisions related to permitting, monitoring, reporting, fees, compliance, and enforcement for facilities subject to the CAA. These regulations apply to OCS sources that are beyond state seaward boundaries. Projects within 25 nm of a state seaward boundary are required to comply with the air quality requirements of the nearest or corresponding onshore area, including applicable permitting requirements.

[1] The Port of Albany and the Port of Coeymans are in the former Albany-Schenectady-Troy Area, New York Ozone Nonattainment Area for the 1979 and 1997 NAAQS. However, USEPA has revoked these standards.
[2] The 100-kilometer distance applies to notification and is not a threshold for use in evaluating impacts. Impacts at Class I areas at distances greater than 100 kilometers may need to be considered for larger emission sources if there is reason to believe that such sources could affect the air quality in the Class I area (USEPA 1992).

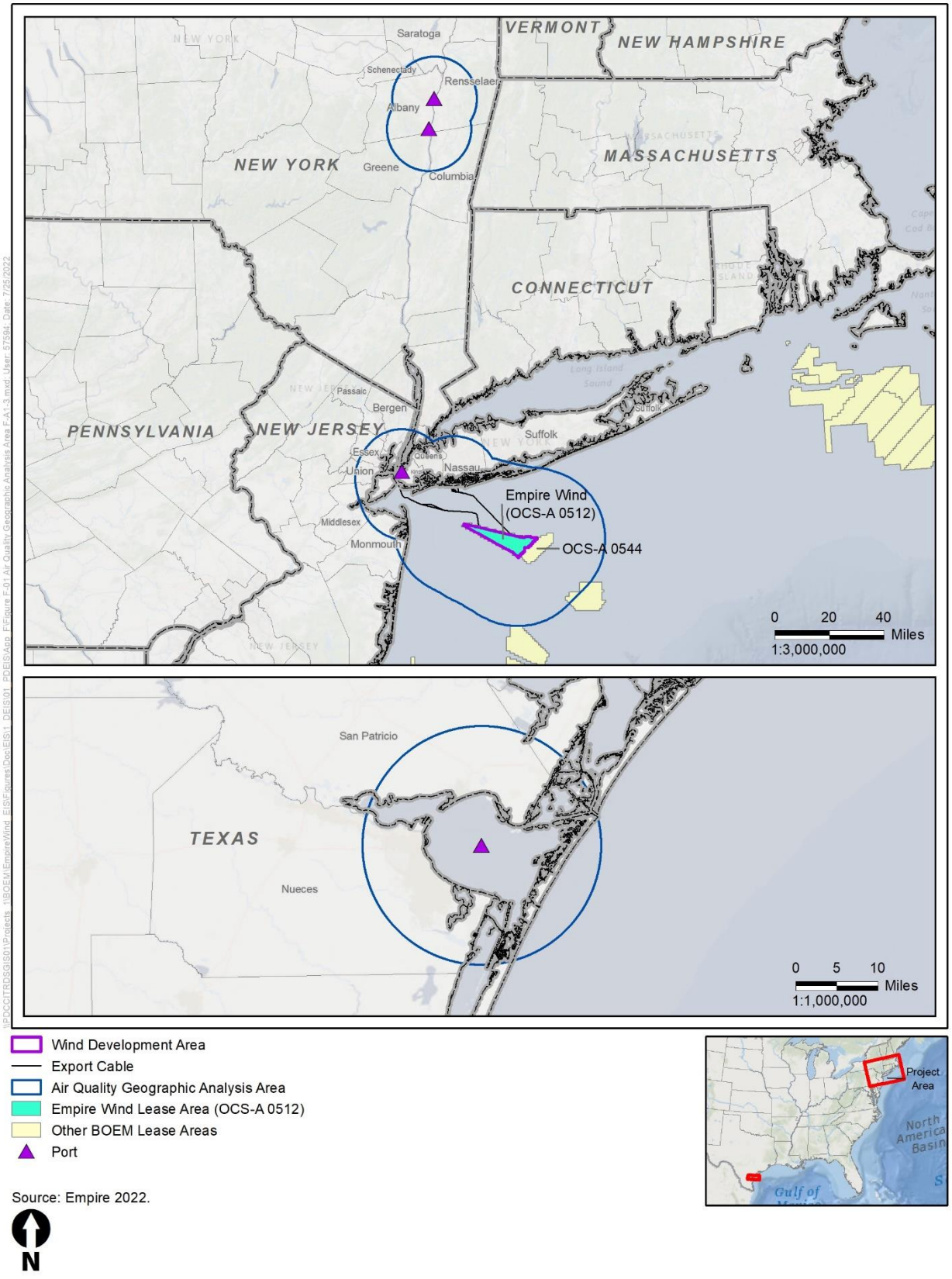
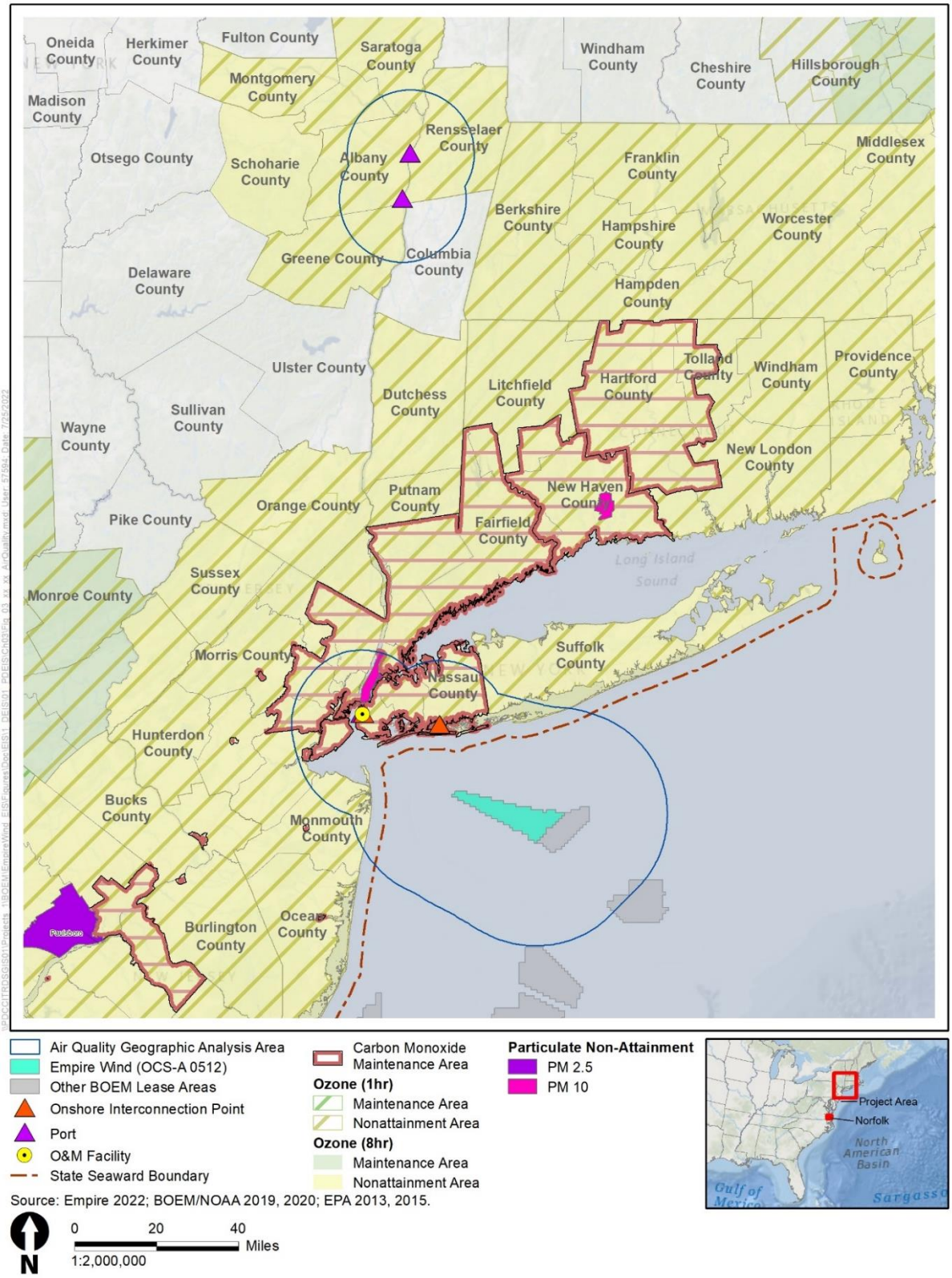



**Figure 3.4-1 Air Quality Geographic Analysis Area**




Note: Corpus Christi, Texas area is not shown.

**Figure 3.4-2 Air Quality Status of the Geographic Analysis Area**

### 3.4.2 Impact Level Definitions for Air Quality

Definitions of impact levels are provided in Table 3.4-1. Impact levels are intended to serve NEPA purposes only, and are not intended to establish thresholds or other requirements with respect to permitting under the CAA.

**Table 3.4-1 Impact Level Definitions for Air Quality**

| Impact Level | Impact Type | Definition |
|---|---|---|
| Negligible | Adverse | Increases in ambient pollutant concentrations due to Project emissions would not be detectable. |
| | Beneficial | Decreases in ambient pollutant concentrations due to Project emissions would not be detectable. |
| Minor to Moderate | Adverse | Increases in ambient pollutant concentrations due to Project emissions would be detectable but would not lead to exceedance of the NAAQS. |
| | Beneficial | Decreases in ambient pollutant concentrations due to Project emissions would be detectable. |
| Major | Adverse | Changes in ambient pollutant concentrations due to Project emissions could lead to exceedance of the NAAQS. |
| | Beneficial | Decreases in ambient pollutant concentrations due to Project emissions would be larger than for minor to moderate impacts. |

### 3.4.3 Impacts of the No Action Alternative on Air Quality

When analyzing the impacts of the No Action Alternative on air quality, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for air quality. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix F, *Planned Activities Scenario*.

#### 3.4.3.1. Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for air quality described in Section 3.4.1, *Description of the Affected Environment for Air Quality*, would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind activities within the geographic analysis area that contribute to impacts on air quality are generally associated with existing onshore land uses, including residential, commercial, industrial, and transportation activities as well as onshore construction activities. Other ongoing activities that could contribute to air quality impacts include construction of undersea transmission lines, gas pipelines, and other submarine cables; marine minerals use and ocean-dredged material disposal; military use; marine transportation; and oil and gas activities. These activities and associated impacts are expected to continue at current trends and have the potential to affect air quality through their emissions. Impacts associated with climate change could affect ambient air quality through increased formation of ozone and particulate matter associated with increasing air temperatures. See Appendix F, Table F1-1 for a summary of potential impacts associated with ongoing non-offshore wind activities by IPF for air quality. There are no ongoing offshore wind activities within the geographic analysis area for air quality.

State policies and plans to encourage and develop renewable energy sources in the region are summarized below.

***New York***

The New York State Climate Leadership and Community Protection Act set an expanded Clean Energy Standard, which requires that 70 percent of New York's electricity come from renewable sources by 2030. In 2014, Governor Andrew Cuomo launched an energy policy, Reforming the Energy Vision, to build an integrated energy network able to harness the combined benefits of the central grid with clean, locally generated power. The State Energy Plan sets a roadmap for the Reforming the Energy Vision policy, combining agency coordination, regulatory reform, and measures to encourage private capital investment. The initiatives outlined in the State Energy Plan, along with private sector innovation and investment fueled by Reforming the Energy Vision, are intended to put New York State on a path to achieving the following GHG emissions limits and clean energy goals:

- 40-percent reduction in GHG emissions from 1990 levels
- 50 percent of energy generation from renewable energy sources
- 600 trillion British thermal unit–increase in statewide energy efficiency (reduction in energy use through efficiency improvements)

NYSERDA led the development of the New York State Offshore Wind Master Plan and is leading the coordination of offshore wind opportunities in New York state and supporting the development of 9,000 MW of offshore wind energy by 2035.

***New Jersey***

NJDEP has projected that under a scenario of continuation of current regulations and policies, emissions from electricity generation would decline slowly through 2050 due to improvements in efficiency and switching to cleaner fuels (NJDEP 2019). Under the No Action Alternative, without implementation of other future offshore wind projects, the electricity that would have been generated by offshore wind would likely be provided by fossil fuel-fired facilities.[3] As a result, the No Action Alternative could lead to less decline in emissions than would occur with offshore wind development. An overall mix of natural gas, solar, wind, and energy storage would likely occur in the future due to market forces and state energy policies. New Jersey Executive Order 92 (November 19, 2019) sets a goal of developing 7,500 MW of offshore wind energy off the coast of New Jersey by 2035. The New Jersey Energy Master Plan (New Jersey Board of Public Utilities 2019) sets a goal of transitioning New Jersey to 100 percent renewable electricity by 2050.

### 3.4.3.2. Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Planned non-offshore wind activities within the geographic analysis area that contribute to cumulative impacts on air quality are generally associated with existing onshore land uses, including residential, commercial, industrial, and transportation activities as well as onshore construction activities. Other planned non-offshore wind activities that could contribute to air quality impacts include construction of undersea transmission lines, gas pipelines, and other submarine cables; marine minerals use and ocean-dredged material disposal; military use; marine transportation; and oil and gas activities (Appendix F). These planned non-offshore wind activities have the potential to affect air quality through their emissions.

[3] In 2020, the generation mix of the PJM Interconnection, the regional grid that serves New Jersey, was approximately 40 percent natural gas, 34 percent nuclear, 19 percent coal, 3 percent wind, 2 percent hydroelectric, and 2 percent other sources, on an annual average basis (Monitoring Analytics 2021).

Impacts associated with climate change could affect ambient air quality through increased formation of ozone and particulate matter associated with increasing air temperatures.

Other planned offshore wind activities within the geographic analysis area that could contribute to impacts on air quality include:

- Construction of the Ocean Winds East project (100 WTGs), expected 2026–2030
- Construction of the Vineyard Mid-Atlantic LLC project (102 WTGs), expected 2026–2030

BOEM expects planned offshore wind activities to affect air quality through the following primary IPFs.

**Air emissions:** Most air pollutant emissions and air quality impacts from planned offshore wind projects would occur during construction, potentially from multiple projects occurring simultaneously. Construction activity would occur at different locations and could overlap temporally with activities at other locations, including operational activities at previously constructed projects. As a result, air quality impacts would shift spatially and temporally across the air quality geographic analysis area. All projects would be required to comply with the CAA. Primary emission sources would include vessel traffic, increased public and commercial vehicular traffic, air traffic, combustion emissions from construction equipment, and fugitive particle emissions from construction-generated dust. During operations, emissions from planned offshore wind projects within the air quality geographic analysis area would overlap temporally, but operations would contribute few criteria pollutant emissions compared to construction and decommissioning. Operational emissions would come largely from commercial vessel traffic and emergency diesel generators. The aggregate operational emissions for all projects within the air quality geographic analysis area would vary by year as successive projects begin operation. As wind energy projects come online, power generation emissions overall would decrease and the region as a whole would realize a net benefit to air quality.

The planned offshore wind projects other than the Proposed Action that may result in air pollutant emissions and air quality impacts within the air quality geographic analysis area include projects within all or portions of lease areas OCS-A 0537 and OCS-A 0544. Wind energy projects currently proposed in these lease areas include Ocean Winds East and Vineyard Mid-Atlantic LLC, respectively. These projects would produce renewable power from the installation of 202 WTGs (Table F2-1). Based on the assumed offshore construction schedule in Table F2-1, construction of Ocean Winds East (2026–2030), Vineyard Mid-Atlantic LLC (2026–2030), and the Proposed Action (2023–2027) would overlap in 2026 and 2027. Ocean Winds East and Vineyard Mid-Atlantic LLC would produce 2,424 MW of renewable power from the installation of 202 WTGs (Table F2-1). Based on the assumed offshore construction schedule in Table F2-1, those projects within the geographic analysis area (Ocean Winds East and Vineyard Mid-Atlantic LLC) would have overlapping construction periods beginning in 2026 and continuing through 2030.

During the construction phase, the total emissions of criteria pollutants and ozone precursors from offshore wind projects other than Empire Wind (Ocean Winds East and Vineyard Mid-Atlantic LLC) proposed within the air quality geographic analysis area, summed over all construction years, are estimated to be 4,445 tons of CO, 23,030 tons of $NO_X$, 754 tons of $PM_{10}$, 721 tons of $PM_{2.5}$, 136 tons of $SO_2$, 604 tons of VOCs, and 1,352,808 tons of $CO_2$ (Table F2-4). Most emissions would occur from diesel-fueled construction equipment, vessels, and commercial vehicles. The magnitude of the emissions and the resulting air quality impacts would vary spatially and temporally during the construction phases. Construction activity would occur at different locations and could overlap temporally with activities at other locations, including operational activities at previously constructed projects. As a result, air quality impacts would shift spatially and temporally across the air quality geographic analysis area.

During operations, emissions from planned offshore wind projects within the air quality geographic analysis area would overlap temporally, but operations would contribute few criteria pollutant emissions

compared to construction and decommissioning. Operational emissions would come largely from commercial vessel traffic and emergency diesel generators. The aggregate operational emissions for all projects within the air quality geographic analysis area (Ocean Winds East and Vineyard Mid-Atlantic LLC) would vary by year as successive projects begin operation. Estimated operational emissions would be 83 tons per year of CO, 327 tons per year of $NO_X$, 12 tons per year of $PM_{10}$, 11 tons per year of $PM_{2.5}$, 2 tons per year of $SO_2$, 8 tons per year of VOCs, and 24,224 tons per year of $CO_2$ (Table F2-4). Cumulatively, operational emissions would be intermittent and dispersed throughout the offshore wind lease areas and the vessel routes from the onshore O&M facility, and would generally contribute to small and localized air quality impacts.

Offshore wind energy development, by displacing fossil-fuel energy, would help offset emissions from fossil fuels, improving regional air quality and reducing GHG. An analysis by Katzenstein and Apt (2009), for example, estimates that $CO_2$ emissions can be reduced by up to 80 percent and $NO_X$ emissions can be reduced up to 50 percent by implementing wind energy projects.[4] An analysis by Barthelmie and Pryor (2021) calculated that, depending on global trends in GHG emissions and the amount of wind energy expansion, development of wind energy could reduce predicted increases in global surface temperature by 0.3–0.8 °C (0.5–1.4 °F) by 2100. Estimations and evaluations of potential health and climate benefits from offshore wind activities for specific regions and project sizes rely on information about the air pollutant emission contributions of the existing and projected mixes of power generation sources, and generally estimate the annual health benefits of an individual commercial scale offshore wind project to be valued in the hundreds of millions of dollars (Kempton et al. 2005; Buonocoure et al. 2016).

Construction and operation of offshore wind projects would produce GHG emissions that would contribute incrementally to climate change. $CO_2$ is relatively stable in the atmosphere and, for the most part, mixed uniformly throughout the troposphere and stratosphere. As such, the impact of GHG emissions does not depend upon the source location. Increasing energy production from offshore wind projects would likely reduce regional GHG emissions by displacing energy from fossil fuels. This reduction would more than offset the relatively small GHG emissions from offshore wind projects. This reduction in regional GHG emissions would be noticeable in the regional context, would contribute incrementally to reducing climate change, and would represent a moderate beneficial impact in the regional context but a negligible beneficial impact in the global context.

**Accidental releases:** Planned offshore wind activities could release air toxics or hazardous air pollutants (HAP) because of accidental chemical spills within the air quality geographic analysis area. Section 3.21, *Water Quality*, includes a discussion of the nature of releases that would be anticipated. Based on Table F2-3, up to about 128,184 gallons (485,229 liters) of coolants and 736,764 gallons (2.8 million liters) of oils and lubricants would be contained within the 202 WTGs, and 317,006 gallons (1.2 million liters) of oils and lubricants and 15,580 gallons (60,000 liters) of diesel fuel would be contained in the 202 WTGs and four OSS for the wind energy projects within the air quality geographic analysis area. If accidental releases occur, they would be most likely during construction but could occur during operations and decommissioning of offshore wind facilities. These may lead to short periods (hours to

[4] Katzenstein and Apt (2009) modeled a system of two types of natural gas generators, four wind farms, and one solar farm. The power output of wind and solar facilities can vary relatively rapidly, and the natural gas generators change their power output accordingly to meet electrical demand. When gas generators change their power output their emission rates may increase above their steady-state levels. As a result, the net emissions reductions realized from gas generators reducing their output in response to wind and solar power can be less than the reduction that would be expected based on the amount of wind and solar power. The study found that reductions in $CO_2$ emissions would be about 80 percent, and in $NO_X$ emissions about 30–50 percent, of the emissions reductions expected if the power fluctuations caused no additional emissions.

days)[5] of HAP emissions through surface evaporation. HAP emissions would consist of VOCs, which may be important for ozone formation. By comparison, the smallest tanker vessel operating in these waters (a general-purpose tanker) has a capacity of between 3.2 and 8 million gallons (12.1 million and 30.3 million liters). Tankers are relatively common in these waters, and the total WTG chemical storage capacity within the geographic analysis area for air quality is much less than the volume of hazardous liquids transported by ongoing activities (U.S. Energy Information Administration 2014). Moreover, liquids associated with the Projects would be distributed among hundreds of independent marine-grade containers spread out over many different structures, thus making any kind of full release extremely unlikely. BOEM expects air quality impacts from accidental releases would be temporary and limited to the area near the accidental release location. Accidental spills would occur infrequently over a 35-year period with a higher probability of spills during planned project construction, but they would not be expected to contribute appreciably to cumulative impacts on air quality.

#### 3.4.3.3. Conclusions

**Impacts of the No Action Alternative.** Under the No Action Alternative, air quality would continue to be affected by existing environmental trends and ongoing activities. Additional, higher-emitting, fossil-fuel energy facilities would be kept in service to meet power demand, fired by natural gas, oil, or coal. BOEM anticipates that ongoing non-offshore wind activities would result in **moderate** impacts on air quality because of air pollutant emissions and GHGs. Ongoing activities would result in moderate impacts on air quality because their emissions would incrementally increase ambient pollutant concentrations, though not by enough to cause a new violation of the NAAQS, New Jersey AAQS, or New York AAQS or contribute substantially to an existing violation. Although the proposed Projects would not be built under the No Action Alternative, BOEM expects ongoing non-offshore wind activities would continue to have regional air quality impacts primarily through air pollutant emissions, accidental releases, and climate change.

**Cumulative Impacts of the No Action Alternative.** Under the No Action Alternative, air quality would continue to be affected by natural and human-caused IPFs. Planned non-offshore wind activities may also contribute to impacts on air quality because air pollutant and GHG emissions would increase through construction and operation of new energy generation facilities to meet future power demands (Table F1-1). Continuation of current regional trends in energy development could include new power plants that could contribute to air quality and GHG impacts in New York and the neighboring states. BOEM expects the combination of ongoing and planned activities other than offshore wind to result in **moderate** impacts on air quality, primarily driven by recent market and permitting trends indicating future fossil-fueled electric generating units would most likely include natural-gas-fired facilities.

Offshore wind activities in the geographic analysis area would contribute to the emissions of criteria pollutants, VOCs, HAPs, and GHGs, mostly released during construction and decommissioning. Impacts would be minor because these emissions would incrementally increase ambient pollutant concentrations, though not by enough to cause a violation of the NAAQS, New Jersey AAQS, or New York AAQS or contribute substantially to an existing violation. Pollutant emissions during operations would be generally lower and more transient. Most air pollutant emissions and air quality impacts would occur during multiple overlapping project construction phases from 2026 through 2030 (Table F2-4). Adverse air quality impacts from planned offshore wind projects are expected to be relatively small and transient. Planned offshore wind projects likely would lead to reduced emissions from fossil-fueled power generating facilities and consequent minor to moderate beneficial impacts on regional air quality after offshore wind projects are operational.

[5] For example, small diesel fuel spills (500–5,000 gallons) usually will evaporate and disperse within a day or less (NOAA 2006).

BOEM anticipates that the cumulative impacts of the No Action Alternative would result in **moderate** adverse impacts due to emissions of criteria pollutants, VOCs, HAPs, and GHGs, mostly released during construction and decommissioning, because these emissions would incrementally increase ambient pollutant concentrations (more than would activities without offshore wind or offshore wind alone), though not by enough to cause a violation of the NAAQS, New Jersey AAQS, or New York AAQS or contribute substantially to an existing violation.

BOEM expects **minor** to **moderate beneficial** impacts on regional air quality after offshore wind projects are operational because these projects likely would lead to reduced emissions from fossil-fueled power generating facilities.

### 3.4.4 Relevant Design Parameters & Potential Variances in Impacts of the Action Alternatives

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The following PDE parameters (Appendix E) would influence the magnitude of the impacts on air quality:

- Emission ratings of construction equipment and vehicle engines;
- Location of construction laydown areas;
- Choice of cable-laying locations and pathways;
- Choice of marine traffic routes to and from the Wind Farm Development Area and offshore export cable routes;
- Soil characteristics at excavation areas, which may affect fugitive emissions; and
- Emission control strategy for fugitive emissions due to excavation and hauling operations.

Changes to the design capacity of the WTGs would not alter the maximum potential air quality impacts for the Proposed Action and other action alternatives because the maximum-case scenario involved the maximum number of WTGs allowed in the PDE.

### 3.4.5 Impacts of the Proposed Action on Air Quality

The Projects may generate emissions and affect air quality in the New York City region and nearby coastal waters during construction, O&M, and decommissioning activities. Onshore emissions would occur in the onshore export cable corridors and at points of interconnection. Offshore emissions would be within the OCS and state offshore waters. Offshore emissions would occur in the Lease Area and the offshore export cable corridors. COP Section 8.2 (Empire 2022) provides additional information on land use and proposed ports.

Air quality in the geographic analysis area may be affected by emissions of criteria pollutants from sources involved in the construction or maintenance of the proposed Projects and, potentially, during operations. These impacts, while generally localized to the areas near the emission sources, may occur at any location associated with the proposed Projects, be it offshore in the Wind Farm Development Area or at any of the onshore construction or support sites. Ozone levels in the region also could be affected.

The proposed Projects' WTGs, substations, and offshore and onshore cable corridors would not themselves generate air pollutant emissions during normal operations. However, air pollutant emissions from equipment used in the construction, O&M, and decommissioning phases could affect air quality in the proposed Project area and nearby coastal waters and shore areas. Most emissions would occur

temporarily during construction, offshore in the Wind Farm Development Area, onshore at the landfall sites, along the offshore and onshore export cable routes, at the onshore substations, and at the construction staging areas. Additional emissions related to the proposed Projects could also occur at nearby ports used to transport material and personnel to and from the Project site. However, the proposed Projects would provide beneficial impacts on the air quality near the proposed Project location and the surrounding region to the extent that energy produced by the Projects would displace energy produced by fossil-fueled power plants in the region.

The majority of air pollutant and GHG emissions from the Proposed Action would come from the main engines, auxiliary engines, and auxiliary equipment on marine vessels used during offshore construction activities. Fugitive dust emissions would occur as a result of excavation and hauling of soil during onshore construction activities. Emissions from the OCS source, as defined in the CAA, would be permitted as part of the OCS permitting process that is underway by Empire.

**Air emissions – construction:** Fuel combustion and solvent use would cause construction-related emissions. The air pollutants would include criteria pollutants, VOCs, and HAPs, as well as GHGs. During the construction phase, the activities of additional workers, increased traffic congestion, additional commuting miles for construction personnel, and increased air-polluting activities of supporting businesses also could have impacts on air quality. Construction equipment would comply with all applicable emissions and fuel-efficiency standards to minimize combustion emissions and associated air quality impacts. The total estimated construction emissions of each pollutant are summarized in Table 3.4-2.

**Table 3.4-2 Empire Wind Total Construction Emissions (U.S. tons)**

| Year | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC | $CO_2e$[1] |
|---|---|---|---|---|---|---|---|
| 2023 | <1 | 1 | <1 | <1 | <1 | <1 | 280 |
| 2024 | 185 | 779 | 19 | 19 | 16 | 31 | 48,380 |
| 2025 | 816 | 3,330 | 91 | 89 | 75 | 168 | 202,661 |
| 2026 | 920 | 3,597 | 108 | 105 | 68 | 150 | 215,973 |
| 2027 | 721 | 2,422 | 75 | 73 | 43 | 103 | 160,035 |
| **Total** | **2,642** | **10,130** | **295** | **286** | **202** | **453** | **627,329** |

Source: Appendix F, Table F2-4
Sum of individual values may not equal total due to rounding.
[1] Calculation of $CO_2e$ is based on 100-year global warming potentials published by USEPA in Table A-1 of 40 CFR Part 98, Subpart A. The global warming potentials are 1 for $CO_2$, 25 for methane, 298 for nitrous oxide, and 22,800 for sulfur hexafluoride.
< = less than; $CO_2e$ = carbon dioxide equivalent

### *Offshore Construction*

Emissions from construction activities would vary throughout the construction and installation of offshore components. Emissions from offshore activities would occur during pile and scour protection installation, offshore cable laying, turbine installation, and substation installation. Offshore construction-related emissions also would come from diesel-fueled generators used to temporarily supply power to the WTGs and substations so that workers could operate lights, controls, and other equipment before cabling is in place. There also would be emissions from engines used to power pile-driving hammers and air compressors used to supply compressed air to noise-mitigation devices during pile driving (if used). Emissions from vessels used to transport workers, supplies, and equipment to and from the construction areas would result in additional air quality impacts. The Projects may need emergency generators at times, potentially resulting in increased emissions for limited periods. Empire's APMs to reduce air

quality impacts include compliance with applicable emissions standards (APM 28 and APM 31) and fuel sulfur content standards (APM 29 and APM 30), purchase of emission-reduction credits where required (APM 27), data and information sharing with BOEM and USEPA (APM 32 and APM 33), compliance with state regulations on engine idling (APM 34), and compliance with a Fugitive Dust Control Plan (see COP Section 4.3.2.1 and Table 9-1; Empire 2022).

The nearest Class I area, the Brigantine Wilderness Area in New Jersey, is more than 67 miles (108 kilometers) from the Projects. This distance is greater than the 100-kilometer distance within which USEPA recommends that the federal land manager of the Class I area be notified about a project that requires a federal air quality permit. Winds blow from the Project area toward the Brigantine Wilderness Area for only a small proportion of the year (see Appendix I, Figure I-1). Emissions from Project construction activities would not be concentrated at a single point but would occur throughout the geographic analysis area. As a result, Project emissions would be relatively well dispersed before being transported toward the Brigantine Wilderness Area. For these reasons, adverse air quality impacts are not expected at the Brigantine Wilderness area due to the Projects.

Air quality impacts due to offshore wind projects within the air quality geographic analysis area are anticipated to be small relative to those of combined impacts of larger emission sources in the region, such as fossil-fueled power plants. The largest air quality impacts of offshore wind projects are anticipated during construction, with smaller and more infrequent impacts anticipated during decommissioning. Most emissions would occur from diesel-fueled construction equipment, vessels, and commercial vehicles. The magnitude of the emissions and the resulting air quality impacts would vary spatially and temporally during the construction phases.

Construction activity would occur at different locations and could overlap temporally with activities at other locations, including operational activities at previously constructed projects. As a result, air quality impacts would shift spatially and temporally across the air quality geographic analysis area. The largest combined air quality impacts from offshore wind would occur during overlapping construction and decommissioning of multiple offshore wind projects. Construction of the proposed Projects would overlap with the early years of construction of Ocean Winds East and Vineyard Mid-Atlantic LLC (Table F2-4). Most air quality impacts would remain offshore because the highest emissions would occur in the offshore region and the westerly prevailing winds would result in most emission plumes remaining offshore for some distance. Although air quality offshore is subject to the NAAQS in federal waters and the OCS permit area, the amount of human exposure offshore is typically very low. However, ozone and some particulate matter are formed in the atmosphere from precursor emissions and can be transported longer distances, potentially over land.

***Onshore Construction***

Onshore activities of the Proposed Action would consist primarily of HDD, duct bank construction, cable-pulling operations, and substation construction. Emissions would primarily be from operation of diesel-powered equipment and vehicle activity such as bulldozers, excavators, and heavy trucks, and fugitive particulate emissions from excavation and hauling of soil. Empire's APMs include complying with applicable emissions standards (APM 28 and APM 31) and fuel sulfur content standards (APM 29 and APM 30), purchase of emission-reduction credits where required (APM 27), data and information sharing with BOEM and USEPA (APM 32 and APM 33), compliance with state regulations on engine idling (APM 34), and compliance with a Fugitive Dust Control Plan (see COP Section 4.3.2.1 and Table 9-1; Empire 2022).

These onshore emissions would be highly variable and limited in spatial extent at any given period and would result in minor impacts, as they would be temporary in nature. Fugitive particulate emissions

would vary depending on the spatial extent of the excavated areas, soil type, soil moisture content, and magnitude and direction of ground-level winds.

**Air emissions – O&M:** During O&M, air quality impacts are anticipated to be smaller in magnitude compared to construction and decommissioning. Offshore O&M activities would consist of WTG operations, planned maintenance, and unplanned emergency maintenance and repairs. The WTGs operating under the Proposed Action would have no pollutant emissions. Emergency generators on the WTGs and the substations would operate only during emergencies or testing, so emissions from these sources would be small and transient. Pollutant emissions from O&M would be mostly the result of operations of ocean vessels and helicopters used for maintenance activities. Crew transfer vessels and helicopters would transport crews to the Wind Farm Development Area for inspections, routine maintenance, and repairs. Jack-up vessels, multipurpose offshore support vessels, and rock-dumping vessels would travel infrequently to the Wind Farm Development Area for significant maintenance and repairs. The proposed Projects' contribution would be additive with the impact(s) of any and all other operational activities, including offshore wind activities, that occur within the air quality geographic analysis area. COP Section 3.5 (Empire 2022) provides a more detailed description of offshore and onshore O&M activities, and COP Table 4.3-9 summarizes emissions during O&M. The annual estimated emissions for O&M are summarized in Table 3.4-3.

**Table 3.4-3 Empire Wind Operations and Maintenance Emissions (U.S. tons)**

| Period | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC | $CO_2e$[1] |
|---|---|---|---|---|---|---|---|
| Annual | 228 | 479 | 13 | 12 | 7 | 21 | 45,918 |
| Lifetime (35 years) | 7,968 | 16,763 | 448 | 434 | 253 | 729 | 1,607,130 |

Source: Appendix F, Table F2-4
[1] Calculation of $CO_2e$ is based on 100-year global warming potentials published by USEPA in Table A-1 of 40 CFR Part 98, Subpart A. The global warming potentials are 1 for $CO_2$, 25 for methane, 298 for nitrous oxide, and 22,800 for sulfur hexafluoride.
$CO_2e$ = carbon dioxide equivalent

BOEM anticipates that air quality impacts from O&M of the Proposed Action would be minor, occurring for short periods of time several times per year during the proposed 35 years.

Emissions from onshore O&M activities would be limited to periodic use of construction vehicles and equipment. Onshore O&M activities would include occasional inspections and repairs to the onshore substation and splice vaults, which would require minimal use of worker vehicles and construction equipment. Empire intends to construct and maintain an O&M facility to support O&M activities. A location for this facility at the SBMT is being considered (see COP Section 3.5; Empire 2022). BOEM anticipates that air quality impacts due to onshore O&M from the Proposed Action would be minor, intermittent, and occurring for short periods.

Increases in renewable energy could lead to reductions in emissions from fossil-fueled power plants. The USEPA Avoided Emissions and Generation Tool (USEPA 2021b) was used to estimate the emissions avoided as a result of the Proposed Action. Once operational, the Proposed Action would result in annual avoided emissions of 953 tons of $NO_X$, 292 tons of $PM_{2.5}$, 232 tons of $SO_2$, and 3,573,860 tons of $CO_2$. This estimate is derived assuming the electricity generation mix of 2018 for generating units in New York and New Jersey that is included in the Avoided Emissions and Generation Tool. If renewable energy sources make up more of the electricity generation mix in the future, these potential benefits would be proportionally diminished as overall air emissions decrease and air quality improves. The avoided $CO_2$ emissions are equivalent to the emissions generated by about 705,000 passenger vehicles in a year (USEPA 2020a). Accounting for construction emissions and assuming decommissioning emissions would be the same, and including emissions from future operations, operation of the Proposed Action would

offset emissions related to its development and eventual decommissioning within different time periods of operation depending on the pollutant: $PM_{2.5}$ and $SO_2$ each would be offset in approximately 1 year of operation, and $CO_2$ in 3 months. $NO_X$ emissions would be offset in approximately 34 years, or nearly the Projects' lifetime. If emissions from future operations and decommissioning were not included, the times required for emissions to "break even" would be shorter. From that point, the Projects would be offsetting emissions that would otherwise be generated from another source.

The potential health benefits of avoided emissions can be evaluated using USEPA's CO-Benefits Risk Assessment (COBRA) health impacts screening and mapping tool (USEPA 2020b). COBRA is a tool that estimates the health and economic benefits of clean energy policies. COBRA was used to analyze the avoided emissions that were calculated for the Proposed Action. Table 3.4-4 presents the estimated avoided health effects. The estimates in Table 3.4-4 are based on the reduction in electrical generation from fossil fuel combustion during Project operation. If emissions increases from Project O&M were included, the net avoided health effects and monetized benefits would be lower.

**Table 3.4-4 COBRA Estimate of Annual Avoided Health Effects with Proposed Action**

| Discount Rate[1] (2023) | Avoided Mortality (cases per year) | | Monetized Total Health Benefits (U.S. dollars per year) | |
|---|---|---|---|---|
| | Low Estimate[2] | High Estimate[2] | Low Estimate[2] | High Estimate[2] |
| 3% | 7.613 | 17.223 | $84,807,165 | $191,089,005 |
| 7% | 7.613 | 17.223 | $75,691,313 | $170,408,581 |

[1] The discount rate is used to express future economic values in present terms. Not all health effects and associated economic values occur in the year of analysis. Therefore, COBRA accounts for the "time value of money" preference (i.e., a general preference for receiving economic benefits now rather than later) by discounting benefits received later (USEPA 2020c).
[2] The low and high estimates are derived using two sets of assumptions about the sensitivity of adult mortality and non-fatal heart attacks to changes in ambient $PM_{2.5}$ levels. Specifically, the high estimates are based on studies that estimated a larger effect of changes in ambient $PM_{2.5}$ levels on the incidence of these health effects (USEPA 2020c).

The overall impacts of GHG emissions can be assessed using "social costs." The "social cost of carbon," "social cost of nitrous oxide," and "social cost of methane"—together, the "social cost of greenhouse gases" (SC-GHG)—are estimates of the monetized damages associated with incremental increases in GHG emissions in a given year.

CEQ is currently updating its 2016 guidance document (CEQ 2016) on consideration of GHGs and climate change under NEPA. While CEQ works on updated guidance, it has instructed agencies to consider and use all tools and resources available to them in assessing GHG emissions and climate change effects including its 2016 GHG guidance document. The 2016 CEQ guidance noted that NEPA does not require monetizing costs and benefits but allows the use of the social cost of carbon, SC-GHG, or other monetized costs and benefits of GHGs in weighing the merits and drawbacks of alternative actions. SC-GHG estimates are presented below for purposes of information and disclosure.

For federal agencies, the best currently available estimates of SC-GHG are the interim estimates of the social costs of $CO_2$, methane, and nitrous oxide developed by the Interagency Working Group (IWG) on SC-GHG and published in its Technical Support Document (IWG 2021). IWG's SC-GHG estimates are based on complex models describing how GHG emissions affect global temperatures, sea level rise, and other biophysical processes; how these changes affect society through, for example, agricultural, health, or other effects; and monetary estimates of the market and nonmarket values of these effects. One key parameter in the models is the discount rate, which is used to estimate the present value of the stream of

future damages associated with emissions in a particular year. The discount rate accounts for the "time value of money," i.e., a general preference for receiving economic benefits now rather than later, by discounting benefits received later. A higher discount rate assumes that future benefits or costs are more heavily discounted than benefits or costs occurring in the present (i.e., future benefits or costs are less valuable or are a less significant factor in present-day decisions). IWG developed the current set of interim estimates of SC-GHG using three different annual discount rates: 2.5 percent, 3 percent, and 5 percent (IWG 2021).

There are multiple sources of uncertainty inherent in the SC-GHG estimates. Some sources of uncertainty relate to physical effects of GHG emissions, human behavior, future population growth and economic changes, and potential adaptation (IWG 2021). To better understand and communicate the quantifiable uncertainty, the IWG method generates several thousand estimates of the social cost for a specific gas, emitted in a specific year, with a specific discount rate. These estimates create a frequency distribution based on different values for key uncertain climate model parameters. The shape and characteristics of that frequency distribution demonstrate the magnitude of uncertainty relative to the average or expected outcome.

To further address uncertainty, IWG recommends reporting four SC-GHG estimates in any analysis. Three of the SC-GHG estimates reflect the average damages from the multiple simulations at each of the three discount rates. The fourth value represents higher-than-expected economic impacts from climate change. Specifically, it represents the 95th percentile of damages estimated, applying a 3-percent annual discount rate for future economic effects. This is a low-probability but high-damage scenario and represents an upper bound of damages within the 3-percent discount rate model. The estimates below follow the IWG recommendations.

Table 3.4-5 presents the SC-GHG associated with estimated emissions from the Proposed Action. These estimates represent the present value of future market and nonmarket costs associated with $CO_2$, methane, and nitrous oxide emissions. In accordance with IWG's recommendation, four estimates were calculated based on IWG estimates of social cost per metric ton of emissions for a given emissions year and Empire's estimates of emissions in each year. In Table 3.4-5, negative values represent social benefits of avoided GHG emissions. The negative values for net SC-GHG indicate that the impact of the Proposed Action on GHG emissions and climate would be a net benefit in terms of SC-GHG.

**Table 3.4-5 Estimated Social Cost of GHGs associated with the Proposed Action**

| Description | Social Cost of GHGs (2020$)[1,2] | | | |
|---|---|---|---|---|
| | Average Value, 5% discount rate | Average Value, 3% discount rate | Average Value, 2.5% discount rate | 95th Percentile Value, 3% discount rate |
| Construction, Operation, and Decommissioning | $20,483,000 | $81,201,000 | $124,333,000 | $246,235,000 |
| Avoided Emissions | -$977,131,000 | -$4,060,472,000 | -$6,271,797,000 | -$12,404,875,000 |
| Net SC-GHG | -$956,647,000 | -$3,979,271,000 | -$6,147,464,000 | -$12,158,640,000 |

Estimates are the sum of the social costs for $CO_2$, methane, and nitrous oxide over the Project lifetime.
Estimates are rounded to the nearest $1,000.
[1] NYSDEC calculates SC-GHG using discount rates of 1%, 2%, and 3% (NYSDEC 2022), which differ from the IWG recommended rates used in the table. If the estimated SC-GHG for the Proposed Action were calculated using the NYSDEC rates, the estimates would differ from those shown in the table.
[2] The following calendar years were used in calculating SC-GHG: construction 2023–2027, operation (30 years) 2028–2057, and decommissioning 2058–2059.

**Air emissions – decommissioning:** At the end of the operational lifetime of the Projects, Empire would decommission the Projects. Empire anticipates that all structures above the seabed level or aboveground would be completely removed. The decommissioning sequence would generally be the reverse of the construction sequence, involve similar types and numbers of vessels, and use similar equipment.

The dismantling and removal of the turbine components (blades, nacelle, and tower) and other offshore components would largely be a "reverse installation" process subject to the same constraints as the original construction phase. Onshore decommissioning activities would include removal of facilities and equipment and restoration of the sites to pre-Project conditions where warranted. Emissions from Project decommissioning would be less than for construction, as shown in Table 3.4-6. The Projects anticipate pursuing a separate OCS Air Permit for those activities because it is assumed that marine vessels, equipment, and construction technology will change substantially in the next 35 years and in the future will have lower emissions than current vessels and equipment. BOEM anticipates minor and temporary air quality impacts from the Proposed Action due to decommissioning.

**Table 3.4-6 Empire Wind Decommissioning Emissions (U.S. tons)**

| Period | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC | $CO_2e$[1] |
|---|---|---|---|---|---|---|---|
| Total | 422 | 1,698 | 50 | 48 | 35 | 78 | 101,050 |

Source: COP Appendix K, Table K-8 (Empire 2022)
[1] Calculation of $CO_2e$ is based on 100-year global warming potentials published by USEPA in Table A-1 of 40 CFR Part 98, Subpart A. The global warming potentials are 1 for $CO_2$, 25 for methane, 298 for nitrous oxide, and 22,800 for sulfur hexafluoride.
$CO_2e$ = carbon dioxide equivalent

The Proposed Action would produce GHG emissions that contribute to climate change; however, its contribution would be less than the emissions displaced during operation of the Projects. Because GHG emissions disperse and mix within the troposphere, the climatic impact of GHG emissions does not depend upon the source location. Therefore, regional climate impacts are largely a function of global emissions. Consequently, the Proposed Action would have negligible impacts on climate change during construction and operation, and an overall net beneficial impact on criteria pollutant and ozone precursor emissions as well as GHGs, compared to a similarly sized fossil-fueled power plant or to the generation of the same amount of energy by the existing grid.

**Accidental releases:** The proposed Projects could release VOCs or HAPs because of accidental chemical spills. Based on Table F2-3, the Proposed Action would have up to about 128,184 gallons (485,228 liters) of coolants and damping liquid, 1,053,770 gallons (4.0 million liters) of oils and lubricants, and 15,850 gallons (59,999 liters) of diesel fuel in its 147 wind turbine and 2 substation structures. Accidental releases including spills from vessel collisions and allisions may lead to short periods of VOC and HAP emissions through evaporation. VOC emissions also would be a precursor to ozone formation. Air quality impacts would be temporary and limited to the local area at and around the accidental release location. BOEM anticipates that a major spill is very unlikely due to vessel and offshore wind energy industry safety measures, as discussed in Section 3.21.3.2, as well as the distributed nature of the material. BOEM anticipates that these activities would have a negligible air quality impact as a result of the Proposed Action.

### 3.4.5.1. Impact of the Connected Action

The connected action would affect air quality in the geographic analysis area through the following IPFs: accidental releases and air pollutant emissions. The connected action was evaluated in the Full Environment Assessment Form Supplemental Analysis for SBMT (NYCEDC 2022), which is included in this EIS as Appendix P.

**Accidental releases:** Accidental releases of fuel, fluids, or hazardous materials could occur during staging and assembly of Project components at SBMT. NYCEDC would develop and implement a SWPPP or SPCC plan to manage accidental spills or releases of oil, fuel, or hazardous materials during construction and operation of improvements at the SBMT. The provisions of the SWPPP or SPCC plan would minimize emissions to the atmosphere that could occur due to accidental releases. Accordingly, accidental releases from the connected action alone would have localized, short-term, negligible to minor impacts on air quality.

**Air emissions:** The SBMT infrastructure improvement project would improve the terminal site that Empire would use for construction and staging of some Project components. Construction and operation of SBMT, and some Project construction and O&M activities, would occur in close proximity to each other on the site and would overlap in time.

Emission sources associated with SBMT would include land-based non-road equipment and on-road vehicles, and vessels accessing the site. SBMT performed air quality dispersion modeling to estimate pollutant concentrations for the highest-emissions periods for SBMT construction and operation. The results showed that all concentrations would be well within the NAAQS and New York AAQS (NYCEDC 2022, Table 3.20-6).

Construction and operation of the Proposed Action at SBMT would include land-based non-road equipment and on-road vehicles, vessels accessing the site, and emergency generators. These emissions potentially could increase pollutant concentrations above the levels that were modeled for SBMT. Comparison of the relative emissions for the Projects and SBMT indicates that the combined concentrations for the Projects and SBMT would be expected to be within the NAAQS and New York AAQS for each pollutant, for all years of the Projects' construction and operation.

### 3.4.5.2. Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned activities, and the connected action at SBMT.

**Offshore construction.** The contribution of the Proposed Action to the cumulative impacts on air quality from ongoing and planned activities would be minor during construction. During overlapping construction activities, there could be higher levels of impacts, but these effects would be temporary in nature, as the overlap in the air quality geographic analysis area would be limited in duration.

**Onshore construction.** The contribution of the Proposed Action to cumulative air quality impacts from ongoing and planned activities associated with onshore construction would be minor. Emissions from ongoing and planned activities, including the Proposed Action, would be highly variable and limited in spatial extent at any given period. As with the Proposed Action, fugitive particulate emissions would vary depending on the spatial extent of the excavated areas, soil type, soil moisture content, and magnitude and direction of ground-level winds.

**Air emissions – O&M.** The contribution of the Proposed Action O&M emissions to the combined impacts of ongoing and planned activities would be minor. O&M emissions associated with planned offshore wind activities would largely be due to the same source types as for the Proposed Action, including commercial vessel traffic, air traffic such as helicopters, and operation of emergency diesel generators. Such activity would result in intermittent, and widely dispersed emissions. Planned offshore wind activities, including the Proposed Action, are estimated to emit 522 tons per year of CO, 743 tons per year of $NO_X$, 36 tons per year of $PM_{10}$, 34 tons per year of $PM_{2.5}$, 16 tons per year of $SO_2$, 49 tons per year of VOCs, and 111,383 tons per year of $CO_2$ when all projects are operating (Table F2-4). Anticipated impacts on air quality from O&M emissions would be transient, small in magnitude, and localized.

Additionally, some emissions associated with O&M activities could overlap with other projects' construction-related emissions. The largest magnitude air quality impacts and largest spatial extent would result from the overlapping operations activities from the offshore wind projects within the air quality geographic analysis area. However, a net improvement in air quality is expected on a regional scale as the Projects begin operation and displaces emissions from fossil-fueled sources.

**Air emissions – decommissioning.** The contribution of decommissioning of the Proposed Action to the combined air quality impacts from ongoing and planned activities would be minor. The decommissioning process for all offshore wind projects is expected to be similar, and impacts would be similar in nature to impacts of construction but would be less in degree. Because the emissions related to onshore activities would be widely dispersed and transient, BOEM expects all air quality impacts to occur close to the emitting sources. If decommissioning activities for projects overlap in time, then impacts could be greater for the duration of the overlap. In context of reasonably foreseeable environmental trends, the contribution of the Proposed Action to the combined GHG impacts on air quality from ongoing and planned activities would be beneficial from the net decrease in GHG emissions, to the extent that fossil-fueled generating facilities would reduce operations as a result of increased energy generation from offshore wind projects.

**Accidental releases.** Based on Table F2-3, there would be up to about 209,994 gallons (794,913 liters) of coolants, 1,933,235 gallons (7.3 million liters) of oils and lubricants, and 342,558 gallons (1.3 million liters) of diesel fuel contained in the 355 WTGs and OSS associated with the Proposed Action and other planned offshore wind projects in the air quality geographic analysis area. BOEM expects that in context of reasonably foreseeable environmental trends, the contribution of the Proposed Action to the combined accidental release impacts on air quality from ongoing and planned activities would be negligible due to the temporary nature and localized potential effects. Accidental spills would occur infrequently over the 35-year period with a higher probability of spills during construction of projects, but they would not be expected to contribute appreciably to cumulative impacts on air quality, as the total storage capacity within the air quality geographic analysis area is considerably less than the existing volumes of hazardous liquids being transported by ongoing activities and is distributed among many different locations and containers.

### 3.4.5.3. Conclusions

**Impacts of the Proposed Action.** The Proposed Action would result in a net decrease in overall emissions over the region compared to the installation of a conventional fossil-fueled power plant. Although there would be some air quality impacts due to various activities associated with construction, maintenance, and eventual decommissioning, these emissions would be relatively small and limited in duration. The Proposed Action would result in air quality–related health effects avoided in the region due to the reduction in emissions associated with fossil-fueled energy generation (Table 3.4-4). **Minor** air quality impacts would be anticipated for a limited time during construction, maintenance, and decommissioning, but there would be a **minor beneficial** impact on air quality near the Wind Farm Development Area and the surrounding region overall to the extent that energy produced by the Projects would displace energy produced by fossil-fueled power plants. Empire has committed to APMs that would reduce potential impacts through complying with applicable emissions standards (APM 28 and APM 31) and fuel sulfur content standards (APM 29 and APM 30), purchase of emission-reduction credits where required (APM 27), data and information sharing with BOEM and USEPA (APM 32 and APM 33), compliance with state regulations on engine idling (APM 34), and compliance with a Fugitive Dust Control Plan. for onshore construction areas (see COP Section 4.3.2.1 and Table 9-1; Empire 2022). Because of the amounts of emissions, the fact that emissions are spread out in time (5 years for construction and then lesser emissions annually during operation), and the large geographic area over which they would be dispersed (throughout the 79,350-acre Lease Area and the vessel routes from the

onshore facilities), air pollutant concentrations associated with the Proposed Action are not expected to exceed the NAAQS, New York AAQS, or New Jersey AAQS.

BOEM expects that the connected action alone would have **negligible** to **minor** impacts on air quality due to accidental releases and air pollutant emissions, because all concentrations would be well below the NAAQS and New York AAQS. Empire's use of the SBMT marine terminal for WTG staging and as an O&M facility would have **minor** impacts on existing air quality and long-term **minor** impacts on air quality due to the increased industrial and transportation activity at SBMT, because pollutant concentrations would remain below the NAAQS and New York AAQS.

**Cumulative Impacts of the Proposed Action.** Considering all the IPFs together, BOEM anticipates that the contribution of the Proposed Action and the connected action to the air quality impacts of ongoing and planned activities would be **minor**. The main driver for this impact rating is emissions related to construction activities increasing commercial vessel traffic, air traffic, and truck and worker vehicle traffic. Combustion emissions from construction equipment, and fugitive emissions, would be higher during overlapping construction activities but temporary in nature, as the overlap would be limited in duration. Cumulative impacts on air quality in combination with other ongoing and planned activities would likely be **moderate** due to the contribution of moderate impacts from ongoing and planned activities on air quality in the geographic analysis area, as summarized in Section 3.4.3.3. Displacement of fossil-fuel energy by wind energy would result in **moderate beneficial** impacts regionally because the magnitude of the potential reduction in emissions from displacing fossil-fuel-generated power would be small relative to total energy generation emissions in the region.

### 3.4.6 Impacts of Alternatives B, C, D, E, F, G, and H on Air Quality

**Impacts of Alternatives B, C, D, E, F, G, and H.** The air quality and climate impacts associated with all action alternatives would be similar to those of the Proposed Action. Alternatives B, E, and F would alter the turbine array layout compared to the Proposed Action; however, each of these alternatives would allow for installation of up to 147 WTGs and two OSS as defined in Empire's PDE.

Alternatives C-1, C-2, D, and G would have the same number of WTGs as the Proposed Action and, therefore, the same anticipated emissions from WTG construction and operation. These alternatives would have differing locations and lengths of offshore and onshore cables, and so would have different emissions associated with cable construction and installation compared to the Proposed Action. Alternative H would have the same number of WTGs and the same cable configurations as the Proposed Action but could differ in the dredging and sediment disposal methods used for construction of the EW 1 landfall in the vicinity of the SBMT, so the emissions from this construction-related activity could differ as well. Overall, the differences in emissions among the action alternatives and the Proposed Action would be relatively small, and the air quality and climate impacts from all action alternatives would be substantially the same as described for the Proposed Action.

Similarly, the quantities of coolants, oils and lubricants, and diesel fuel under the other action alternatives would be similar to those of the Proposed Action and therefore the impacts on air quality from accidental releases are expected to be similar to those of the Proposed Action.

**Cumulative Impacts of Alternatives B, C, D, E, F, G, and H.** In context of reasonably foreseeable environmental trends, the contributions of the action alternatives to the impacts of ongoing and planned activities would not be materially different from those described under the Proposed Action.

#### 3.4.6.1. Conclusions

**Impacts of Alternatives B, C, D, E, F, G, and H.** Expected **minor** impacts associated with the Proposed Action would not change under the other action alternatives. The same construction, O&M, and

decommissioning activities would still occur, albeit at slightly differing scales as identified. Alternatives B, E, and F could have slightly less, but not materially different, **minor** impacts on air quality compared to the Proposed Action due to a reduced number of WTGs. Alternatives C-1, C-2, D, and G would have the same number of WTGs, although with some differences in cable construction and installation, and therefore similar **minor** impacts on air quality to those of the Proposed Action. Alternative H would differ from the Proposed Action only in the dredging/disposal methods used at SBMT, and so would have similar **minor** impacts on air quality to those of the Proposed Action. As under the Proposed Action, the action alternatives would result in **minor beneficial** impacts on air quality and climate overall due to reduced emissions from fossil-fueled power plants.

**Cumulative Impacts of Alternatives B, C, D, E, F, G, and H.** In context of reasonably foreseeable environmental trends, the contributions of the action alternatives to the impacts of individual IPFs affecting air quality and climate from ongoing and planned activities would be the same as those of the Proposed Action. The combined air quality impacts of ongoing and planned non-offshore wind activities, offshore wind projects other than the action alternatives, and the action alternatives are expected to be **moderate**. Offshore wind projects, including the action alternatives, would result in **moderate beneficial** cumulative impacts due to reduced emissions from fossil-fueled power plants.

### 3.4.7 Proposed Mitigation Measures

Empire has committed to measures to avoid, minimize, and mitigate air quality impacts of the Projects. These measures include, among others, compliance with all applicable emissions and fuel-efficiency standards to minimize combustion emissions and associated air quality impacts, as discussed in Section 3.4.5. COP Section 4.1.3.4 and Table 4.1-22 (Empire 2022) provide details of these measures. In addition, Empire will comply with the requirements of the OCS air permit, when issued, for emissions reduction and mitigation. The OCS air permit requirements may include emission controls that meet Best Available Control Technology or Lowest Achievable Emission Rate criteria, development of emission offsets, or other mitigation measures. No agency-proposed mitigation measures for air quality have been identified in Appendix H.

### 3.4.8 Comparison of Alternatives

This section provides a summary comparison of the anticipated impacts of ongoing activities, planned activities, the connected action, and Project impacts.

Under the No Action Alternative, air quality would continue to follow current regional trends and respond to IPFs introduced by other ongoing and planned activities. Ongoing and planned non-offshore wind activities and offshore wind activities would have continuing regional impacts primarily through air pollutant emissions and accidental releases. Combined impacts of ongoing and planned non-offshore wind activities as well as offshore wind activities, including air pollutant emissions and GHGs, would be **moderate** because the emissions would incrementally increase ambient pollutant concentrations, though not by enough to cause a violation of the NAAQS, New Jersey AAQS, or New York AAQS. Offshore wind projects likely would lead to reduced emissions from fossil-fueled power generating facilities and consequently **minor** to **moderate beneficial** impacts on air quality and climate.

Under the Proposed Action, air quality impacts would occur due to emissions associated with construction, O&M, and eventual decommissioning, but these impacts would be relatively small and limited in duration. Impacts would be **minor** because the emissions would incrementally increase ambient pollutant concentrations, though not by enough to cause a violation of the NAAQS, New Jersey AAQS, or New York AAQS. There would be a **minor beneficial** impact on air quality in the region overall to the extent that energy produced by the Projects would displace energy produced by fossil-fueled power

plants. The Proposed Action would result in air quality–related health effects avoided in the region due to the reduction in emissions associated with fossil-fueled energy generation.

Alternatives B, E, and F would alter the turbine array layout compared to the Proposed Action; however, each of these alternatives would allow for installation of up to 147 WTGs and two OSS as defined in Empire's PDE. Regional benefits due to reduced emissions associated with fossil-fueled energy generation would be the same as described for the Proposed Action, as these alternatives have the same total generating capacity.

Alternative G would have the same number of WTGs and OSS as the Proposed Action but would use a cable bridge to cross Barnums Channel. The cable bridge is included in the PDE for the Proposed Action and narrowing the PDE to a cable bridge crossing of Barnums Channel would not result in substantially different onshore construction emissions for Alternative G. O&M emissions would be the same as for the Proposed Action. Overall, impacts under Alternative G are expected to be similar to those for the Proposed Action.

Alternative H would have the same number of WTGs and OSS as the Proposed Action and the same onshore facilities. However, construction at the SBMT would use a method of dredge or fill activities that would reduce the discharge of dredged material. The proposed method for dredge and fill activities under Alternative H is included in the PDE for the Proposed Action and narrowing the PDE to a preferred method for dredging for the EW 1 landfall would not result in substantially different construction emissions. O&M emissions would be the same as for the Proposed Action. Overall, impacts under Alternative H are expected to be similar to those for the Proposed Action.

In context of other reasonably foreseeable environmental trends, and considering all the IPFs together, BOEM anticipates that the overall impacts associated with the Proposed Action when combined with the impacts from ongoing and planned activities including offshore wind would be **moderate** adverse and **moderate beneficial**. The overall adverse impact on air quality would likely be moderate because pollutant concentrations are not expected to exceed the NAAQS, New Jersey AAQS, or New York AAQS. The Proposed Action and other offshore wind projects would benefit air quality in the region surrounding the Projects to the extent that energy produced by the Projects would displace energy produced by fossil-fueled power plants. BOEM anticipates an overall **moderate beneficial** impact because the magnitude of this potential reduction would be small relative to total energy generation emissions in the area. Overall impacts with Alternatives B, E, and F would be similar to those with the Proposed Action. Overall impacts with Alternatives C, D, G, and H would be similar to those with the Proposed Action.

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# 3.5. Bats

This section discusses potential impacts on bat resources from the proposed Projects, alternatives, and ongoing and planned activities in the bat geographic analysis area. The bat geographic analysis area, as shown on Figure 3.5-1, includes the United States coastline from Maine to Florida, and extends 100 miles (161 kilometers) offshore and 5 miles (8 kilometers) inland to capture the movement range for species in this group.

## 3.5.1 Description of the Affected Environment for Bats

The number of bat species in the geographic analysis area varies by state, ranging from eight species (Rhode Island, New Hampshire, and Maine) to 17 (Virginia and North Carolina) (Rhode Island Department of Environmental Management n.d.; Maine Department of Inland Fisheries and Wildlife 2021; New Hampshire Fish and Game n.d.; Virginia Department of Wildlife Resources 2021; North Carolina Wildlife Resources Commission 2017).

There are nine species of bats present in the state of New York, eight of which may be present in the Project area and six that are year-round residents (Table 3.5-1) (Empire 2022). These species can be broken down into cave-hibernating bats and migratory tree bats based on their wintering strategy. Both groups are nocturnal insectivores that use a variety of forested and open habitats for foraging during the summer (Empire 2022 citing Barbour and Davis 1969). Cave-hibernating bats are generally not observed offshore at distances where WTGs are proposed (Empire 2022 citing Dowling and O'Dell 2018) and, in the winter, migrate from summer habitat to hibernacula in the Mid-Atlantic region (Empire 2022 citing Maslo and Leu 2013). Migratory tree bats fly to southern parts of the United States in the winter and are observed offshore during migration (Empire 2022 citing Hatch et al. 2013).

**Table 3.5-1 Bats Present in New York and their Conservation Status**

| Common Name | Scientific Name | State Status | Federal Status |
|---|---|---|---|
| **Cave-Hibernating Bats** | | | |
| Eastern small-footed bat | *Myotis leibii* | SC | - |
| Little brown bat | *Myotis lucifugus* | SGCN | Under Review[3] |
| Northern long-eared bat[1] | *Myotis septentrionalis* | T | T |
| Indiana bat[2] | *Myotis sodalist* | E | E |
| Tri-colored bat | *Perimyotis subflavus* | SGCN | Under Review[4] |
| Big brown bat | *Eptesicus fuscus* | - | - |
| **Migratory Tree Bats** | | | |
| Eastern red bat | *Lasiurus borealis* | - | - |
| Hoary bat | *Lasiurus cinereus* | - | - |
| Silver-haired bat | *Lasionycteris noctivagans* | - | - |

Source: Empire 2022; USFWS 2021a, 2021b.
[1] On March 23, 2022, USFWS published a proposal to reclassify the northern long-eared bat as endangered. The U.S. District Court for the District of Columbia has ordered USFWS to complete a new final listing determination by November 2022 (Case 1:15-cv-00477, March 1, 2021).
[2] Range does not indicate species presence in the Project area.
[3] Currently under a USFWS discretionary status review. Results of the review may be to propose listing, make a species a candidate for listing, provide notice of a not warranted candidate assessment, or other action as appropriate. USFWS anticipates a decision in Fiscal Year 2022.

[4] Currently under 12-month finding review on a petition to list the species. If listing is warranted, USFWS would generally proceed with a concurrent proposed listing rule and proposed critical habitat. USFWS anticipates a decision in Fiscal Year 2022.
E = Endangered; SC = Special Concern; SGCN = Species of Greatest Conservation Need; T = Threatened; USFWS = U.S. Fish and Wildlife Service

There is uncertainty on the specific movements of bats offshore, but bats have been documented in the offshore marine environment, particularly during migration (Empire 2022 citing Grady and Olson 2006; Cryan and Brown 2007; Empire 2022 citing Johnson et al. 2011; Empire 2022 citing BOEM 2013; Empire 2022 citing Hatch et al. 2013; Empire 2022 citing Lagerveld et al. 2017; Empire 2022 citing Dowling and O'Dell 2018). Bats have been documented temporarily roosting on structures on nearshore islands such as lighthouses (Empire 2022 citing Dowling et al. 2017) and there is historical evidence of bats, particularly the eastern red bat, migrating offshore in the Atlantic (Empire 2022 citing Hatch et al. 2013). In a Mid-Atlantic bat acoustic study conducted during the spring and fall of 2009 and 2010, the maximum distance that bats were detected from shore was 13.6 miles (21.9 kilometers) and the mean distance was 5.2 miles (8.4 kilometers) (Empire 2022 citing Sjollema et al. 2014). In Maine, bats were detected on islands up to 25.8 miles (41.6 kilometers) from the mainland (Empire 2022 citing Peterson et al. 2014). In the Mid-Atlantic acoustic study, eastern red bat represented 78 percent of all bat detections offshore and bat activity decreased as wind increased (Empire 2022 citing Sjollema et al. 2014). In addition, eastern red bats were detected in the Mid-Atlantic up to 27.3 miles (44 kilometers) offshore by high-definition video aerial surveys (Empire 2022 citing Hatch et al. 2013).

Cave-hibernating bats hibernate regionally in caves, mines, and other structures and feed primarily on insects in terrestrial and fresh-water habitats. These species generally exhibit lower activity in the offshore environment than the migratory tree bats (Empire 2022 citing Sjollema et al. 2014), with movements primarily during the fall. In the Mid-Atlantic, the maximum distance *Myotis* bats were detected offshore was 7.2 miles (11.5 kilometers) (Empire 2022 citing Sjollema et al. 2014). A recent nano-tracking study on Martha's Vineyard recorded little brown bat movements off the island in late August and early September, with one individual flying from Martha's Vineyard to Cape Cod (Empire 2022 citing Dowling et al. 2017). Big brown bats were also detected migrating from the island later in the year (October–November) (Empire 2022 citing Dowling et al. 2017). These findings are supported by an acoustic study conducted on islands and buoys off the Gulf of Maine that indicated the greatest percentage of activity in July–October (Empire 2022 citing Peterson et al. 2014). Given that the use of the coastline as a migratory pathway by cave-hibernating bats is likely limited to their fall migration period, that acoustic studies indicate lower use of the offshore environment by cave-hibernating bats, and that cave-hibernating bats do not regularly feed on insects over the ocean, exposure to the Wind Farm Development Area is unlikely for this group.

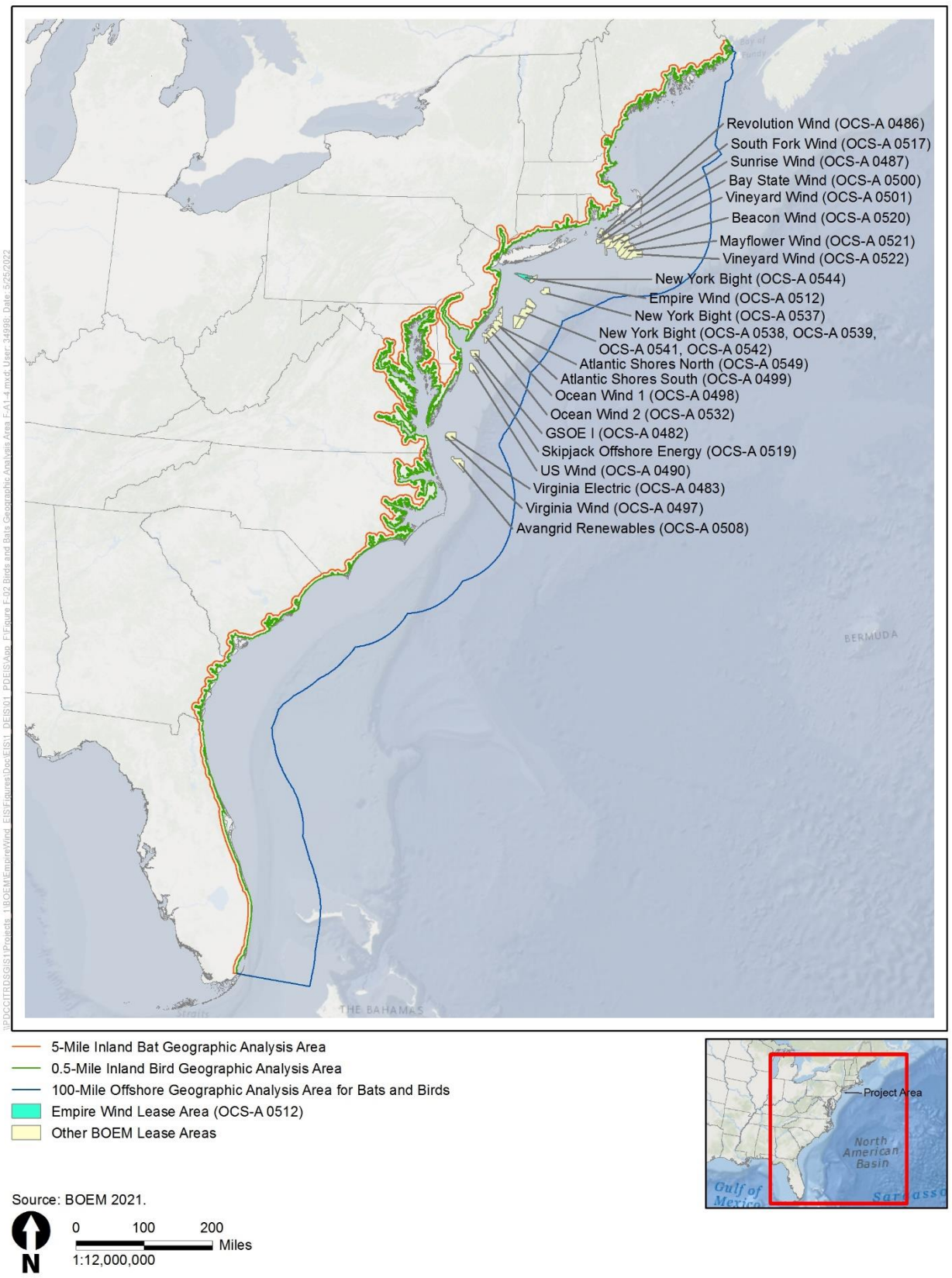


**Figure 3.5-1 Bats Geographic Analysis Area**

Tree bats migrate south to overwinter and have been documented in the offshore environment (Empire 2022 citing Hatch et al. 2013). Eastern red bats have been detected migrating from Martha's Vineyard late in the fall, with one bat tracked as far south as Maryland (Empire 2022 citing Dowling et al. 2017). These results are supported by historical observations of eastern red bats offshore and recent acoustic and survey results (Empire 2022 citing Hatch et al. 2013; Empire 2022 citing Peterson et al. 2014; Empire 2022 citing Sjollema et al. 2014). While little local data are available for the Project area, recent offshore acoustic surveys recorded bats within the Lease Area, with observations primarily composed of eastern red bats and silver-haired bats, concentrated during fall migration. Big brown bats were documented infrequently in the Lease Area, and hoary bats were also detected in the offshore environment, but closer to shore and not within the Lease Area. NYSERDA remote metocean data from buoys 29 miles southeast and 45 miles south-southeast of the Lease Area, respectively, detected a total of nine silver-haired bats and one unknown low-frequency bat between September 2019 and February 2022 (NYSERDA 2022). The closest buoy detected three bats in September/October 2019 and no bats for the remaining years. The other buoy detected three bats in September 2019, one bat in August 2020, and two bats in October 2020; no bats were detected in the remaining time frame. These data suggest that some tree bats are most likely to pass through the Lease Area, mainly red and silver-haired bats during the migration period (late summer/early fall) (COP Volume 3, Appendix R; Empire 2022).

Onshore coastal areas throughout the geographic analysis area provide a variety of habitats that support a diversity of bat species. The EW 1 onshore substation site and O&M facility consist primarily of highly urbanized environments and existing infrastructure with few natural habitat areas. Because the EW 1 area is highly urbanized, it is not expected to provide bat habitat. The proposed onshore export cable routes and onshore substation sites for EW 2 occur in a highly developed area bordered by commercial and residential developments. A portion of the EW 2 Onshore Substation C site is characterized by an area with trees and shrubs, which may support bats for foraging and roosting during summer, but this area is not expected to be important habitat for any species and is completely isolated by surrounding developments. The EW 2 Onshore Substation A site is previously developed and currently supports a recycling facility.

Three isolated areas along onshore export cable route segment IP-C between Long Beach Road and Daly Boulevard consist of scrub-shrub habitat with some scattered trees/woody vegetation, but are unlikely to provide important bat habitat. Forested habitats can provide roosting areas for both migratory and non-migratory species. All bat species present in New York are known to utilize forested areas of varying types during summer for roosting and foraging. Some of these species roost solely in the foliage of trees, while others select dead and dying trees where they roost in peeling bark or inside crevices. Some species may select forest interior sites, while others prefer edge habitats (Empire 2022 citing Barbour and Davis 1969). None of the bat species that occur in New York are likely to use the urbanized, developed areas within the onshore portions of the Project area. However, there is some likelihood that they could utilize the treed areas for foraging and roosting and open water areas for foraging at EW 2 during the bat active period (generally April to October).

Hibernacula are documented in New York, but the numbers of individuals at the sites have declined dramatically because of the fungal disease white-nose syndrome (WNS) (Empire 2022 citing Ingersoll et al. 2016; Empire 2022 citing NJ Division of Fish and Wildlife 2017). Since 2011, WNS has substantially reduced *Myotis* bat populations in New York (Empire 2022 citing NJ Division of Fish and Wildlife 2017). The nearest known hibernaculum to the EW 2 onshore export and interconnection cable corridor occurs approximately 75 miles (120 kilometers) to the east, in the town of East Hampton. Overall, none of potentially suitable summer habitat in the EW 2 area would be reasonably considered optimal habitat given the lack of connectivity with contiguous forest and forested wetland habitats. Therefore, the presence of both cave-hibernating and migratory tree bats that may occur in areas around EW 2 is expected to be minimal.

One bat species protected under the ESA may occur or potentially occur in the Project area: the northern long-eared bat (USFWS 2021a). Northern long-eared bats are not expected to be exposed to the Wind Farm Development Area. This is substantiated by a tracking study on Martha's Vineyard (n = 8; July–October 2016) where no offshore movements were recorded (Empire 2022 citing Dowling et al. 2017) and by the 2018 acoustic data collected within the Lease Area (Empire 2022 citing Tetra Tech 2019). Because research on the movements of these bats in the marine environment is limited, there remains uncertainty as to whether this species travels offshore. If northern long-eared bats were to migrate over water, movements would likely be in close proximity to the mainland.

The related little brown bat has been documented to migrate from Martha's Vineyard to Cape Cod, and northern long-eared bats may likewise migrate to mainland hibernacula from these islands in August through September (Empire 2022 citing Dowling et al. 2017). In addition, while in a different area, the Vineyard Wind 1 BA concluded that "it is extremely unlikely northern long-eared bats would traverse offshore portions" of that project (Empire 2022 citing BOEM 2019). Given that there is little evidence of use of the offshore environment by northern long-eared bat, exposure to the Wind Farm Development Area is anticipated to be minimal. None of the potentially suitable summer habitat in the EW 2 area would be reasonably considered optimal habitat for any bat species given the lack of connectivity with contiguous forest or forested wetland habitats. Maternity roosts, active detections (mist net captures and acoustic recordings), and hibernacula have been reported for northern long-eared bats in several areas of Long Island (particularly in the eastern portion), suggesting a year-round presence of northern long-eared bat. Although northern long-eared bat presence has been detected within approximately 19 miles (30 kilometers) of the EW 2 onshore substation sites, no detections have been reported within the Onshore Project area. The Empire Wind BA will provide a detailed discussion of ESA-listed species and potential impacts on these species as a result of the Projects. Results of ESA consultation with USFWS will be included in the Final EIS.

Cave bat species, including the northern long-eared bat, are experiencing drastic declines due to WNS. WNS has been confirmed present in every state in the geographic analysis area, except Florida (Whitenosesyndrome.org 2021). WNS was confirmed present in New York in 2006 and has killed large numbers of cave bats during hibernation—more than 90 percent at many sites (Whitenosesyndrome.org 2021). Proposed Project-related impacts have the potential to affect cave bat populations already affected by WNS. The unprecedented mortality of more than 5.5 million bats in northeastern North America as of 2015 reduces the likelihood of many individuals being present within the onshore portions of the proposed Project area (USFWS 2015). However, given the drastic reduction in cave bat populations in the region, the biological significance of mortality resulting from the proposed Projects, if any, may be increased.

### 3.5.2 Impact Level Definitions for Bats

Definitions of impact levels are provided in Table 3.5-2. There are no beneficial impacts on bats.

**Table 3.5-2 Impact Level Definitions for Bats**

| Impact Level | Impact Type | Definition |
|---|---|---|
| Negligible | Adverse | Impacts would be so small as to be unmeasurable. |
| Minor | Adverse | Most impacts would be avoided; if impacts occur, the loss of one or few individuals or temporary alteration of habitat could represent a minor impact, depending on the time of year and number of individuals involved. |
| Moderate | Adverse | Impacts are unavoidable but would not result in population-level effects or threaten overall habitat function. |

| Impact Level | Impact Type | Definition |
|---|---|---|
| Major | Adverse | Impacts would result in severe, long-term habitat or population-level effects on species. |

### 3.5.3 Impacts of the No Action Alternative on Bats

When analyzing the impacts of the No Action Alternative on bats, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on the baseline conditions for bats. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with the other planned non-offshore wind and offshore wind activities as described in Appendix F, *Planned Activities Scenario*.

#### 3.5.3.1. Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for bats described in Section 3.5.1, *Description of the Affected Environment for Bats*, would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind activities within the geographic analysis area that contribute to impacts on bats are generally associated with onshore construction and climate change. Onshore construction activities and associated impacts are expected to continue at current trends and have the potential to affect bat species through temporary and permanent habitat removal and temporary noise impacts, which could cause avoidance behavior and displacement. Mortality of individual bats could occur but population-level effects would not be anticipated. Impacts associated with climate change have the potential to reduce reproductive output and increase individual mortality and disease occurrence.

Ongoing offshore wind activities within the geographic analysis area that contribute to impacts on bats include:

- Continued O&M of the Block Island project (five WTGs) installed in state waters;
- Continued O&M of the Coastal Virginia Offshore Wind project (two WTGs) installed in OCS-A 0497; and
- Ongoing construction of two offshore wind projects, the Vineyard Wind 1 project (62 WTGs and 1 OSS) in OCS-A 0501 and the South Fork project (12 WTGs and 1 OSS) in OCS-A 0517.

Ongoing O&M of the Block Island and Coastal Virginia Offshore Wind projects and ongoing construction of the Vineyard Wind 1 and South Fork projects would affect bats through the primary IPFs of noise, presence of structures, and land disturbance. Ongoing offshore wind activities would have the same type of impacts from noise, presence of structures, and land disturbance described in detail in Section 3.5.3.2 for planned offshore wind activities but the impacts would be of lower intensity.

#### 3.5.3.2. Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impact of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Other planned non-offshore wind activities that may affect bats include new submarine cables and pipelines, oil and gas activities, increasing onshore construction, marine minerals extraction, port expansions, and installation of new structures on the OCS (see Section F.2 in Appendix F for a complete

description of planned activities). These activities may result in temporary or permanent displacement and injury or mortality to individual bats, but population-level effects would not be expected. See Table F1-2 for a summary of potential impacts associated with planned non-offshore wind activities by IPF for bats.

BOEM expects planned offshore wind activities to affect bats through the following primary IPFs.

**Noise:** Anthropogenic noise on the OCS associated with planned offshore wind development, including noise from pile-driving and construction activities, has the potential to affect bats on the OCS. Additionally, onshore construction noise has the potential to affect bats. BOEM anticipates that these impacts would be temporary and highly localized.

In the planned activities scenario (Appendix F, *Planned Activities Scenario*), the construction of 2,803 WTGs and 66 OSS would create noise and may temporarily affect some migrating tree bats, if conducted at night during spring or fall migration. The greatest impact of noise is likely to be caused by pile-driving activities during construction. Noise from pile driving would occur during installation of foundations for offshore structures at a frequency of 4 to 6 hours at a time over an 8-year period. Construction activity would be temporary and highly localized. Auditory impacts are not expected to occur, as recent research has shown that bats may be less sensitive to TTS than other terrestrial mammals (Simmons et al. 2016). Habitat-related impacts (i.e., displacement from potentially suitable habitats) could occur as a result of construction activities, which could generate noise sufficient to cause avoidance behavior by individual migrating tree bats (Schaub et al. 2008). These impacts would likely be limited to behavioral avoidance of pile-driving or construction activity, and no temporary or permanent hearing loss would be expected (Simmons et al. 2016). However, these impacts are highly unlikely to occur, as use of the OCS by bats is limited, and only during spring and fall migration.

Some potential for temporary, localized habitat impacts arising from onshore construction noise exists; however, no auditory impacts on bats would be expected to occur. Recent literature suggests that bats are less susceptible to temporary or permanent hearing loss from exposure to intense sounds (Simmons et al. 2016). Nighttime work may be required on an as-needed basis. Some temporary displacement or avoidance of potentially suitable foraging habitat could occur, but these impacts would not be expected to be biologically significant. 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 common among bats (Hann et al. 2017; Whitaker 1998).

Non-routine activities associated with the offshore wind facilities would generally require intense, temporary activity to address emergency conditions. The noise made by onshore construction equipment or offshore repair vessels could temporarily deter bats from approaching the site of a given non-routine event. Impacts on bats, if any, would be temporary and last only as long as repair or remediation activities were necessary to address these non-routine events.

Given the temporary and localized nature of potential impacts and the expected biologically insignificant response to those impacts, no individual fitness or population-level impacts would be expected to occur as a result of onshore or offshore noise associated with planned offshore wind development.

**Presence of structures:** Planned offshore wind-related activities would add up to 2,803 WTGs and 66 OSS to the geographic analysis area and the presence of these structures could result in potential long-term effects on bats. Cave bats (including the federally listed as threatened northern long-eared bat) do not tend to fly offshore (even during fall migration) and, therefore, exposure to construction vessels during construction or maintenance activities, or the rotor-swept zone (RSZ) of operating WTGs in the offshore wind lease areas, is expected to be negligible, if exposure occurs at all (BOEM 2015; Pelletier et al. 2013).

Tree bats, however, may pass through the offshore wind lease areas during the fall migration, with limited potential for migrating bats to encounter vessels during construction and decommissioning of WTGs, OSS, and offshore export cable corridors, although structure and vessel lights may attract bats due to increased prey abundance. As discussed above, while bats have been documented at offshore islands, relatively little bat activity has been documented in open water habitat. Several authors, such as Cryan and Barclay (2009), Cryan et al. (2014), and Kunz et al. (2007), discuss several hypotheses as to why bats may be attracted to WTGs. Many of these, including the creation of linear corridors, altered habitat conditions, or thermal inversions, would not apply to WTGs on the Atlantic OCS (Cryan and Barclay 2009; Cryan et al. 2014; Kunz et al. 2007).

Other hypotheses associated with the Atlantic OCS regarding bat attraction to WTGs include bats perceiving the WTGs as potential roosts, potentially increased prey base, visual attraction, disorientation due to EMF or decompression, or attraction due to mating strategies (Arnett et al. 2008; Cryan 2007; Kunz et al. 2007). However, no definitive answer as to why, if at all, bats are attracted to WTGs; it is possible that some bats may encounter, or perhaps be attracted to, OSS and non-operational WTG towers to opportunistically roost or forage. Bats' echolocation abilities and agility make it unlikely that these stationary objects (OSS and non-operational WTGs) or moving vessels would pose a collision risk to migrating individuals; this assumption is supported by the evidence that bat carcasses are rarely found at the bases of onshore turbine towers (Choi et al. 2020).

Tree bat species that may encounter the operating WTGs in the offshore wind lease areas include the eastern red bat, hoary bat, and silver-haired bat. Offshore O&M would present a seasonal risk factor to migratory tree bats that may utilize the offshore habitats during fall migration. While some potential exists for migrating tree bats to encounter operating WTGs during fall migration, the overall occurrence of bats on the OCS is relatively very low (Stantec 2016). Unlike with terrestrial migration routes, there are no landscape features that would concentrate bats and thereby increase exposure to the offshore wind lease areas. Given the expected infrequent and limited use of the OCS by migrating tree bats, very few individuals would be expected to encounter operating WTGs or other structures associated with planned offshore wind development. With the proposed 0.6 to 1-nm (1.9-kilometer) spacing between many structures associated with planned offshore wind development and the distribution of anticipated projects, individual bats migrating over the OCS within the RSZ of project WTGs would likely pass through projects with only slight course corrections, if any, to avoid operating WTGs because, unlike with terrestrial migration routes, there are no landscape features that would concentrate migrating tree bats and increase exposure to offshore wind lease areas on the OCS.

The potential collision risk to migrating tree bats is associated with weather conditions; specifically, bat activity is associated with relatively low wind speeds and warm temperatures (Arnett et al. 2008; Cryan and Brown 2007; Fiedler 2004; Kerns et al. 2005). Given the rarity of tree bats in the offshore environment, the WTGs being widely spaced, and the patchiness of projects, the likelihood of collisions is expected to be low. Additionally, the likelihood of a migrating individual encountering one or more operating WTGs during adverse weather conditions is extremely low, as bat activity is low during periods of strong winds, low temperatures, and rain (Arnett et al. 2008; Erickson et al. 2002).

**Land disturbance:** A small amount of infrequent construction impacts associated with onshore power infrastructure would be required over the next 8 years to connect planned offshore wind energy projects to the electrical grid. Typically, this would require only small amounts of habitat removal, if any, and would occur in previously disturbed areas. Short-term and long-term impacts associated with habitat loss or avoidance during construction may occur, but no injury or mortality of individuals would be expected. As such, onshore construction activities associated with planned offshore wind development would not be expected to appreciably contribute to cumulative impacts on bats.

In addition to electrical infrastructure, some amount of habitat conversion may result from port expansion activities required to meet the demands for fabrication, construction, transportation, and installation of wind energy structures. The general trend along the coastal region from Virginia to Maine is that port activity will increase modestly and require some conversion of undeveloped land to meet port demand. This conversion will result in permanent habitat loss for local bat populations. However, the incremental increase from planned offshore wind development would be a minimal contribution in the port expansion required to meet increased commercial, industrial, and recreational demand.

#### 3.5.3.3. Conclusions

**Impacts of the No Action Alternative.** Under the No Action Alternative, bats would continue to be affected by existing environmental trends and ongoing activities. BOEM expects ongoing activities to have continuing temporary, long-term, and permanent impacts (disturbance, displacement, injury, mortality, and habitat conversion) on bats primarily through the onshore construction impacts, the presence of structures, and climate change. Given the infrequent and limited anticipated use of the OCS by migrating tree bats during spring and fall migration, and given that cave bats do not typically occur on the OCS, ongoing offshore wind activities would not appreciably contribute to impacts on bats. Temporary disturbance and permanent loss of habitat onshore may occur as a result of offshore wind development. However, habitat removal is anticipated to be minimal, and any impacts resulting from habitat loss or disturbance would not be expected to result in individual fitness or population-level effects within the geographic analysis area. The No Action Alternative would result in **negligible** impacts on bats.

**Cumulative Impacts of the No Action Alternative.** Under the No Action Alternative, existing environmental trends and ongoing activities would continue, and bats would continue to be affected by natural and human-caused IPFs. Planned activities would contribute to the impacts on bats due to habitat loss from increased onshore construction. BOEM anticipates cumulative impacts of the No Action Alternative would likely be **negligible** because bat presence on the OCS is anticipated to be limited and onshore bat habitat impacts are expected to be minimal.

### 3.5.4 Relevant Design Parameters & Potential Variances in Impacts of the Action Alternatives

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The following proposed PDE parameters (Appendix E) would influence the magnitude of the impacts on bats:

- The onshore export cable routes, including routing variants, and extent of ground disturbance for new onshore substations, which could require the removal of trees suitable for roosting and foraging;
- The number, size, and location of WTGs; and
- The time of year during which construction occurs.

Variability of the proposed Project design exists as outlined in Appendix E. Below is a summary of potential variances in impacts:

- WTG number, size, and location: The level of hazard related to WTGs is proportional to the number of WTGs installed; fewer WTGs would present less hazard to bats.
- Onshore export cable routes and substation footprints: The route chosen (including variants within the general route) and substation footprints would determine the amount of habitat affected.

- Season of construction: The active season for bats in this area is from April through October. Construction outside of this window would have a lesser impact on bats than construction during the active season.

### 3.5.5 Impacts of the Proposed Action on Bats

The sections below summarize the potential impacts of the Proposed Action on bats during the various phases of the proposed Projects. Routine activities would include construction, O&M, and decommissioning of the proposed Projects, as described in Chapter 2, *Alternatives Including the Proposed Action*. BOEM will prepare a BA for the potential effects on USFWS federally listed species. The results of consultation with USFWS pursuant to Section 7 of the ESA will be included in the Final EIS.

**Noise:** Pile-driving noise and onshore and offshore construction noise associated with the Proposed Action is expected to result in temporary and highly localized impacts. Auditory impacts are not expected to occur, as recent research has shown that bats may be less sensitive to TTS than other terrestrial mammals (Simmons et al. 2016). Impacts, if any, are expected to be limited to behavioral avoidance of pile-driving or construction activity, and no temporary or permanent hearing loss would be expected (Simmons et al. 2016).

**Presence of structures:** The various types of impacts on bats that could result from the presence of structures, such as migration disturbance and turbine strikes, are described in detail in Section 3.5.3.2. The Proposed Action would add up to 147 WTGs and two OSS to the Lease Area where none currently exist. The structures associated with Proposed Action would remain until decommissioning of the proposed Projects is complete and could pose long-term effects on bats.

At this time, there is some uncertainty regarding the level of bat use of the OCS and the ultimate consequences of mortality, if any, associated with operating WTGs. Migratory tree bats have the potential to pass through the Lease Area, but overall a small number of bats is expected in the Lease Area given its distance from shore (Empire 2022 citing BOEM 2014). While there is evidence of bats visiting WTGs close to shore (2.5–4.3 miles [4–7 kilometers]) in the Baltic Sea (enclosed by land) (Empire 2022 citing Ahlén et al. 2009; Empire 2022 citing Rydell and Wickman 2015) and bats are demonstrated to be vulnerable to collisions, the individual bats entering the Lease Area and vulnerable to collision are expected to occur in low numbers, except possibly during late summer/fall migration.

Recent data from 3 years of post-construction monitoring around Block Island Wind Farm found relatively low numbers of bats and only during fall, and no northern long-eared bats (Stantec Consulting Services 2020). Empire would implement measures to avoid and minimize bat impacts, including implementing a monitoring program (COP Volume 2f, Table 9-1, APM 86; Empire 2022) and reporting dead and injured bats (APM 83) to further understand the long-term effects of structures. In addition, Empire has committed to implementing a *Bird and Bat Monitoring Framework* that outlines an approach to post-construction bat monitoring that supports advancement of the understanding of bat interactions with offshore wind farms (Appendix H, Attachment H-3). Therefore, population-level impacts are unlikely given what appear to be high numbers of these species in the region relative to the low numbers likely to be affected by Project operations and the measures that would be implemented by Empire to avoid and minimize bat impacts.

**Land disturbance:** Impacts associated with construction of onshore elements of the Proposed Action could occur if construction activities occur during the active season (generally April through October), and may result in injury or mortality of individuals, particularly juveniles who are unable to flush from a roost, if occupied by bats at the time of removal. The primary potential effect on bats from the Projects' onshore components is localized and minor habitat modification. The majority of the proposed onshore

export and interconnection cable routes are in already-disturbed urban areas (e.g., roadways). No tree clearing is anticipated to be required at the EW 1 onshore substation site, the EW 2 Onshore Substation A site, or the O&M facility. If tree cutting along the route is required, particularly in the three isolated areas along segment IP-C between Long Beach Road and Daly Boulevard, it would be a long-term impact but is not expected to cause loss of important habitat. Similarly, some of the scattered trees at the EW 2 Onshore Station C site could be cut, but this is not expected to cause a loss of important habitat. Any remnant habitat within the permanent substation site would be converted to developed land with landscaping for the duration of the Projects' operational lifetime, which would be considered a long-term effect. Overall, habitat loss would be limited, and any potential effects would be indirect and unlikely to affect individual or population levels of bat species.

New York State restricts tree clearing between March through November on Long Island; however, as the northern long-eared bat has not been documented at the EW 2 onshore substation sites, Empire intends to work with the applicable agencies to minimize this restriction, as appropriate. Furthermore, Empire would implement measures to avoid and minimize bat impacts, including time of year clearing restrictions (COP Volume 2f, Table 9-1, APMs 77, 78, 79; Empire 2022), siting onshore Project components in disturbed areas as much as practicable (APM 76), and revegetating disturbed areas (APM 87). With the lack of suitable habitat in most of the onshore area and with Empire's commitment to implement measures to avoid and minimize bat impacts, BOEM anticipates that land disturbance would not result in individual fitness or population-level effects on bats.

Empire could leave some onshore facilities in place for future use (see COP Volume 1, Section 3.6, *Decommissioning Activities*; Empire 2022). Disturbance to the land surface or terrestrial habitat during the course of Proposed Action decommissioning would be minimal, such as disconnecting and cutting buried cables at the fence site below ground (and retiring cable in place). Therefore, onshore temporary impacts of decommissioning would be negligible.

### 3.5.5.1. Impact of the Connected Action

As described in Chapter 2, infrastructure improvements have been proposed at SBMT to provide the necessary structural capacity, berthing facilities, and water depths to operate as an offshore wind hub for several proposed offshore wind projects, including the Proposed Action. These improvements include in-water activities (i.e., dredging and dredged material management, replacement and strengthening of existing bulkheads, installation of new pile-supported and floating platforms, installation of new fenders), as well as some upland activities (building construction and paving). BOEM expects the connected action to affect bats through the noise IPF. Because there is no bat habitat in the vicinity of the SBMT, land disturbance and presence of structures IPFs would not pose a risk to bats.

**Noise:** As stated for the Proposed Action, pile-driving noise and onshore construction noise alone is expected to be temporary and highly localized. However, because there is no bat habitat in the area of the SBMT due the highly developed nature of the area, noise impacts on bats are not anticipated. Even if a bat were flying within a distance of the SBMT where construction noise could be detected above ambient urban noise conditions, auditory impacts are not expected to occur, as recent research has shown that bats may be less sensitive to TTS than other terrestrial mammals (Simmons et al. 2016). Impacts, if any, are expected to be limited to behavioral avoidance of pile-driving or construction activity, and no temporary or permanent hearing loss would be expected (Simmons et al. 2016).

### 3.5.5.2. Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind activities, other planned offshore wind activities, and the connected action at SBMT. Ongoing and planned non-offshore wind activities related

to submarine cables and pipelines, oil and gas activities, marine minerals extraction, onshore development, and port expansions would contribute to impacts on bats through the primary IPFs of noise, presence of structures, and land disturbance. Construction related to the connected action would generate temporary and localized noise impacts on bats. The construction, O&M, and decommissioning of both onshore and offshore infrastructure for offshore wind activities across the geographic analysis area would also contribute to the primary IPFs of noise, presence of structures, and land disturbance. Given the infrequent and limited anticipated use of the OCS by migrating tree bats during spring and fall migration, and given that cave bats do not typically occur on the OCS, offshore wind activities would not appreciably contribute to impacts on bats. Temporary disturbance and permanent loss of onshore habitat may occur as a result of constructing onshore infrastructure such as onshore substations and onshore export cables for offshore wind development. However, habitat removal is anticipated to be minimal, and any impacts resulting from habitat loss or disturbance would not be expected to result in individual fitness or population-level effects within the geographic analysis area. Ongoing and planned offshore wind activities in combination with the Proposed Action would result in an estimated 3,031 WTGs, of which the Proposed Action would contribute 147 or about 5 percent.

The cumulative impacts on bats would likely be negligible because the occurrence of bats offshore is low, and onshore habitat loss is expected to be minimal. In context of reasonably foreseeable environmental trends, the Proposed Action would contribute an undetectable increment to the cumulative noise, presence of structures, and land disturbance impacts on bats.

#### 3.5.5.3. Conclusions

**Impacts of the Proposed Action.** Construction and decommissioning of the Proposed Action would have **negligible** impacts on bats, especially if conducted outside the active season. The main significant risk would be from operation of the offshore WTGs and potential onshore removal of habitat, which could lead to negligible long-term impacts in the form of mortality, although BOEM anticipates this to be rare. Noise effects from construction are expected to be limited to temporary and localized behavioral avoidance that would cease once construction is complete. Similarly, the connected action is anticipated to have **negligible** impacts on bats with the potential for temporary and localized noise impacts during construction.

**Cumulative Impacts of the Proposed Action.** BOEM anticipates that the cumulative impacts on bats in the geographic analysis area would be **negligible**. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by the Proposed Action to the cumulative impacts on bats would be undetectable. Because the occurrence of bats offshore is low, the Proposed Action would contribute to the cumulative impacts primarily through the long-term impacts from onshore habitat loss related to the EW 2 Onshore Station C site and cable route that would cross three isolated habitat areas.

### 3.5.6 Impacts of Alternatives B, E, and F on Bats

**Impacts of Alternatives B, E, and F.** Alternatives B, E, and F would alter the turbine array layout compared to the Proposed Action; however, each of these alternatives would allow for installation of up to 147 WTGs as defined in Empire's PDE. The impacts resulting from individual IPFs associated with construction and installation, O&M, and decommissioning of the Projects under Alternatives B, E, and F would be the same as those described under the Proposed Action because the same number of WTGs would be constructed throughout the Lease Area. While the WTGs may move to a different position in the Lease Area under Alternatives B, E, and F, impacts on bats would not materially change compared to the Proposed Action. All other offshore and onshore Project components of Alternatives B, E, and F would be the same as under the Proposed Action.

**Cumulative Impacts of Alternatives B, E, and F.** The cumulative impacts on bats would likely be negligible for the same reasons described for the Proposed Action (i.e., bat presence offshore is low and onshore habitat loss would be minimal). In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternatives B, E, and F to the cumulative impacts on bats would be the same as those of the Proposed Action.

#### 3.5.6.1. Conclusions

**Impacts of Alternatives B, E, and F.** As discussed above, the expected **negligible** impacts associated with the Proposed Action would not change under Alternative B, E, or F.

**Cumulative Impacts of Alternatives B, E, and F.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative B, E, or F to the cumulative impacts on bats would be undetectable. Because the impacts of the Proposed Action would not change under Alternatives B, E, and F, BOEM anticipates that the cumulative impacts of Alternatives B, E, and F would be the same as described for the Proposed Action: **negligible**. Like the Proposed Action, because the occurrence of bats offshore is low, Alternatives B, E, and F would contribute to the overall impact rating primarily through the long-term impacts from onshore habitat loss related to the EW 2 Onshore Station C site and cable route that would cross three small, isolated habitat areas.

### 3.5.7 Impacts of Alternative C, D, and G on Bats

**Impacts of Alternatives C, D, and G.** The impacts resulting from individual IPFs associated with construction and installation, O&M, and decommissioning of the Projects under Alternative C, D, or G would be the same those described under the Proposed Action. Submarine and onshore cable route options around the Gravesend Anchorage (Alternative C-1) and the Ambrose Navigation Channel (Alternative C-2), to avoid the sand borrow area (Alternative D), or to use a cable bridge to cross Barnums Channel (Alternative G) are already covered under the Proposed Action as part of the PDE approach, and narrowing the submarine and onshore cable route options under Alternative C, D, or G would not materially change the analyses of any IPF. All other offshore and onshore Project components would be the same as under the Proposed Action.

**Cumulative Impacts of Alternatives C, D, and G.** The cumulative impacts on bats would likely be negligible because the occurrence of bats offshore is low, and onshore habitat loss is expected to be minimal. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative C, D, or G to the cumulative impacts on bats would be the same as those of the Proposed Action.

#### 3.5.7.1. Conclusions

**Impacts of Alternatives C, D, and G.** As discussed above, the expected **negligible** impacts associated with the Proposed Action would not change under Alternative C, D, or G.

**Cumulative Impacts of Alternatives C, D, and G.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative C, D, or G to the cumulative impacts on bats would be undetectable. Because the impacts of the Proposed Action would not change under Alternatives C, D, and G, BOEM anticipates that the cumulative impacts of Alternatives C, D, and G would be the same as described for the Proposed Action: **negligible**. Like the Proposed Action, because the occurrence of bats offshore is low, Alternatives C, D, and G would contribute to the cumulative impact rating primarily through the long-term impacts from onshore habitat loss related to the EW 2 Onshore Station C site and cable route that would cross three small, isolated habitat areas.

### 3.5.8 Impacts of Alternative H on Bats

**Impacts of Alternative H.** The impacts resulting from individual IPFs associated with construction and installation, O&M, and decommissioning of the Projects under Alternative H would be the same those described under the Proposed Action. An alternate method of dredge and fill activity at the SBMT would not materially change the analysis of any IPF, as the Onshore Project area is heavily developed with no natural bat habitat. BOEM does not anticipate that any change in dredge and fill activity would affect undisturbed or natural areas. All other offshore and onshore Project components of Alternative H would be the same as under the Proposed Action.

**Cumulative Impacts of Alternative H.** The cumulative impacts on bats would likely be negligible because the occurrence of bats offshore is low, and onshore habitat loss is expected to be minimal. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative H to cumulative impacts would be the same as described under the Proposed Action.

#### 3.5.8.1. Conclusions

**Impacts of Alternative H**. As discussed above, the expected **negligible** impacts associated with the Proposed Action would not change under Alternative H.

**Cumulative Impacts of Alternative H.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative H to cumulative impacts on bats would be undetectable. Because the impacts of the Proposed Action would not change under Alternative H, BOEM anticipates that the cumulative impacts of Alternative H would be the same as described for the Proposed Action: **negligible**. Like the Proposed Action, because the occurrence of bats offshore is low, Alternative H would contribute to the cumulative impact rating primarily through the long-term impacts from onshore habitat loss related to the EW 2 Onshore Station C site and cable route that would cross three small, isolated habitat areas.

### 3.5.9 Proposed Mitigation Measures

If the reported post-construction bat monitoring results (generated as part of Empire's *Bird and Bat Monitoring Framework* [Appendix H, Attachment H-3]) indicate bat impacts deviate substantially from the impact analysis included in this EIS, then Empire must make recommendations for new mitigation measures or monitoring methods (refer to Appendix H, Table H-1).

BOEM has also proposed annual mortality reporting to minimize impacts on birds and bats (refer to Appendix H, Table H-1). As part of this measure, the lessee would prepare and submit annual reports to BOEM, USFWS, and BSEE documenting any dead (or injured) birds or bats found on vessels and structures during construction, operations, and decommissioning. The lessee would report carcasses with federal or research bands to the United States Geological Survey Bird Band Laboratory. The lessee would report occurrences of dead ESA birds or bats to BOEM, USFWS, and BSEE within 24 hours of the sighting and, if practicable, carefully collect the dead specimen and preserve the material in the best possible state.

### 3.5.10 Comparison of Alternatives

Alternatives B, E, and F would have the same number of WTGs as the Proposed Action, which would result in the same impacts on bats; the overall impact level would not change—**negligible**.

Alternative C, D, or G would not materially change the analysis compared to the Proposed Action because the cable route options that would be constructed under these alternatives are already covered

under the Proposed Action as part of the PDE approach. Therefore, the overall impact level on bats would not change—**negligible**.

Under Alternative H, an alternative method of dredge and fill activity would occur in waters around the SBMT, which would not materially change the analysis of any IPF compared to the Proposed Action because the Onshore Project area is heavily developed with no bat habitat. Therefore, the overall impact level on bats would not change—**negligible**.

In context of reasonably foreseeable environmental trends, the cumulative impacts associated with Alternatives B, C, D, E, F, G, and H when each is combined with the impacts from ongoing and planned activities would be the same as for the Proposed Action—**negligible**.

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# 3.7. Birds

This section discusses potential impacts on bird resources from the proposed Projects, alternatives, and ongoing and planned activities in the geographic analysis area for birds. The geographic analysis area for birds, as shown on Figure 3.7-1, includes the United States coastline from Maine to Florida; the offshore limit is 100 miles (161 kilometers) from the Atlantic shore and the onshore limit is 0.5 mile (0.8 kilometer) inland.

## 3.7.1 Description of the Affected Environment for Birds

This section discusses bird species that use onshore and offshore habitats, including both resident bird species that use the proposed Project area during all (or portions of) the year and migrating bird species with the potential to pass through the proposed Project area during fall or spring migration. Detailed information regarding habitats and bird species potentially present can be found in the COP Volume 2, Section 5.3, Appendix P, and Appendix Q (Empire 2022). Given the differences in life history characteristics and habitat use between offshore and onshore birds, the sections below provide a discussion of each group. This section also discusses bald and golden eagles. This section addresses federally listed threatened and endangered birds; BOEM will also prepare a BA for the USFWS to analyze the effects of the Projects on these species per ESA Section 7 requirements. Results of ESA consultation with USFWS will be included in the Final EIS.

The Mid-Atlantic Coast plays an important role in the ecology of many bird species. The Atlantic Flyway is one of four major North American north-south migration routes for many species of seabirds, shorebirds, waterfowl, raptors, and songbirds. The Atlantic Flyway is along the eastern coast of North America, which includes several states and Canadian provinces that span the route from Canada to South America and the Caribbean. Coastal and marine environments along the Atlantic Flyway provide important habitat and food resources for hundreds of avian species at stopover sites, breeding locations, and wintering areas. Migrant terrestrial species may follow the coastline during migration or choose more direct flight routes over expanses of open water. Many marine birds also make annual migrations up and down the eastern seaboard (e.g., gannets, loons, and seaducks). Chapter 4.2.4 of the Atlantic OCS Proposed Geological and Geophysical Activities Programmatic EIS (BOEM 2014a) discusses the use of Atlantic Coast habitats by migrating birds.

Birds in the geographic analysis area are subject to pressure from ongoing activities, such as onshore construction, marine minerals extraction, port expansions, and installation of new structures in the OCS, but particularly from accidental releases; new cable, transmission line, and pipeline emplacement; interactions with fisheries and fishing gear; and climate change. More than one-third of bird species that occur in North America (37 percent, 432 species) are at risk of extinction unless significant conservation actions are taken (NABCI 2016). BOEM assumes that the North American Bird Conservation Initiative's (NABCI) 2016 estimate is true for the condition of birds in the geographic analysis area. This is likely representative of the conditions of birds within the geographic analysis area. The Northeastern United States is also home to more than one-third of the human population of the nation. As a result, species that live or migrate through the Atlantic Flyway have historically been, and will continue to be, subject to a variety of ongoing anthropogenic stressors, including hunting pressure (approximately 86,000 seaducks harvested annually [Roberts 2019]), commercial fisheries by-catch (approximately 2,600 seabirds are killed annually on the Atlantic [Hatch 2017; Sigourney et al. 2019]; recent estimates for long lines is 3,066 [Bi et al. 2021]), and climate change, which have the potential to have adverse impacts on bird species.

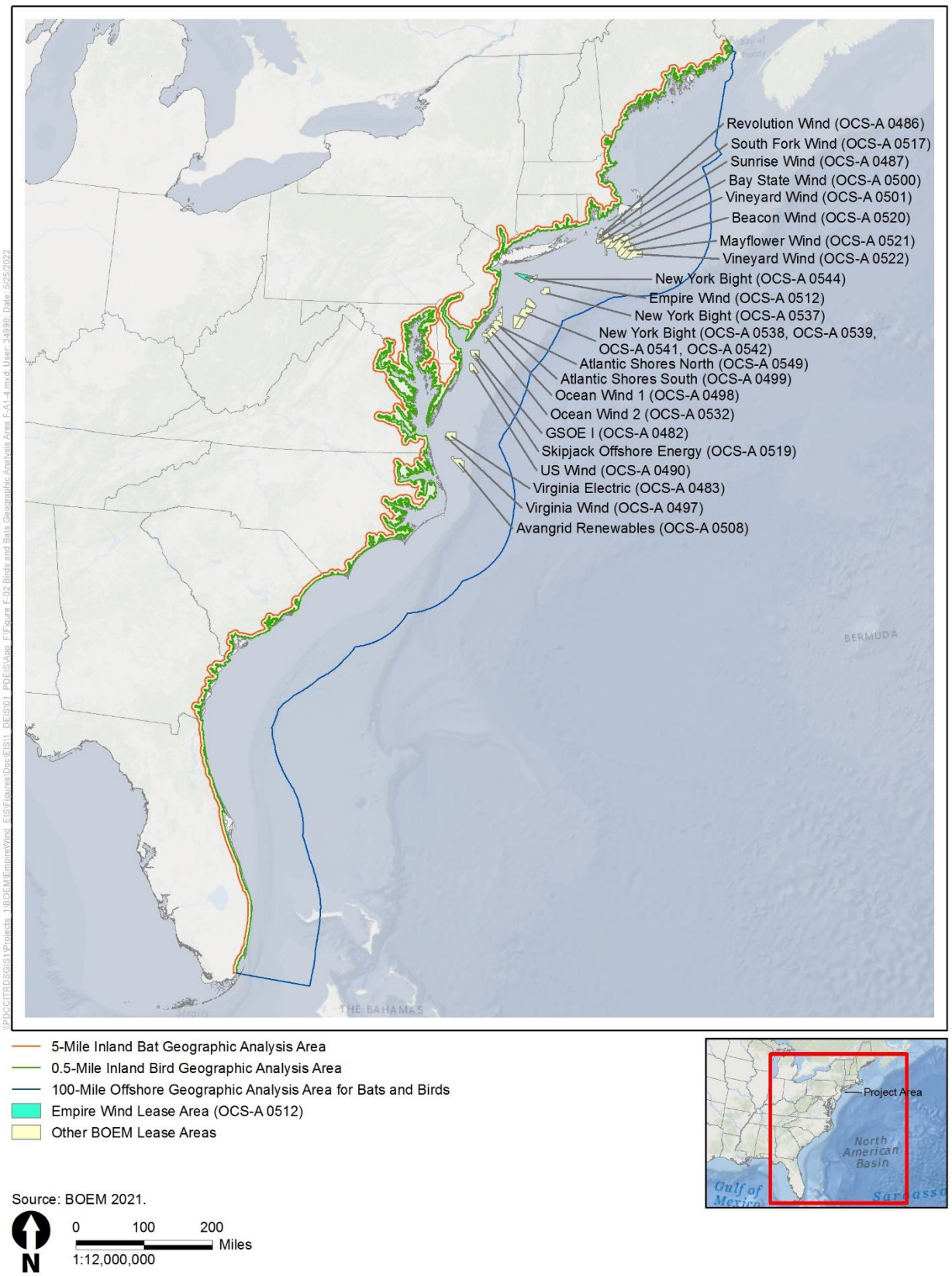


**Figure 3.7-1 Birds Geographic Analysis Area**

According to NABCI, more than half of the offshore Atlantic bird species (57 percent, 31 species) have been placed on the NABCI watch list as a result of small ranges, small and declining populations, and threats to required habitats. This watch list identified species of high conservation concern based upon high vulnerability to a variety of factors, including population size, breeding distribution, non-breeding distribution, threats to breeding, threats to non-breeding, and population trend (NABCI 2016). Globally, monitored offshore bird populations have declined by nearly 70 percent from 1950 to 2010, which may be representative of the overall population trend of seabirds (Paleczny et al. 2015) including those that forage, breed, and migrate over the Atlantic OCS. Overall, offshore bird populations are decreasing; however, considerable differences in population trajectories of offshore bird families have been documented.

Birds that nest in coastal marshes and other low-elevation habitats are vulnerable to sea-level rise and the increasing frequency of strong storms as a result of global climate change. According to NABCI, nearly 40 percent of the more than 100 bird species that rely on coastal habitats for breeding or for migration are on the NABCI watch list. Many of these coastal species have small population size or restricted distributions, making them especially vulnerable to habitat loss or degradation and other stressors (NABCI 2016). Models of vulnerability to climate change estimate that, throughout New York, 48 percent of New York's 280 bird species are vulnerable to climate change across all seasons (Audubon 2019), some of which occur in the geographic analysis area. A rapidly changing climate could lead to population declines if species are not able to adapt. In addition, the reshuffling of bird communities at a continental scale will bring together species that previously lived in isolation, leading to unpredictable interactions. Disruptions in food and nesting resources would further compound vulnerabilities to climate change. These ongoing impacts on birds would continue regardless of the offshore wind industry.

A broad group of avian species has been documented in or may pass through the Lease Area, including migrants (such as raptors and songbirds), coastal birds (such as shorebirds, waterfowl, and waders), and marine birds (such as seabirds and seaducks). The Lease Area is within the New York Bight, which is part of the larger Mid-Atlantic Bight. The Mid-Atlantic Bight supports a high diversity of marine birds and is an ecologically important area for birds due to its central location in a major migratory flyway. Approximately 61 bird species have been identified as occurring in the Offshore Project area through public databases and Project-associated baseline studies (see Table 2-9 in COP Appendix Q; Empire 2022). Of these 61 species, four are state-listed as threatened or endangered (black tern, least tern, common tern, roseate tern) and one is federally listed as endangered (roseate tern). Two additional federally and state-listed birds have the potential to occur in the Offshore Project area: the piping plover (state listed as endangered, federally listed as threatened) and red knot (state- and federally listed as threatened).

The Lease Area is within the Atlantic Flyway, which, as mentioned above, is one of four major North American north-south migration routes for many species of seabirds, shorebirds, waterfowl, raptors, and songbirds. Many marine birds also make annual migrations up and down the eastern seaboard (e.g., gannets, loons, and seaducks), taking them directly through the New York Bight region in spring and fall.

The New York Bight supports large populations of birds in summer, some of which breed in the area, such as gulls and terns. Other summer residents, such as shearwaters and storm-petrels, migrate from the Southern Hemisphere (where they breed during the austral summer). In the fall, many of the summer residents leave the area and migrate south to warmer regions, while species that breed farther north migrate south and spend winter in the Mid-Atlantic region. This results in a complex ecosystem where the community composition shifts regularly, and temporal and geographic patterns are highly variable (Empire 2022).

Table 3.7-1 briefly summarizes the bird presence in the Offshore Project area by bird group based on information in the *Avian Impact Assessment* conducted for the Projects (see COP Appendix Q; Empire

2022). The table breaks down birds into six groups—shorebirds, wading birds, raptors, songbirds, coastal waterbirds, and marine birds—that coincide with the *Avian Impact Assessment* bird groupings. Marine birds are further broken down by family group. The *Avian Impact Assessment* evaluates baseline conditions for birds in the onshore and offshore portions of the Projects by documenting which species are likely to occur in the Project area, based on the best available data. It then evaluates the risk of the impact of Project construction, operations, and decommissioning activities on those species likely to occur based on their habitat requirements, behavior, seasonal use of the Project area, and potential sensitivity to each Project activity. Additional Project-specific bird survey information, which is incorporated into the *Avian Impact Assessment,* can be found in the *Ornithological and Marine Fauna Aerial Survey* conducted for the Projects (COP Appendix P; Empire 2022).

**Table 3.7-1 Bird Presence in the Offshore Project Area by Bird Group**

| Bird Group | Potential Bird Presence in Offshore Project Area |
|---|---|
| Shorebirds | Shorebirds (e.g., black-bellied plover, semipalmated plover) are typically coastal breeders and foragers and generally avoid straying out over deep waters during breeding. Of the shorebirds that range into and migrate through the Offshore Project area, only red phalarope and red-necked phalarope are generally considered marine species, meaning that they swim and forage in offshore marine waters. Red phalaropes are also known to regularly winter in Atlantic waters just south of the Offshore Project area. Primarily, exposure of shorebirds to the offshore infrastructure would be limited to the spring and fall migration periods |
| Wading Birds | Most long-legged wading birds, such as herons and egrets, breed and migrate in coastal and inland areas. Like the smaller shorebirds, wading birds are believed to avoid straying out over deep waters (Kushlan and Hafner 2000), but may traverse the Lease Area during spring and fall migration periods. The USFWS IPaC database does not indicate any wading birds in the Lease Area or adjacent waters that are identified as vulnerable or Birds of Conservation Concern, and digital aerial surveys and site-specific surveys conducted by Empire (see COP Appendix P) showed no wading birds within the Lease Area (see maps in COP Appendix Q). |
| Raptors | The degree to which raptors might occur offshore is dictated primarily by their morphology and flight strategy (i.e., flapping versus soaring), which influences species' ability or willingness to cross large expanses of open water where thermal formation is poor (Kerlinger 1985). Among raptors, falcons are the most likely to be encountered in offshore settings along the Atlantic flyway (Cochran 1985; DeSorbo et al. 2012, 2018). Merlins are the most abundant diurnal raptor observed at offshore islands during migration. Both have been observed offshore on vessels and offshore oil platforms considerable distances from shore. Therefore, these raptors are considered to be the most likely to pass through the Lease Area during migration. |

| Bird Group | Potential Bird Presence in Offshore Project Area |
|---|---|
| Songbirds | Songbirds (e.g., warblers, sparrows) almost exclusively use terrestrial, freshwater, and coastal habitats and do not use the offshore marine system except during migration. Many North American breeding songbirds migrate to the tropical regions, many in flocks. On their migrations, neotropical migrants generally travel at night and at high altitudes where favorable winds can aid them along their trip. Songbirds regularly cross large bodies of water (Bruderer and Lietchi 1999; Gauthreaux and Belser 1999), and there is some evidence that species migrate over the northern Atlantic (Adams et al. 2015). Some birds may briefly fly over the water while others, like the blackpoll warbler, are known to migrate over vast expanses of ocean (Faaborg et al. 2010; DeLuca et al. 2015). Evidence for a variety of species suggests that overwater migration in the Atlantic is much more common in fall (than in spring), when the frequency of overwater flights increases perhaps due to consistent tailwinds (Morris et al. 1994; Hatch et al. 2013; Adams et al. 2015; DeLuca et al. 2015). Based on the *Avian Impact Assessment* for the Projects (COP Appendix Q), the exposure of songbirds to the Lease Area would be minimal to low and limited to the months of migration. |
| Coastal Waterbirds | Coastal waterbirds use terrestrial or coastal wetland habitats and rarely use the marine offshore environment. This group includes aquatic species not captured in other groupings, such as grebes and waterfowl, that are generally restricted to freshwater or use saltmarshes or beaches. Waterfowl comprise a broad group of geese and ducks, most of which spend much of the year in terrestrial or coastal wetland habitats. The diving ducks generally winter on open freshwater, as well as brackish or saltwater. Species that regularly winter on saltwater, including mergansers, scaup, and goldeneyes, usually restrict their distributions to shallow, very nearshore waters. Because most coastal waterbirds spend a majority of the year in freshwater aquatic systems and nearshore marine systems, there is little to no use of the Lease Area during any season. A subset of diving ducks has a strong affinity for saltwater, either year-round or outside of the breeding season; these species are known as seaducks. Seaducks are discussed below in the marine bird section. |
| **Marine Birds (by family group)** | |
| Loons | Common loons and red-throated loons are known to use the Atlantic OCS in winter. Analysis of satellite-tracked red-throated loons, captured and tagged in the Mid-Atlantic area, found their winter distributions to be largely inshore of the Mid-Atlantic WEAs, although they did overlap with the Lease Area during spring migration (Gray et al. 2016). The digital aerial surveys and MDAT models show lower use of the Lease Area by loons in the summer than in other seasons. |
| Seaducks | The seaducks (e.g., black scoter, surf scoter, common eider) use the Atlantic OCS heavily in winter. Most of these seaducks dive to forage on mussels and other benthic invertebrates, and generally winter in shallower inshore waters or out over large offshore shoals, where they can access benthic prey. Seaducks tracked with satellite transmitters remained largely inshore of the Lease Area, with exception of surf scoter and black scoter during spring migration (Spiegel et al. 2017). Based on the *Avian Impact Assessment* (COP Appendix Q), including digital aerial survey data and MDAT models, seaduck exposure to the Projects is expected to be minimal and would be primarily limited to migration or travel between wintering sites. |

| Bird Group | Potential Bird Presence in Offshore Project Area |
|---|---|
| Petrel group | In the Atlantic, this group consists mostly of shearwaters (e.g., Cory's shearwater, great shearwater, sooty shearwater) and storm-petrels (e.g., leach's storm-petrel, Wilson's storm-petrel) that breed in the southern hemisphere and visit the northern hemisphere in vast numbers during the austral winter (boreal summer) and may pass through the Lease Area. These species use the Atlantic OCS region so heavily that, in terms of sheer numbers, they easily outnumber the locally breeding species and year-round residents at this time of year. Several of the species (e.g., Cory's shearwater, Wilson's storm-petrel) are found in high densities across the broader region, concentrating beyond the Atlantic OCS and in the Gulf of Maine as shown in the MDAT avian abundance models. |
| Gannets, Cormorants, and Pelicans | Northern gannets use the Atlantic OCS during winter and migration. They are opportunistic foragers, capable of long-distance oceanic movements, and may pass through the Lease Area regularly during the non-breeding period. The double-crested cormorant is the most likely species of cormorant exposed to the Lease Area, but regional MDAT abundance models show that cormorants are concentrated closer to shore and not commonly encountered well offshore (Curtice et al. 2016; Winship et al. 2018), and few cormorants were observed during digital aerial surveys. Brown pelicans are rare in the area, as only one was detected during project-specific surveys (COP Appendix P) and New Jersey is at the northern extent of its range; therefore, they are unlikely to pass through the Lease Area in any numbers. |
| Gulls, skuas, and jaegers | 14 species of gulls, skuas, and jaegers were observed in digital aerial surveys in the Lease Area (COP Appendices P and Q). The regional MDAT abundance models show that these birds have wide distributions, ranging from near shore (gulls) to offshore (jaegers). Herring gulls and great black-backed gulls are resident in the region year-round, and are found farther offshore during the non-breeding season. The parasitic jaeger is often observed closer to shore during migration than the other species and great skuas may migrate along the Atlantic OCS outside the breeding season. |
| Terns | During Project-specific surveys (COP Appendix P), Black tern, least tern, common tern, Forster's tern, roseate tern, and royal tern have been observed in the Lease Area; least tern, common tern, and unidentified tern were identified with in the Lease Area in the spring. Terns generally restrict themselves to coastal waters during breeding, although they may pass through the Lease Area during migration. Roseate terns are federally listed. |
| Auks | Auk species present in the Project area are generally northern or Arctic-breeders that winter along the Atlantic OCS (e.g., common murre, dovekie, razorbill). The annual abundance and distribution of auks along the eastern seaboard in winter is erratic, and is dependent upon broad climatic conditions and the availability of prey. The MDAT abundance models show that during winter auks are generally concentrated offshore, along the shelf edge, and southwest of Nova Scotia. |

Sources: Empire 2022; USFWS 2021a.
IPaC = Information for Planning and Consultation; MDAT = Marine-life Data and Analysis Team

Habitats within and in the vicinity of the EW 1 Onshore Project area are significantly altered by human development and are primarily used for industrial and commercial operations (see Figure 5.3-5 in COP Volume 2b, *Biological Resources*; Empire 2022). The EW 1 area and surrounding vicinity serve as a transportation and service corridor and associated infrastructure is a dominant feature. The SBMT is dominated by a paved lot and warehouse buildings, with over 95 percent impervious surfaces; vegetation is limited to volunteer invasives and a line of poplar trees on the north side of the 35$^{th}$ Street Pier

(AECOM 2022). Due to the mobility of birds, a variety of species have the potential to pass through the EW 1 Onshore Project area. However, due to the highly developed nature of the EW 1 Onshore Project area, the area does not provide important bird habitat for native species or species of conservation concern, with the exception of species that associate with coastal urbanized areas (e.g., pigeons, seagulls, European starlings). A bird survey conducted from August to October 2020 identified approximately 50 bird species in and around the SBMT, none of which were federally listed threatened or endangered species (AECOM 2022). A low number of four state special status birds were observed, including common tern (state-listed as threatened), osprey (state species of special concern), American black duck (high-priority species), and peregrine falcon (state-listed as endangered). Overall, the Onshore Project area has low value to these species due to the low resource levels, high levels of disturbance, and overall low-quality habitat for nesting, roosting, and foraging (AECOM 2022). The nearest Audubon Important Bird Area (IBA) is approximately 1.5 miles (2.4 kilometers) east of EW 1. This IBA (Prospect Park) supports a high diversity of migrant songbirds and is thought to be an important migratory stopover site for land birds (see Figure 5.3-5 in COP Volume 2b, *Biological Resources*; Empire 2022). The complete list of birds identified within 15 kilometers of the EW 1 onshore site is found in COP Appendix Q, Table 3-7 (Empire 2022).

Habitats within and in the vicinity of the EW 2 Onshore Project area are significantly altered by human development (see Figure 5.3-6 in COP Volume 2b, *Biological Resources*; Empire 2022). Natural habitat is minimal, as the landscape is highly characterized by residential and commercial development and only provides edge habitat for common urban birds. This area serves as a transportation and service corridor and associated infrastructure is a dominant feature. EW 2 Onshore Substation C is composed of several active commercial properties with approximately 70 percent of the site devoid of vegetation and includes commercial buildings, supporting ancillary appurtenances, roads, and gravel parking areas. The remaining 30 percent of the site consists of vegetated perimeters (some trees and shrubs) of parking lots and an approximately 1-acre area that has been routinely disturbed with land clearing and soil disturbance. The undeveloped areas of the EW 2 Onshore Substation C site may have the potential to provide some habitat for certain urban bird species, but this area is not expected to be important habitat for any species and is completely isolated by surrounding developments. The EW 2 Onshore Substation A site is previously developed and currently supports a recycling facility. There is some beach and dune habitat along shoreline that is developed for tourism and recreational use. Long Beach is sandy with no vegetation and could provide foraging habitat for common marine bird species (e.g., gulls), while Lido Beach includes vegetated dunes that provide nesting habitat to various coastal nesting species. The landfall sites are in a paved parking area site, directly adjacent to commercial areas and existing roadways. The EW 2 Onshore Project area is surrounded by the West Hempstead Bay/Jones Beach West IBA (a global IBA), which includes most of the beach areas and inland waterways around the EW 2 Onshore Project area (see Figure 3-2 in COP Appendix Q; Empire 2022). This IBA has over 60 recorded species known to occur, with known breeding of the piping plover and short-eared owl. Outside of the beach areas, the IBA does not include the islands of Long Beach and Island Park, however. Because the EW 2 Onshore Project area is highly developed, the birds most likely to be present in the EW 2 Onshore Project area are common coastal, urban (some introduced), and upland species. The birds most likely to be exposed to the Project activities at EW 2 Landfall A, EW 2 Landfall B, and EW 2 Landfall E sites include gulls, geese, dabbling ducks, and cormorants, while some coastal nesting species may be exposed at the EW 2 Landfall C site. Upland species are likely to include European starling, house sparrow, song sparrow, and mockingbird.

The complete list of birds identified within 15 kilometers of the EW 2 Onshore Project area is found in COP Appendix Q, Table 3-7 (Empire 2022) and includes species listed by the federal government as endangered, threatened, and birds of conservation concern and by the state of New York as endangered, threatened, or special concern. In the eBird database there are 23 species listed as high-priority Species of

Greatest Conservation Need (SGCN),[1] five of which are state-listed: piping plover (also federally listed), black tern, roseate tern (also federally listed), peregrine falcon, and short-eared owl. The two state-listed birds that utilize upland habitats (i.e., peregrine falcon and short-eared owl) are not likely to be present because available habitat, including the wooded parcel adjacent to the Oceanside POI, is in an urban developed area. It is possible that the coastal species (e.g., terns, warblers, sparrows) may pass through the beach areas at the export cable landfall site during migration (Empire 2022).

Bald eagles (*Haliaeetus leucocephalus*), which are listed as endangered (breeding) and threatened (non-breeding) in New Jersey and threatened in New York, are federally protected by the Bald and Golden Eagle Protection Act, 16 USC 668 et seq., as are golden eagles (*Aquila chrysaetos*). Bald eagles are broadly distributed across North America and generally nest and perch in areas associated with water (lakes, rivers, bays) in both freshwater and marine habitats, often remaining largely within roughly 1,640 feet of the shoreline (Buehler 2000). Bald eagles are present year-round in New Jersey and New York. In New Jersey, nesting is concentrated on the edge of Delaware Bay (NJDEP 2017); in New York, eagle territories are primarily inland, and in 2010 no territories were identified on Long Island (Nye 2010). In a study evaluating the space use of bald eagles captured in Chesapeake Bay, the coast of New Jersey was associated with moderate levels of use and the coast of New York had low to moderate levels of use (Mojica et al. 2016). The general morphology of bald eagles dissuades long-distance movements in offshore settings, as the species generally relies upon thermal formations, which develop poorly over the open ocean, during long-distance movements. As such, bald eagles are unlikely to fly through the Lease Area. Bald eagles were rarely observed in Mid-Atlantic offshore surveys (all observations were less than 3.7 miles [6 kilometers] from shore), and only one bald eagle was observed in the APEM[2] surveys; this individual was close to shore (see Figure 2-16 in COP Appendix Q) and none were documented in the Lease Area (Empire 2022).

Golden eagles are found throughout the United States, but mostly in the western half of the United States and are rare in the eastern states (Cornell University 2019). The species is now virtually extirpated as a breeding bird east of the Mississippi River (NYSDEC n.d.). Although sightings occur every year in New York, most are during migration and no active nests are known to occur (NYSDEC n.d.). In New Jersey, golden eagles are associated with forest habitats in the Delaware Bay, Piedmont Intercoastal Plain, Pinelands, and Skylands landscape regions (NJDEP 2018). The area of New Jersey closest to the Lease Area is within the Atlantic Coastal Landscape region, which is not associated with golden eagles (New Jersey Bureau of GIS 2019). Like with bald eagle, the general morphology of golden eagle dissuades long-distance movements in offshore settings (Kerlinger 1985), as the species generally relies upon thermal formations, which develop poorly over the open ocean, during long-distance movements. As such, golden eagles are unlikely to fly through the Lease Area.

Three species of birds listed as threatened or endangered under the ESA may occur in the Onshore and Offshore Project areas: the threatened piping plover (*Charadrius m. melodus*), endangered roseate tern (*Sterna d. dougallii*), and threatened *Rufa* subspecies of the red knot (*Calidris canutus rufa*) (USFWS 2021a; Empire 2022).

[1] High-priority SGCN species are wildlife species experiencing a population decline or have identified threats that may put them in jeopardy, and are in need of timely management intervention or are likely to reach critical population levels in New York (NYSDEC 2015).
[2] APEM is a European environmental consultant that specializes in aerial surveys.

### 3.7.2 Impact Level Definitions for Birds

Definitions of impact levels are provided in Table 3.7-2.

**Table 3.7-2 Impact Level Definitions for Birds**

| Impact Level | Impact Type | Definition |
|---|---|---|
| Negligible | Adverse | Impacts would be so small as to be unmeasurable. |
| | Beneficial | Impacts would be so small as to be unmeasurable. |
| Minor | Adverse | Most impacts would be avoided; if impacts occur, the loss of one or few individuals or temporary alteration of habitat could represent a minor impact, depending on the time of year and number of individuals involved. |
| | Beneficial | Impacts would be localized to a small area but with some measurable effect on one or a few individuals or habitat. |
| Moderate | Adverse | Impacts would be unavoidable but would not result in population-level effects or threaten overall habitat function. |
| | Beneficial | Impacts would affect more than a few individuals in a broad area but not regionally, and would not result in population-level effects. |
| Major | Adverse | Impacts would result in severe, long-term habitat or population-level effects on species. |
| | Beneficial | Long-term beneficial population-level effects would occur. |

### 3.7.3 Impacts of the No Action Alternative on Birds

When analyzing the impacts of the No Action Alternative on birds, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on the baseline conditions for birds. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with the other planned non-offshore wind and offshore wind activities as described in Appendix F, *Planned Activities Scenario*.

#### 3.7.3.1. Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for birds described in Section 3.7.1, *Description of the Affected Environment for Birds*, would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind activities within the geographic analysis area that contribute to impacts on birds are generally associated with construction and climate change, and may also include interactions with commercial fisheries and anthropogenic light in the coastal environment. Onshore construction activities and associated impacts are expected to continue and have the potential to affect birds through temporary and permanent habitat removal and temporary noise impacts, which can cause avoidance behavior and displacement. Mortality of individual birds could occur but population-level effects would not be anticipated. Impacts of climate change such as increased storm severity and frequency, ocean acidification, altered migration patterns, increased disease frequency, and increased erosion and sediment deposition have the potential to result in long-term, potentially high-consequence risks to birds and could lead to changes in prey abundance and distribution, changes in nesting and foraging habitat abundance and distribution, and changes to migration patterns and timing.

Ongoing offshore wind activities within the geographic analysis area that contribute to impacts on birds include:

- Continued O&M of the Block Island project (five WTGs) installed in state waters;
- Continued O&M of the Coastal Virginia Offshore Wind project (two WTGs) installed in OCS-A 0497; and
- Ongoing construction of two offshore wind projects, the Vineyard Wind 1 project (62 WTGs and 1 OSS) in OCS-A 0501 and the South Fork project (12 WTGs and 1 OSS) in OCS-A 0517.

Ongoing O&M of the Block Island and Coastal Virginia Offshore Wind projects and ongoing construction of the Vineyard Wind 1 and South Fork projects would affect birds through the primary IPFs of accidental releases, lighting, cable emplacement and maintenance, noise, presence of structures, traffic (aircraft), and land disturbance. Ongoing offshore wind activities would have the same type of impacts from accidental releases, lighting, cable emplacement and maintenance, noise, presence of structures, traffic (aircraft), and land disturbance described in detail in Section 3.7.3.2 for planned offshore wind activities but the impacts would be of lower intensity.

### 3.7.3.2. Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impact of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Other planned non-offshore wind activities that may affect birds include installation of new submarine cables and pipelines, increasing onshore construction, marine minerals extraction, port expansions, and installation of new structures on the OCS (see Section F.2 in Appendix F for a complete description of planned activities). These activities may result in short-term and permanent impacts on birds including disturbance, displacement, injury, mortality, habitat degradation, and habitat conversion. See Table F1-4 for a summary of potential impacts associated with planned non-offshore wind activities by IPF for birds.

BOEM expects planned offshore wind development activities to affect birds through the following primary IPFs.

**Accidental releases:** Accidental releases of fuel/fluids, other contaminants, and trash and debris could occur as a result of future offshore wind activities. The risk of any type of accidental release would be increased primarily during construction, but also during operations and decommissioning of offshore wind facilities. Ingestion of fuel and other hazardous contaminants has the potential to result in lethal and sublethal impacts on birds, including decreased hematological function, dehydration, drowning, hypothermia, starvation, and weight loss (Briggs et al. 1997; Haney et al. 2017; Paruk et al. 2016). Additionally, even small exposures that result in oiling of feathers 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). Based on the volumes potentially involved (refer to Table F2-3 in Appendix F, *Planned Activities Scenario*), the likely amount of releases associated with future offshore wind development would fall within the range of accidental releases that already occur on an ongoing basis from non-offshore wind activities and would represent a negligible impact on birds.

Vessel compliance with USCG regulations would minimize trash or other debris; therefore, BOEM expects accidental trash releases from offshore wind vessels to be rare and localized in nature. In the unlikely event of a release, lethal and sublethal impacts on individuals could occur as a result of blockages caused by both hard and soft plastic debris (Roman et al. 2019). Given that accidental releases

are anticipated to be rare and localized, BOEM expects that accidental releases of trash and debris would not appreciably contribute to overall impacts on birds.

**Lighting:** Nighttime lighting associated with offshore wind structures and vessels (during construction, operations, and decommissioning) could represent a source of bird attraction, which can result in disorientation and increased collision and predation risks (Hüppop et al. 2006). Under the No Action Alternative, up to 2,803 WTGs and 66 OSS would have navigational and FAA hazard and aviation lighting that would be incrementally added beginning in 2023 and continuing through 2030. However, BOEM anticipates this impact to be significantly reduced due to the anticipated use of ADLS, which is a system that would activate WTG lighting only when an aircraft enters a predefined airspace. For example, the recently approved Vineyard 1 offshore wind project will implement ADLS and, based on historical air traffic data, WTG light activation under ADLS is estimated to occur 235 times per year, for a total illumination duration of less than 4 hours per year (illuminating less than 0.1 percent of the nighttime hours per year) (BOEM 2021a). Another recently approved offshore wind project—South Fork—will also implement ADLS as part of BOEM's COP approval terms and conditions, and several offshore wind projects currently under BOEM consideration are proposing/considering ADLS (pending FAA and BOEM approval) (e.g., Atlantic Shores, Ocean Wind, Coastal Virginia Offshore Wind). As such, BOEM anticipates ADLS to significantly reduce the potential WTG lighting impacts on birds. In addition, and as discussed in more detail below in the *Presence of Structures* IPF, the abundance of bird species that overlap with the anticipated development of wind energy facilities on the Atlantic OCS is relatively small (Figure 3.7-2), and the relative seasonal exposure of bird populations is generally very low (Table 3.7-2). BOEM anticipates long-term but minor impacts on birds due to lighting of offshore structures.

Construction vessels are also a source of artificial lighting, which could attract birds and cause disorientation and collision or predation risk. However, the potential impact would be short term, lasting only the duration of construction and, as previously described, the abundance of bird species on the OCS that overlap with the anticipated wind development of wind energy facilities is relatively small. Therefore, BOEM anticipates vessel lighting would result in short-term and minor impacts on birds.

**Cable emplacement and maintenance:** Generally, emplacement of submarine cables would result in increased suspended sediments that may affect diving birds, result in displacement of foraging individuals or decreased foraging success, and have impacts on some prey species (e.g., benthic assemblages) (Cook and Burton 2010). The total area of seafloor disturbed by offshore export and interarray cables for offshore wind facilities is estimated to be 36,125 acres (146.2 $km^2$). Impacts associated with cable emplacement would be short term and localized, and birds would be able to successfully forage in adjacent areas not affected by increased suspended sediments. Any dredging necessary prior to cable installation could contribute to additional impacts. Disturbed seafloor from construction of future offshore wind projects may affect some bird prey species; however, assuming future projects use installation procedures similar to those proposed in the Empire Wind COP, the duration and extent of impacts would be limited and short term, and benthic assemblages would recover from disturbance relatively quickly (as stated Section 3.6, *Benthic Resources*, and Section 3.13, *Finfish, Invertebrates, and Essential Fish Habitat*). Given that impacts would be short term and generally localized to the emplacement corridor, no individual fitness or population-level effects on birds would be expected.

**Noise:** Anthropogenic noise on the OCS associated with future offshore wind development, including noise from aircraft, pile-driving activities, G&G surveys, offshore construction, and vessel traffic, has the potential to result in impacts on birds on the OCS. Additionally, onshore construction noise has the potential to result in impacts on birds. BOEM anticipates that these impacts would be localized and short term. Potential impacts could be greater if avoidance and displacement of birds occurs during seasonal migration periods.

Aircraft flying at low altitudes may cause birds to flush, resulting in increased energy expenditure. Disturbance to birds, if any, would be temporary and localized, with impacts dissipating once the aircraft has left the area. No individual or population-level effects would be expected.

Construction of up to 2,803 WTGs and 66 OSS would create noise and may temporarily affect diving birds. The greatest impact of noise is likely to be caused by pile-driving activities during construction. Noise transmitted through water has the potential to result in temporary displacement of diving birds in a limited space around each pile and can cause temporary stress and behavioral changes ranging from mild annoyance to escape behavior (BOEM 2014b, 2016). Additionally, noise impacts on prey species may affect bird foraging success. Similar to pile driving, G&G site characterization surveys for offshore wind facilities would create high-intensity impulsive noise around sites of investigation, leading to similar impacts on birds.

Onshore noise associated with intermittent construction of required offshore wind development infrastructure may also result in localized and short-term impacts, including avoidance and displacement, although no individual fitness or population-level effects would be expected to occur.

Noise associated with project vessels could disturb some individual diving birds, but they would likely acclimate to the noise or move away, potentially resulting in a short-term loss of habitat (BOEM 2012). However, brief, temporary responses, if any, would be expected to dissipate once the vessel has passed or the individual has moved away. No individual fitness or population-level effects would be expected.

**Presence of structures:** The presence of structures can lead to long-term beneficial and adverse impacts on birds. Beneficial impacts from the presence of structures could result for some bird species through a reduction in derelict fishing gear (by entanglement with foundations) and increased prey items, which could result in fish aggregation and associated increase in foraging opportunities. Adverse impacts could include migration disturbances, strikes with structures (e.g., WTGs, buoys), and displacement.

The primary threat to birds from future offshore wind development is the presence of WTGs that could cause collisions and displacement. The Atlantic Flyway is an important migratory pathway for as many as 164 species of waterbirds, and a similar number of land birds, with the greatest volume of birds using the Atlantic Flyway during annual migrations between wintering and breeding grounds (Watts 2010). Within the Atlantic Flyway along the North American Atlantic Coast, much of the bird activity is concentrated along the coastline (Watts 2010). Waterbirds use a corridor between the coast and several kilometers out onto the OCS, while land birds tend to use a wider corridor extending from the coastline to tens of kilometers inland (Watts 2010). While both groups may occur over land or water within the flyway and may extend considerable distances from shore, the highest diversity and density are centered on the shoreline.

Building on this information, Robinson Wilmott et al. (2013) evaluated the sensitivity of bird resources to collision and displacement due to future wind development on the Atlantic OCS and included the 164 species selected by Watts (2010) plus an additional 13 species, for a total of 177 species that may occur on the Atlantic OCS from Maine to Florida during all or some portion of the year. As discussed in Robinson Willmott et al. (2013) and consistent with Garthe and Hüppop (2004), Furness and Wade (2012), and Furness et al. (2013), species with high scores for sensitivity for collision include gulls, jaegers, and the northern gannet (*Morus bassanus*). In many cases, high collision sensitivity was driven by high occurrence on the OCS, low avoidance rates with high uncertainty, and time spent in the RSZ. It should be noted that, although Robinson Wilmott et al. (2013) use a comprehensive set of metrics in the study, may other environmental factors could influence bird vulnerability to offshore wind facilities (e.g., weather, lighting, area of RSZ).

Many of the species addressed in Robinson Willmott et al. (2013) that were identified as having low collision sensitivity include passerines that spend very little time on the Atlantic OCS during migration and typically fly above the RSZ. As described by Watts (2010), approximately 55 seabirds occur on the Atlantic OCS at a distance from shore where WTGs could be operating. However, generally the abundance of bird species that overlap with the anticipated development of wind energy facilities on the Atlantic OCS is relatively small (Figure 3.7-2). Of the 55 seabird species, 47 seabird species have sufficient survey data to calculate the modeled percentage of a species population by season that would overlap with the anticipated offshore wind development on the Atlantic OCS (Winship et al. 2018). Looking at all 47 birds across all four seasons, the relative seasonal exposure is generally very low, ranging from 0.0 to 5.2 percent of the seabird populations (Table 3.7-3). BOEM assumes that the 47 species (85 percent) with sufficient data to model the relative distribution and abundance on the Atlantic OCS are representative of the 55 species that may overlap with offshore wind development on the Atlantic OCS.

Offshore wind development would add up to 2,803 WTGs in the bird geographic analysis area (Table F2-1). In the contiguous United States, bird collisions with operating WTGs are believed to be relatively rare events, with an estimated 140,000 to 500,000 (mean = 320,000) birds killed annually from about 49,000 onshore wind turbines in 39 states (USFWS 2018). Bird collisions with turbines in the eastern United States have been estimated at 6.86 birds per turbine per year (USFWS 2018). Based on this mortality rate, an estimated 19,229 birds could be killed annually from the 2,803 WTGs that would be added for offshore wind development. Given that the relative density of birds in the OCS is low, relatively few birds are likely to encounter WTGs (see Figure 3.7-2).

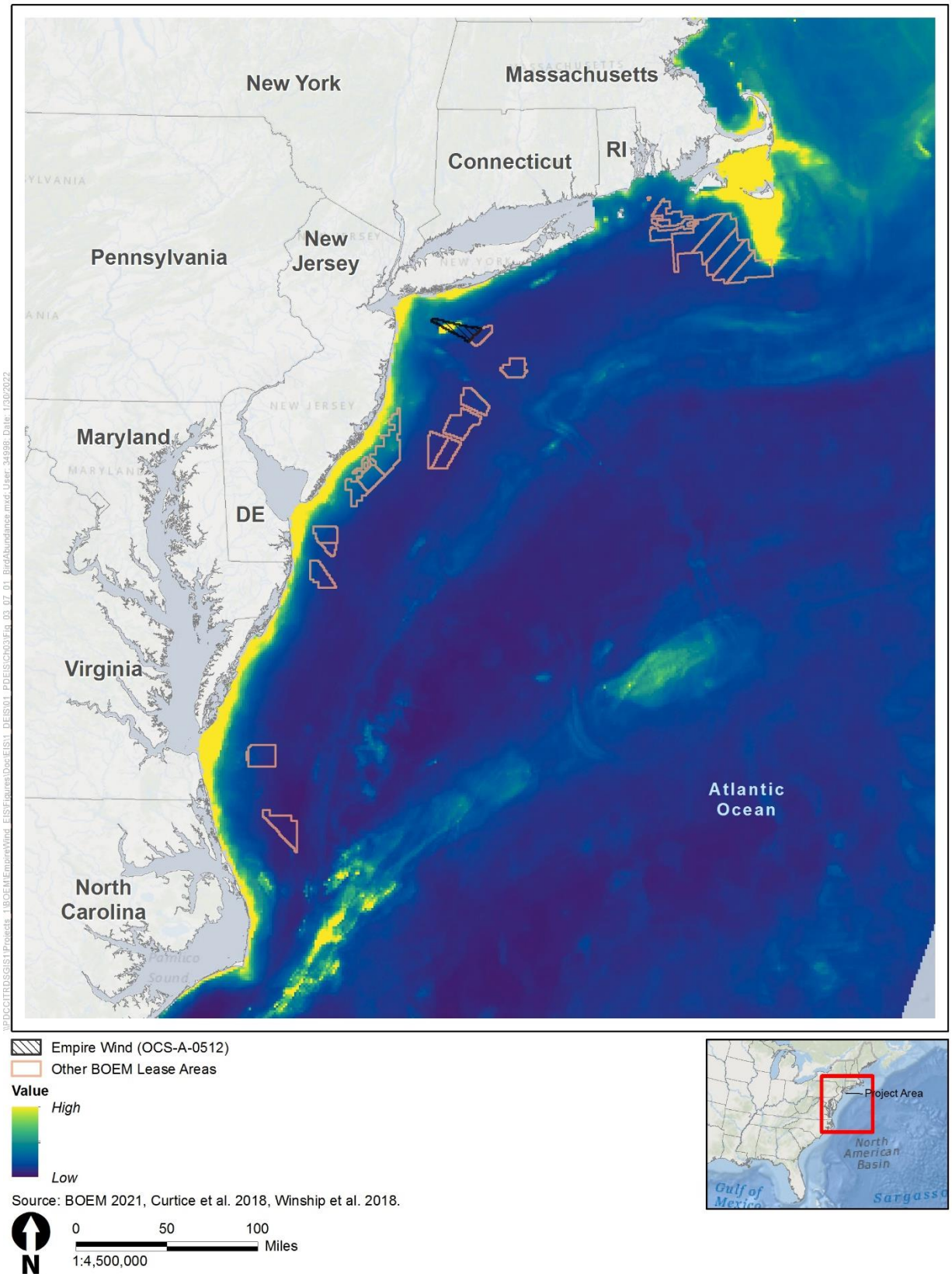


**Figure 3.7-2 Total Avian Relative Abundance Distribution Map**

Potential annual bird kills from WTGs would be relatively low compared to other causes of migratory bird deaths in the United States; feral cats are the primary cause of migratory bird deaths in the United States (2.4 billion per year), followed by collisions with building glass (599 million per year), collisions with vehicles (214.5 million per year), poison (72 million per year), collisions with electrical lines (25.5 million per year), collisions with communication towers (6.6 million per year), and electrocutions (5.6 million per year) (USFWS 2021b). Not all individuals that occur or migrate along the Atlantic Coast are expected to encounter the RSZ of one or more operating WTGs associated with future offshore wind development. Generally, only a small percentage of a species' seasonal population would potentially encounter operating WTGs (Table 3.7-3).

**Table 3.7-3 Percentage of Atlantic Seabird Populations that Are Expected to Overlap with Anticipated Offshore Wind Energy Development on the Outer Continental Shelf by Season**

| Species | Spring | Summer | Fall | Winter |
|---|---|---|---|---|
| Artic Tern (*Sterna paradisaea*) | NA | 0.2 | NA | NA |
| Atlantic Puffin (*Fratercula arctica*)[1] | 0.2 | 0.1 | 0.1 | 0.2 |
| Audubon Shearwater (*Puffinus lherminieri*) | 0.0 | 0.0 | 0.0 | 0.0 |
| Black-capped Petrel (*Pterodroma hasitata*) | 0.0 | 0.0 | 0.0 | 0.0 |
| Black Guillemot (*Cepphus grille*) | NA | 0.3 | NA | NA |
| Black-legged Kittiwake (*Rissa tridactyla*)[1] | 0.7 | NA | 0.7 | 0.5 |
| Black Scoter (*Melanitta americana*) | 0.2 | NA | 0.4 | 0.5 |
| Bonaparte's Gull (*Chroicocephalus philadelphia*) | 0.5 | NA | 0.4 | 0.3 |
| Brown Pelican (*Pelecanus occidentalis*) | 0.1 | 0.0 | 0.0 | 0.0 |
| Band-rumped Storm-Petrel (*Oceanodroma castro*) | NA | 0.0 | NA | NA |
| Bridled Tern (*Onychoprion anaethetus*) | NA | 0.1 | 0.1 | NA |
| Common Eider (*Somateria mollissima*)[1] | 0.3 | 0.1 | 0.5 | 0.6 |
| Common Loon (*Gavia immer*) | 3.9 | 1.0 | 1.3 | 2.1 |
| Common Murre (*Uria aalge*) | 0.4 | NA | NA | 1.9 |
| Common Tern (*Sterna hirundo*)[1] | 2.1 | 3.0 | 0.5 | NA |
| Cory's Shearwater (*Calonectris borealis*) | 0.1 | 0.9 | 0.3 | NA |
| Double-crested Cormorant (*Phalacrocorax auritus*) | 0.7 | 0.6 | 0.5 | 0.4 |
| Dovekie (*Alle alle*) | 0.1 | 0.1 | 0.3 | 0.2 |
| Great Black-backed Gull (*Larus marinus*)[1] | 1.3 | 0.5 | 0.7 | 0.6 |
| Great Shearwater (*Puffinus gravis*) | 0.1 | 0.3 | 0.3 | 0.1 |
| Great Skua (*Stercorarius skua*) | NA | NA | 0.1 | NA |
| Herring Gull (*Larus argentatus*)[1] | 1.0 | 1.3 | 0.9 | 0.5 |
| Horned Grebe (*Podiceps auritus*) | NA | NA | NA | 0.3 |
| Laughing Gull (*Leucophaeus atricilla*) | 1.0 | 3.6 | 0.9 | 0.1 |
| Leach's Storm-Petrel (*Oceanodroma leucorhoa*) | 0.1 | 0.0 | 0.0 | NA |
| Least Tern (*Sternula antillarum*) | NA | 0.3 | 0.0 | NA |
| Long-tailed Ducks (*Clangula hyemalis*) | 0.6 | 0.0 | 0.4 | 0.5 |
| Manx Shearwater (*Puffinus puffinus*)[1] | 0.0 | 0.5 | 0.1 | NA |
| Northern Fulmar (*Fulmarus glacialis*)[1] | 0.1 | 0.2 | 0.1 | 0.2 |
| Northern Gannet (*Morus bassanus*)[1] | 1.5 | 0.4 | 1.4 | 1.4 |
| Parasitic Jaeger (*Stercorarius parasiticus*) | 0.4 | 0.5 | 0.4 | NA |

| Species | Spring | Summer | Fall | Winter |
|---|---|---|---|---|
| Pomarine Jaeger (*Stercorarius pomarinus*) | 0.1 | 0.3 | 0.2 | NA |
| Razorbill (*Alca torda*)[1] | 5.2 | 0.2 | 0.4 | 2.1 |
| Ring-billed Gull (*Larus delawarensis*) | 0.5 | 0.5 | 0.9 | 0.5 |
| Red-breasted Merganser (*Mergus serrator*) | 0.5 | NA | NA | 0.7 |
| Red Phalarope (*Phalaropus fulicarius*) | 0.4 | 0.4 | 0.2 | NA |
| Red-necked Phalarope (*Phalaropus lobatus*) | 0.3 | 0.3 | 0.2 | NA |
| Roseate Tern (*Sterna dougallii*) | 0.6 | 0.0 | 0.5 | NA |
| Royal Tern (*Thalasseus maximus*) | 0.0 | 0.2 | 0.1 | NA |
| Red-throated Loon (*Gavia stellate*)[1] | 1.6 | NA | 0.5 | 1.0 |
| Sooty Shearwater (*Ardenna grisea*) | 0.3 | 0.4 | 0.2 | NA |
| Sooty Tern (*Onychoprion fuscatus*) | 0.0 | 0.0 | NA | NA |
| South Polar Skua (*Stercorarius maccormicki*) | NA | 0.2 | 0.1 | NA |
| Surf Scoter (*Melanitta perspicillata*) | 1.2 | NA | 0.4 | 0.5 |
| Thick-billed Murre (*Uria lomvia*) | 0.1 | NA | NA | 0.1 |
| Wilson's Storm-Petrel (*Oceanites oceanicus*) | 0.2 | 0.9 | 0.2 | NA |
| White-winged Scoter (*Melanitta deglandi*) | 0.7 | NA | 0.2 | 1.3 |

Source: Winship et al. 2018.
[1] Species used in collision risk modeling.
NA = not applicable

The addition of WTGs to the offshore environment may result in increased functional loss of habitat for those species with higher displacement sensitivity. Displacement and avoidance can cause birds to expend more energy and to forage in other areas. However, overall habitat loss due to displacement as a result of a single project is unlikely to affect population trends because of the relatively small size of the Project area in relation to the available foraging habitat (Fox and Petersen 2019). In addition, a recent study of long-term data collected in the North Sea found that despite the extensive observed displacement of loons in response to the development of 20 wind farms, there was no decline in the region's loon population (Vilela et al. 2021). Substantial foraging habitat for resident birds would remain available outside of the proposed offshore lease areas and no individual fitness or population-level impacts would be expected to occur. Because most structures would be spaced 1 nm apart, ample space between WTGs would allow birds that are not flying above WTGs to fly through individual lease areas without changing course or to make minor course corrections to avoid operating WTGs. Adverse impacts of additional energy expenditure due to minor course corrections or complete avoidance of offshore wind lease areas would not be expected to be biologically significant. BOEM anticipates that any additional flight distances would be relatively small when compared with the overall migratory distances traveled by migratory birds, and no individual fitness or population-level effects would be expected to occur.

In the Northeast and Mid-Atlantic waters, there are 2,570 documented annual seabird fatalities through interaction with commercial fishing gear; of those, 84 percent are with gillnets involving shearwaters/fulmars and loons (Hatch 2017). Abandoned or lost fishing nets from commercial fishing may get tangled with foundations, reducing the chance that abandoned gear would cause additional harm to birds and other wildlife if left to drift until sinking or washing ashore. A reduction in derelict fishing gear (in this case by entanglement with foundations) has a beneficial impact on bird populations (Regular et al. 2013). The presence of structures may also increase recreational fishing (see Section 3.9) and thus expose individual birds to harm from fishing line and hooks.

The presence of new structures could result in increased prey items for some marine bird species. Offshore wind foundations could increase the mixing of surface waters and deepen the thermocline, possibly increasing pelagic productivity in local areas (English et al. 2017). Additionally, the new structures may create habitat for structure-oriented and hard-bottom species. This reef effect has been observed around WTGs, leading to local increases in biomass and diversity (Causon and Gill 2018). Recent studies have found increased biomass for benthic fish and invertebrates, and possibly for pelagic fish, marine mammals, and birds as well (Raoux et al. 2017; Pezy et al. 2018; Wang et al. 2019), indicating that offshore wind energy facilities could generate beneficial long-term impacts on local ecosystems, indicating that offshore wind energy facilities may increase foraging opportunities for individuals of some marine bird species, potentially contributing to beneficial impacts on local ecosystems. BOEM anticipates that the presence of structures may result in permanent beneficial impacts. Conversely, increased foraging opportunities could attract marine birds, potentially exposing those individuals to increased collision risk associated with operating WTGs.

**Traffic (aircraft):** General aviation traffic accounts for approximately two bird strikes per 100,000 flights (Dolbeer et al. 2019). Because aircraft flights associated with offshore wind development are expected to be minimal in comparison to baseline conditions, aircraft strikes with birds are highly unlikely to occur. As such, aircraft traffic would not be expected to appreciably contribute to overall impacts on birds.

**Land disturbance:** Onshore construction of offshore wind development infrastructure has the potential to result in some impacts due to habitat loss or fragmentation. However, onshore construction would be expected to account for only a very small increase in development relative to other ongoing development activities. Onshore construction would be expected to generally occur in previously disturbed habitats, and no individual fitness or population-level impacts on birds would be expected to occur. As such, onshore construction associated with future offshore wind development would not be expected to appreciably contribute to overall impacts on birds.

### 3.7.3.3. Conclusions

**Impacts of the No Action Alternative.** Under the No Action Alternative, birds would continue to be affected by existing environmental trends and ongoing activities. BOEM expects ongoing activities to have continuing temporary and permanent impacts (disturbance, displacement, injury, mortality, habitat degradation, habitat conversion) on birds primarily through construction and climate change. Given that the abundance of bird species that overlap with ongoing wind energy facilities on the Atlantic OCS is relatively small, ongoing wind activities would not appreciably contribute to impacts on birds. Temporary disturbance and permanent loss of habitat onshore may occur as a result of offshore wind development. However, habitat removal is anticipated to be minimal, and any impacts resulting from habitat loss or disturbance would not be expected to result in individual fitness or population-level effects within the geographic analysis area. The No Action Alternative would result in **minor** impacts on birds.

**Cumulative Impacts of the No Action Alternative.** Under the No Action Alternative, existing environmental trends and ongoing activities would continue, and birds would continue to be affected by natural and human-caused IPFs. Planned activities would contribute to the impacts on birds due to habitat loss from increased onshore construction and interactions with offshore developments.

BOEM anticipates that the impacts associated with offshore wind activities in the geographic analysis area would result in adverse impacts but could potentially include beneficial impacts because of the presence of structures. The majority of offshore structures in the geographic analysis area would be attributable to the offshore wind development. Migratory birds that use the offshore wind lease areas during all or parts of the year would either be exposed to new collision risk or experience long-term functional habitat loss due to behavioral avoidance and displacement from wind lease areas on the OCS.

The offshore wind development would also be responsible for the majority of impacts related to new cable emplacement and pile-driving noise, but effects on birds resulting from these IPFs would be localized and temporary and would not be expected to be biologically significant. BOEM anticipates that the cumulative impacts of the No Action Alternative would have a **moderate** adverse impact on birds but could also include **moderate beneficial** impacts because of the presence of offshore structures.

### 3.7.4 Relevant Design Parameters & Potential Variances in Impacts of the Action Alternatives

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than described in the sections below. The following proposed PDE parameters (Appendix E) would influence the magnitude of the impacts on birds:

- The new EW 2 onshore substations, which could require the removal of trees and shrubs in or on the edge of the construction footprint;
- The number, size, and location of the WTGs;
- The routing variants within the selected onshore export cable system, which could require removal of trees and shrubs along the construction corridor; and
- The time of year during which construction occurs.

Variability of the proposed Project design exists as outlined in Appendix E. Below is a summary of potential variances in impacts:

- WTG number, size, and location: the level of hazard related to WTGs is proportional to the number of WTGs installed; fewer WTGs would present less hazard to birds.
- Onshore export cable routes and substations footprint: the route chosen (including variants within the general route) and substation footprint would determine the amount of habitat affected.
- Season of construction: The activity and distribution of birds exhibit distinct seasonal changes. For instance, summer and fall months (generally May through October) constitute the most active season for birds in the Project area, and the months on either side coincide with major migration events. Therefore, construction during months in which birds are not present, not breeding, or less active would have a lesser impact on birds than construction during more active times.

### 3.7.5 Impacts of the Proposed Action on Birds

The sections below summarize the potential impacts of the Proposed Action on birds during the various phases of the proposed Projects. Routine activities would include construction, O&M, and decommissioning of the proposed Projects, as described in Chapter 2, *Alternatives Including the Proposed Action*. The most impactful IPF is expected to be the presence of structures, which could lead to adverse impacts including injury and mortality or elicit an avoidance response. BOEM will prepare a BA for the potential effects on USFWS federally listed species. Consultation with USFWS pursuant to Section 7 of the ESA is ongoing and results of consultation will be presented in the Final EIS.

**Accidental releases:** Some potential exists for mortality, decreased fitness, and health effects due to the accidental release of fuel, hazardous materials, and trash and debris from vessels associated with the Proposed Action. Vessels associated with the Proposed Action may potentially generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris. All vessels associated with the Proposed Action would comply with USCG requirements for the prevention and control of oil and fuel spills. Proper vessel regulations and operating procedures would minimize effects

on offshore bird species resulting from the release of debris, fuel, hazardous materials, or waste (BOEM 2012). Empire has prepared and would implement an OSRP (COP Volume 2f, Table 9-1, APM 84; Empire 2022), which would minimize the potential for spills and identify procedures in the event of a spill (see COP Appendix F). These releases, if any, would occur infrequently at discrete locations and vary widely in space and time; as such, BOEM expects localized and short-term impacts on birds.

**Lighting:** Under the Proposed Action, up to 147 WTGs and two OSS would be lit with USCG navigational and FAA hazard lighting; these lights have some potential to attract birds and result in increased collision risk (Hüppop et al. 2006). In accordance with BOEM lighting guidelines (2021b) and as outlined in the COP (Volume 1, Section 3.5.2; Empire 2022), all WTGs in excess of 699 feet about ground level would be lit with two synchronized red flashing obstruction lights (with medium-intensity FAA model L-864 and light-emitting diode color between 800 and 900 nanometers) placed on the back of the nacelle on opposite sides, and up to three FAA model L-810 red flashing lights at mid-mast level, adding up to 870 new red flashing lights to the offshore environment where none currently exist. However, red flashing aviation obstruction lights are commonly used at land-based wind facilities without any observed increase in avian mortality compared with unlit turbine towers (Kerlinger et al. 2010; Orr et al. 2013).

Marine navigation lighting would consist of multiple types of flashing yellow lights on corner WTGs/significant peripheral structures, outer boundary WTGs, and interior WTGs. Empire has committed to using an FAA-approved ADLS (COP Volume 2f, Table 9-1, APM 88; Empire 2022), which is a lighting system that would only activate WTG lighting when aircraft enter a predefined airspace. For the Proposed Action, based on historical air traffic data, obstruction light activation under ADLS was estimated to occur 30 hours per month over the course of 1 year, which equals just 7.5 percent of the time that full-time obstruction lights would be active (COP Volume 2, Section 8.6, and Appendix B; Empire 2022). To further reduce impacts on birds, Empire would limit, where practicable, lighting (not required by FAA and USCG) during offshore construction to reduce attraction of birds (COP Volume 2f, Table 9-1, APM 82; Empire 2022). As such, BOEM expects impacts, if any, to be long term but negligible from WTG and OSS lighting. Vessel lights during construction, O&M, and decommissioning would have short-term but minimal effects and would be limited to vessels transiting to and from construction areas.

**Cable emplacement and maintenance:** The Proposed Action would disturb up to 1,895 acres (7.6 $km^2$) of seafloor associated with the installation of array cable and export cable (EW 1 and EW 2), which would result in turbidity effects that have the potential to reduce marine bird foraging success or have temporary and localized impacts on marine bird prey species. To evaluate the impacts of submarine export and interarray cable installation, a conservative analytical sediment transport model was developed using publicly available data to quantify potential maximum plume dispersion and sediment concentrations and potential maximum sediment deposition thicknesses (see COP Volume 3, Appendix J for details). In areas that consist predominantly of gravels and sands, the analysis indicates a limited extent of increased sediment concentrations, as the larger grain size sediments immediately deposit in the trench (Empire 2022). In locations that are dominated by fine sand, silts, or clays, these sediments can be released into the water column, temporarily increase total suspended solids near the trench, and cause sediment deposition outside of the trench. These impacts are expected to be temporary, with sediments settling quickly to the seabed and potential plumes limited to right above the seabed and not within the water column.

During jet plow activities, silts and clays are anticipated to remain suspended for 4 hours and deposit no farther than 492 feet from the trench, with most of the deposition near the trench. Mass flow excavations were found to have a similar disturbance to sediment, with deposition from the trench no farther than 246 feet. Results from the analysis were also consistent with other sediment transport models completed for wind farm installation projects in the Mid-Atlantic region. Data collections and modeling studies of plowing, trenching, and dredging projects showed that displacement of sediments is low, and they

typically dissipated to background levels very close to the site (Empire 2022). Individual birds would be expected to successfully forage in nearby areas not affected by increased sedimentation during cable emplacement, and only non-measurable impacts, if any, on individuals or populations would be expected given the localized and temporary nature of the potential impacts.

**Noise:** The expected impacts of aircraft (e.g., helicopters), G&G survey, and pile-driving noise associated with the Proposed Action would not increase the impacts of noise beyond those described under the No Action Alternative. Effects on offshore bird species could occur during the construction phase of the Proposed Action because of equipment noise (including pile-driving noise). The pile-driving noise impacts would be temporary (5 hours per pile) and would cease after piles are installed. Vessel and construction noise could temporarily disturb offshore bird species, but they would likely acclimate to the noise or move away, potentially resulting in a temporary loss of habitat (BOEM 2012). BOEM anticipates the temporary impacts, if any, related to construction and installation of the offshore components would be negligible.

Normal operation of the substations would generate continuous noise, but BOEM expects negligible long-term impacts when considered in the context of the other commercial and industrial noises near the proposed substations.

**Presence of structures:** The various types of impacts on birds that could result from the presence of structures, such as fish aggregation and associated increase in foraging opportunities, entanglement and fishing gear loss or damage, migration disturbances, and WTG strikes and displacement, are described in detail in Section 3.7.3.2, *Cumulative Impacts of the No Action Alternative*. The impacts of the Proposed Action as a result of presence of structures would be long term but minor and may include some beneficial impacts. Due to the anticipated use of flashing red tower lights, restricted time period of exposure during migration, and small number of migrants that could cross the Lease Area, BOEM determined that the Proposed Action would not likely adversely affect roseate terns, piping plovers, and red knots.

Within the Atlantic Flyway along the North American Atlantic Coast, much of the bird activity is concentrated along the coastline (Watts 2010). Waterbirds use a corridor between the coast and several kilometers out onto the OCS, while land birds tend to use a wider corridor extending from the coastline to tens of kilometers inland (Watts 2010). However, operation of the Proposed Action would result in impacts on some individuals of offshore bird species and possibly some individuals of coastal and inland bird species during spring and fall migration. These impacts could arise through direct mortality from collisions with WTGs or through behavioral avoidance and habitat loss (Drewitt and Langston 2006; Fox et al. 2006; Goodale and Millman 2016).

The predicted occurrence of bird populations that have a higher sensitivity to collision (as defined by Robinson Willmott et al. 2013) is relatively low across the OCS during all seasons of the year (Figure 3.7-3), suggesting that bird fatalities in the overall OCS due to collision are likely to be low. The Marine-life Data and Analysis Team models predict an area of high bird abundance, however, in the northwestern portion of the Lease Area, but this is believed to be due to the high predicted winter use of just one species, common murre, and not that of all birds. Furthermore, more recent offshore high-definition digital surveys (2016–2019) of the Lease Area conducted by NYSERDA and Empire did not detect any common murres (see COP Appendix Q, Tables 2-16 and 2-36; Empire 2022). Therefore, regardless of the high predicted abundance shown on Figure 3.7-2, Figure 3.7-3, and Figure 3.7-4, the predicted occurrence of overall bird populations in the Lease Area is still relatively low.

When WTGs are present, many birds would avoid the WTG site altogether, especially the species that ranked “high” in vulnerability to displacement by offshore wind energy development (Robinson Willmott et al. 2013). In addition, many birds would likely adjust their flight paths to avoid WTGs by flying above,

below, or between them (e.g., Desholm and Kahlert 2005; Plonczkier and Simms 2012; Skov et al. 2018) and others may take extra precautions to avoid WTGs when the WTGs are moving (Johnston et al. 2014). Several species have very high avoidance rates; for example, the northern gannet, black-legged kittiwake, herring gull, and great black-backed gull have measured avoidance rates of at least 99.6 percent (Skov et al. 2018). As previously stated in Section 3.7.3.2, displacement and avoidance can cause birds to expend more energy and to forage in other areas. However, overall habitat loss due to displacement as a result of a single project is unlikely to affect population trends because of the relatively small size of the Project area in relation to the available foraging habitat (e.g., Fox and Petersen 2019).

Empire performed an exposure and relative vulnerability assessment to estimate the collision and displacement risk of various offshore bird species encountering the Lease Area (COP Appendix Q, Avian Impact Assessment; Empire 2022). Most species were identified as having "minimal" to "low" overall exposure risk. With the exception of migratory falcons and songbirds, coastal birds are considered to have minimal exposure (occurrence) to the Lease Area because it is far enough offshore as to be beyond the range of most breeding terrestrial or coastal bird species. Falcons, primarily peregrine falcons, may be exposed to the Lease Area during migration. However, uncertainty exists about what proportion of migrating peregrine falcons might be attracted to offshore wind energy projects for perching, roosting, and foraging, and the extent to which individuals might avoid WTGs or collide with them.

To minimize the introduction of perching structures to the offshore environment, Empire has committed to installing bird deterrent devices, where appropriate, on offshore, above-water structures (COP Volume 2f, Table 9-1, APM 81; Empire 2022).

Some migratory songbirds may also be exposed to the Lease Area during migration periods, but population-level impacts are unlikely because exposure to the Lease Area is expected to be minimal to low and limited in duration. All marine birds were identified as having minimal to low exposure except terns (not including the roseate tern), which received a medium exposure assessment. Terns would be most exposed during spring migration. Generally, terns are thought to fly below the RSZ, but do have some vulnerability to collision when they are not avoiding WTGs.

Loons also initially received a medium exposure score during the summer, but this was reduced to minimum to low because the exposure score was driven by a low sample size in the summer when most individual are breeding on inland lakes. Local density estimates showed very low to no density during the summer. For these reasons, overall loon exposure is considered minimal to low. Loons are documented to avoid wind farms, but displacement from the Lease Area is unlikely to affect population trends because of the relatively small size of the Lease Area in relation to available foraging habitat. As previously mentioned, while the Marine-life Data and Analysis Team models predict high winter use of the Lease Area by common murre, exposure of all auk species combined at a population level is considered to be minimal to low when the Marine-life Data and Analysis Team models and APEM surveys are assessed together. Generally, auks are not considered vulnerable to collision, as they primarily fly much lower than the RSZ.

During migration, many bird species, including songbirds, likely fly at heights well above or below the RSZ (98 feet to 951 feet [30 to 290 meters] above highest astronomical tide) (COP Appendix Q; Empire 2022). As shown in Robinson Willmott et al. (2013), species with low sensitivity scores include many passerines that only cross the Atlantic OCS briefly during migration and typically fly well above the RSZ. It is generally assumed that inclement weather and reduced visibility cause changes to migration altitudes (Ainley et al. 2015) and could potentially lead to large-scale mortality events. However, this has not been shown to be the case in studies of offshore wind facilities in Europe, with oversea migration completely, or nearly so, ceasing during inclement weather (Fox et al. 2006; Pettersson 2005; Hüppop et al. 2006), and with migrating birds avoiding flying through fog and low clouds (Panuccio et al. 2019).

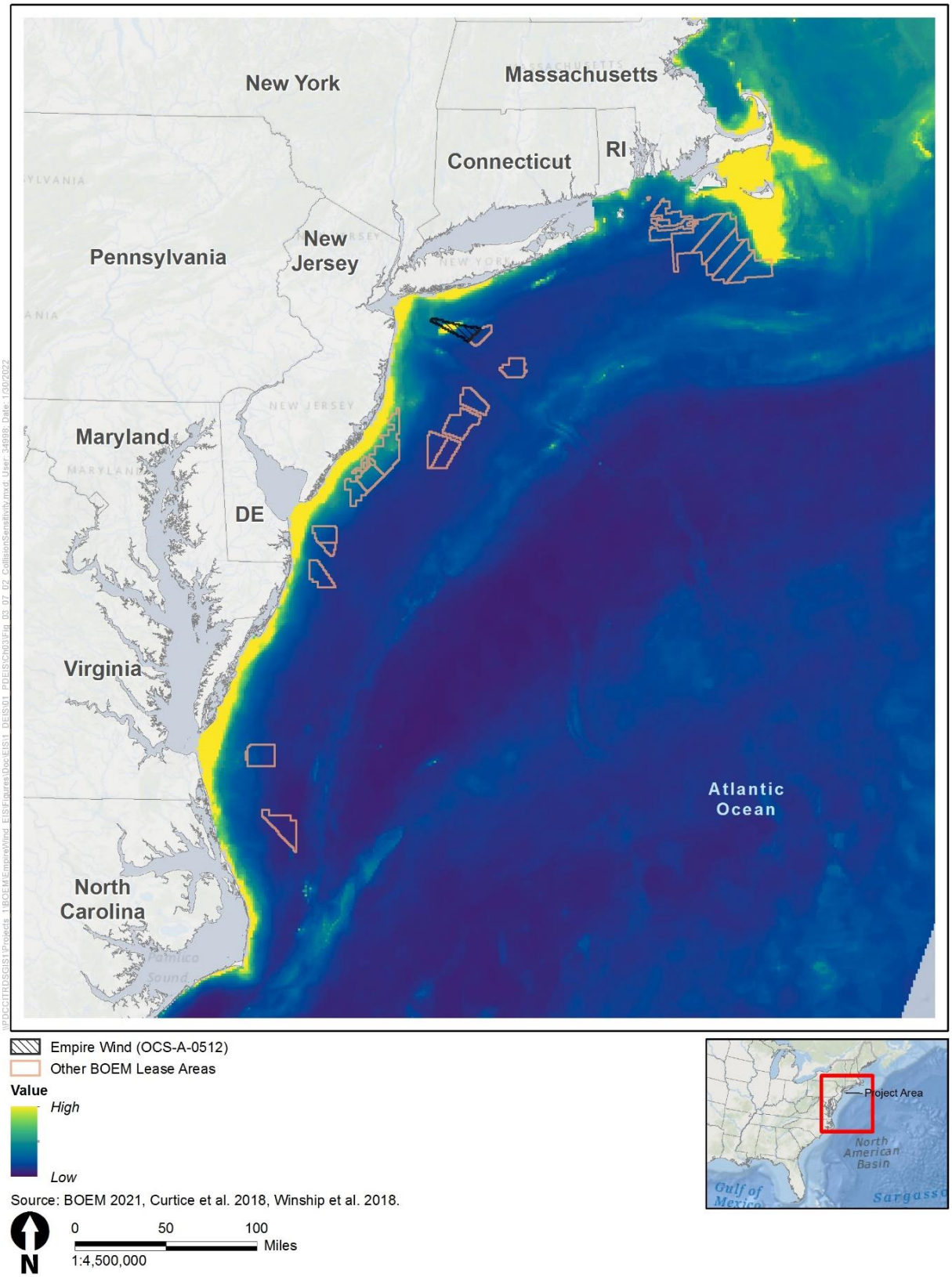


**Figure 3.7-3 Total Avian Relative Abundance Distribution Map for the Higher Collision Sensitivity Species Group**

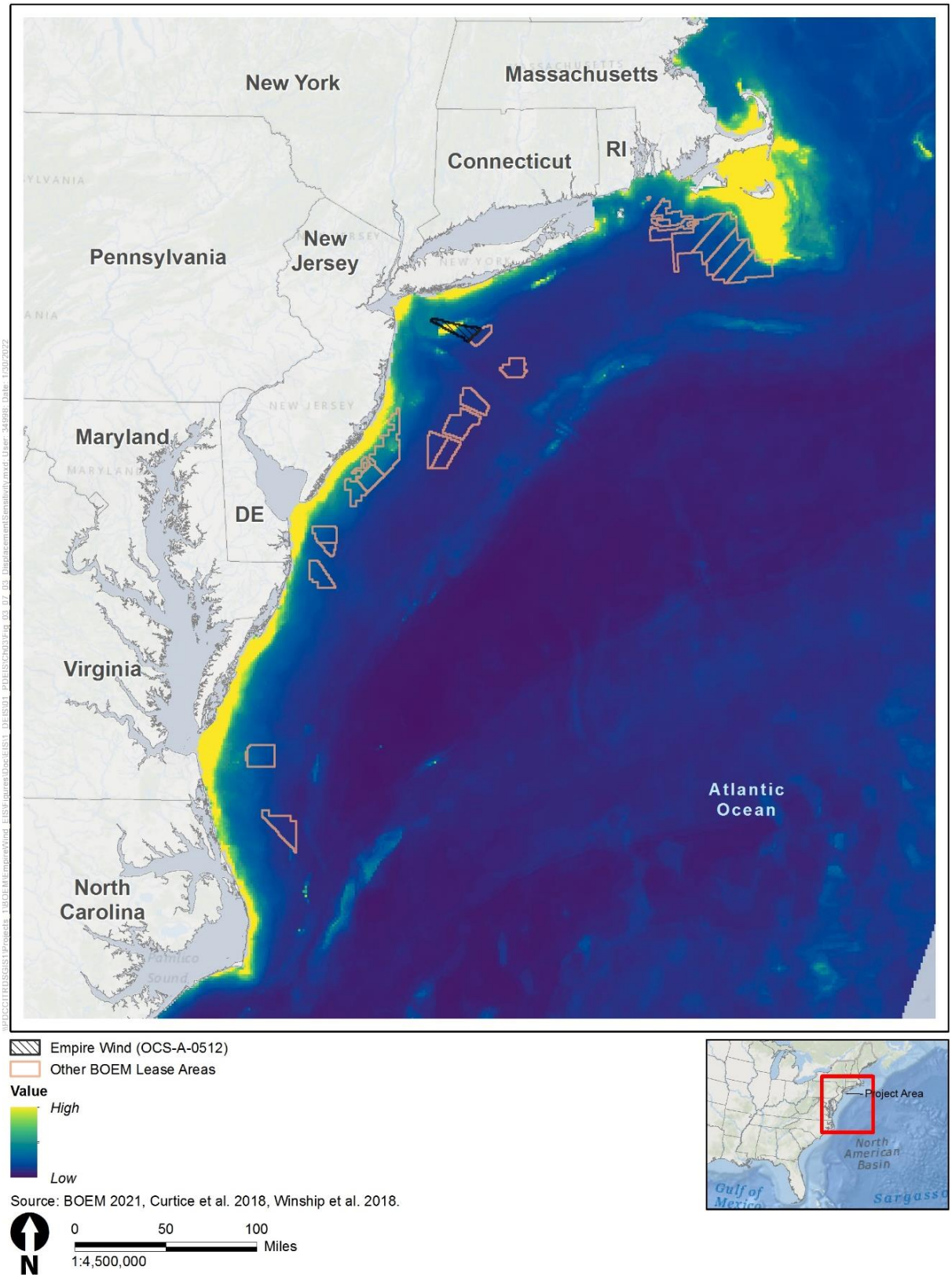


**Figure 3.7-4 Total Avian Relative Abundance Distribution Map for the Higher Displacement Sensitivity Species Group**

Many of these passerine species, while detected on the OCS during migration as part of BOEM's Acoustic/Thermographic Offshore Monitoring project (Robinson Willmott and Forcey 2014), were documented in relatively low numbers. Most of the activity (including blackpoll warblers) was during windspeeds less than 10 kilometers per hour—below the turbine cut-in speed (see Figure 109 in Robinson Willmott and Forcey 2014)—and thus minimizing risk to migrating passerines from spinning turbine blades. Most carcasses of small migratory songbirds found at land-based wind energy facilities in the Northeast were within 2 meters of the turbine towers, suggesting that they are colliding with towers rather than moving turbine blades (Choi et al. 2020). Although it is possible that migrating passerines, including flocks, could collide with offshore structures (including vessels), migrating passerines are also occasionally found dead on boats, presumably from exhaustion (e.g., Stabile et al. 2017). Equinor documented dead or injured birds found on vessels during G&G surveys for the Lease Area since 2018, and observed 0 birds in 2018, 37 in 2019, 19 in 2020, and 7 in 2021 (Equinor 2019, 2021). The majority of birds found in 2019 (month of May) were white-throated sparrows. In 2020 (mid-October to mid-November) about half of the birds found were pine siskins, with the remaining consisting of one or more swamp sparrow, purple finch, dark-eyed junco, northern parula, American robin, ruby-crowned kinglet, red-breasted nuthatch, and common redpoll. In 2021 (one day each in February, May, and August), observed birds included one or more white-throated sparrow, pine siskin, gray catbird, and herring gull. Empire has committed to implementing a monitoring program to answer specific questions, including identifying key bird species of interest and, when possible, contributing to the understanding of long-term, project-specific impacts and larger-scale efforts to understand cumulative impacts on birds (COP Volume 2f, Table 9-1, APM 86; Empire 2022). In addition, Empire has committed to implementing a *Bird and Bat Monitoring Framework* that outlines an approach to post-construction bird monitoring that supports advancement of the understanding of bird interactions with offshore wind farms (Appendix H, Attachment H-3).

Some marine bird species might avoid the Lease Area during its operation, leading to an effective loss of habitat. For example, loons (Dierschke et al. 2016; Drewitt and Langston 2006; Lindeboom et al. 2011; Percival 2010; Petersen et al. 2006), grebes (Dierschke et al. 2016; Leopold et al. 2011; Leopold et al. 2013), seaducks (Drewitt and Langston 2006; Petersen et al. 2006), and northern gannets (Drewitt and Langston 2006; Lindeboom et al. 2011; Petersen et al. 2006) typically avoid offshore wind developments. The proposed Projects would no longer provide foraging opportunities to those species with high displacement sensitivity, but suitable foraging habitat exists in the immediate vicinity of the proposed Projects and throughout the region. However, as depicted on Figure 3.7-4, modeled use of the Lease Area by bird species with high displacement sensitivity is low (see explanation above for the high abundance rating in part of the Lease Area related to common murre). A complete list of species included in the higher displacement sensitivity group can be found in Robinson Willmott et al. (2013). Because the Lease Area is not likely to contain important foraging habitat for the species susceptible to displacement, BOEM expects this loss of habitat to be insignificant. Population-level, long-term impacts resulting from habitat loss would likely be negligible.

The expected impacts of the Proposed Action would increase incrementally beyond those described under the No Action Alternative. The structures associated with the Proposed Action and the consequential impacts would be long term and would remain at least until decommissioning of the proposed Projects is complete.

Generally, onshore operation is not expected to pose any significant IPFs (i.e., hazards) to birds because activities would disturb little if any habitat, and the onshore export cables would be below ground. The EW 1 and EW 2 onshore Project components would be within highly disturbed areas with little or no natural habitats.

**Traffic (aircraft):** The expected impacts of aircraft traffic associated with the Proposed Action would not increase the impacts of this IPF beyond those described under the No Action Alternative.

**Land disturbance:** The expected impacts of onshore construction associated with the Proposed Action would not increase the impacts of this IPF beyond those described under the No Action Alternative. Empire would implement trenchless technology (e.g., HDD) for the EW 2 offshore export cable landing to go under beaches, which would avoid beach habitat for nesting shorebirds (COP Volume 2b, Section 5.1.1.2; Empire 2022); as such, temporary impacts on birds, particularly nesting shorebirds, resulting from the landfall location would be negligible. Collisions between birds and vehicles or construction equipment have some limited potential to cause mortality. However, these temporary impacts, if any, would be negligible, as most individuals would avoid noisy construction areas (Bayne et al. 2008; Goodwin and Shriver 2010; McLaughlin and Kunc 2013).

Impacts on bird habitat from onshore construction activities would be limited. The EW 1 Onshore Project area (which also includes the O&M facility) lacks natural bird habitat (i.e., significantly altered by human development and primarily used for industrial and commercial operations) and does not support native species or species of conservation concern; some species that associate with coastal urbanized areas (e.g., pigeons, seagulls) occur in the geographic analysis area. Therefore, impacts on birds from construction and operations of EW 1 onshore components and the O&M facility would be negligible, as no natural habitat would be affected.

While habitats in the EW 2 Onshore Project area have also been significantly altered by human development, there are some small areas of tree and shrub habitat that could be affected, depending on the substation and onshore cable route; however, these more natural areas are isolated and surrounded by developed and urbanized areas. During construction, the onshore export and interconnection cables and onshore substations for EW 2 would require varying acreage of tree removal, which would be a long-term impact lasting until decommissioning and restoration. To minimize disturbance, the majority of the proposed onshore export and interconnection cable routes would be sited in already disturbed areas (e.g., existing roadways) to the extent practicable (COP Volume 2f, Table 9-1, APM 76; Empire 2022).

Construction of onshore export cable segment IP-C would require vegetation removal in three isolated areas between Long Beach Road and Daly Boulevard (6.44 acres herbaceous, 1.99 acres forest/wooded vegetation, and 0.41 acre scrub/shrub). Construction of EW 2 Onshore Substation C would require the removal of approximately 0.55 acre of tree/shrub habitat along the existing railroad corridor. Clearing and grading during construction within temporary workspaces would result in short-term loss of forage and cover for birds within the area. Construction of Onshore Substation C would result in long-term impacts on habitat from construction of the permanent substation facilities and short-term impacts for temporary construction workspaces. Any remnant habitat within the permanent substation site would be converted to developed land with landscaping for the duration of the Projects' operational lifetime. Landscaped areas would provide some habitat for species acclimated to human activity. Tree and shrub removal for onshore export cable installation would likely result in a maintained right-of-way of herbaceous/low shrub vegetation, which would be a short-term impact for herbaceous/low shrub vegetation and a long-term impact for tree removal. No tree clearing is expected for EW 2 Onshore Substation A. In addition, Empire would implement measures to avoid and minimize bird impacts, including time of year clearing restrictions (COP Volume 2f, Table 9-1, APMs 77, 78; Empire 2022) and revegetating disturbed areas (APM 87). Given the nature of the existing conditions of the Onshore Project area (i.e., developed and highly urbanized with little or no natural habitat), the temporary nature of construction, and Empire's commitment to measures to avoid and reduce bird impacts, the impacts on birds are not expected to be measurable.

### 3.7.5.1. Impact of the Connected Action

As described in Chapter 2, infrastructure improvements have been proposed at SBMT that include in-water activities (i.e., dredging and dredged material management, replacement and strengthening of existing bulkheads, installation of new pile-supported and floating platforms, installation of new fenders),

as well as some upland activities (building construction and paving). As previously stated in Section 3.7.1, habitats within and in the vicinity of the EW 1 Onshore Project area are significantly altered by human development and are primarily used for industrial and commercial operations. The EW 1 area and surrounding vicinity serve as a transportation and service corridor and associated infrastructure is a dominant feature. Due to the mobility of birds, a variety of species have the potential to pass through the EW 1 Onshore Project area. However, due to the highly developed nature of the EW 1 Onshore Project area, the SBMT does not provide important bird habitat. BOEM expects the activities associated with the connected action to affect birds primarily through the noise, accidental releases, and land disturbance IPFs. Other IPFs considered under the Proposed Action do not apply (e.g., cable emplacement and maintenance, traffic [aircraft]), and because the surrounding area consists of existing structures and other infrastructure, the presence of structures IPF would not pose a substantial risk to birds.

**Noise:** The expected impacts of noise associated with the connected action's activities could affect any birds that may be in the vicinity of the SBMT. However, similar to under the Proposed Action, construction noise would be temporary and localized and would not be anticipated to be significantly different than the noise levels in the surrounding urban environment. If pile driving is necessary during construction, the noise would be temporary and would cease after piles are installed. Similarly, dredging vessels and other construction noise could temporarily disturb and displace bird species, but they are likely already acclimated to noise in an urban environment and would be able to move away from the noise. Normal operation at the SBMT would generate continuous noise, but BOEM expects negligible long-term impacts when considered in the context of the other commercial and industrial noises in the EW 1 Onshore Project area. BOEM anticipates noise impacts associated with the connected action to be negligible.

**Accidental releases:** Onshore construction activities would require heavy equipment use, and potential spills could occur as a result of an inadvertent release from the machinery or during refueling activities. Some potential exists for bird impacts (e.g., injury from exposure) due to the accidental release of fuel, hazardous materials, and trash and debris from vessels associated with dredging and construction equipment in the aquatic and terrestrial environment around SBMT. BOEM assumes an SPCC plan would be developed and implemented to avoid, minimize, and contain spills. Accidental releases, if any, would occur infrequently at discrete locations and vary widely in space and time; as such, BOEM expects localized and short-term impacts on birds. In addition, all dredging equipment/use of watercraft and in-water work would comply with federal, state, and local permitting (e.g., CWA Section 404 and 401) requirements for prevention and control of petrochemical spills, including oil and fuel. Normal operation at the SBMT could result in accidental releases, but BOEM expects negligible impacts due to federal, state, and local requirements to contain and clean up releases. Therefore, BOEM anticipates accidental releases associated with the connected action to be negligible.

**Land disturbance**: Improvement activities at the SBMT would remove all existing structures and approximately 40 percent of the currently paved area. After additional excavation for installation of subsurface piles, utilities, and building structures, only minor grade changes are anticipated. The site would be repaved and new structures installed. Impacts on upland vegetation would be limited to removal of approximately 0.05 acre of volunteer invasive vegetation throughout the SBMT site and three poplar trees along the north side of the 35$^{th}$ Street Pier to replace a bulkhead, with each tree being approximately 4 inches in diameter at breast height. The removal of this vegetation is not anticipated to affect birds because it is low-quality habitat and not considered significant or important to birds. Therefore, BOEM anticipates land disturbance associated with the connected action to be negligible.

### 3.7.5.2. Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind activities, other planned offshore wind

activities, and the connected action at SBMT. Ongoing and planned non-offshore wind activities related to installation of new submarine cables and pipelines, increasing onshore construction, marine minerals extraction, port expansions, and installation of new structures on the OCS would contribute to impacts on birds through the primary IPFs of accidental releases, lighting, cable emplacement and maintenance, presence of structures, traffic (aircraft), and land disturbance. Construction related to the connected action could affect birds through the removal a few small trees, by generating temporary and localized noise, and with potential accidental releases of fuels and hazardous materials. The construction, O&M, and decommissioning of both onshore and offshore infrastructure for offshore wind activities across the geographic analysis area would also contribute to the primary IPFs of accidental releases, lighting, cable emplacement and maintenance, presence of structures, traffic (aircraft), and land disturbance. Given that the abundance of bird species that overlap with wind energy facilities on the Atlantic OCS is relatively small, offshore wind activities would not appreciably contribute to impacts on bird populations. Temporary disturbance and permanent loss of habitat onshore may occur as a result of offshore wind development. However, habitat removal is anticipated to be minimal, and any impacts resulting from habitat loss or disturbance would not be expected to result in individual fitness or population-level effects within the geographic analysis area. Ongoing and planned offshore wind activities in combination with the Proposed Action would result in an estimated 3,031 WTGs, of which the Proposed Action would contribute 147 or about 5 percent, and would include up to more than 37,353 acres (155.4 $km^2$) of seafloor disturbed from the offshore export cable and interarray cables.

The cumulative impacts on birds would likely be moderate because, although bird abundance on the OCS is low, there could be unavoidable impacts offshore and onshore; however, BOEM does not anticipate the impacts to result in population-level effects or threaten overall habitat function. In context of reasonably foreseeable environmental trends, the Proposed Action would contribute an undetectable increment to the cumulative accidental releases, lighting, cable emplacement and maintenance, presence of structures, traffic (aircraft), and land disturbance impacts on birds.

#### 3.7.5.3. Conclusions

**Impacts of the Proposed Action.** Activities associated with the construction, installation, O&M, and eventual decommissioning of the Proposed Action would have **minor** impacts on birds, depending on the location, timing, and species affected by an activity. The primary impacts of the Proposed Action affecting birds are habitat loss and collision-induced mortality from rotating WTGs and long-term habitat loss and conversion from onshore construction. The Proposed Action would also potentially result in **minor beneficial** impacts associated with foraging opportunities for some marine birds. The primary impacts of the connected action are related to noise, accidental releases, and land disturbance, which could affect birds in the EW 1 Onshore Project area. However, given the developed nature of the EW 1 Onshore Project area, birds are likely acclimated to activities similar to those related to the connected action; therefore, BOEM anticipates impacts of the connected action would be **negligible**.

**Cumulative Impacts of the Proposed Action.** BOEM anticipates that the cumulative impacts on birds in the geographic analysis area would be **moderate**, as well as **moderate beneficial**. In context of other reasonably foreseeable environmental trends in the area, the incremental impacts contributed by the Proposed Action to the cumulative impacts on birds would be undetectable. The Proposed Action would contribute to the cumulative impacts primarily through the permanent impacts from the presence of structures and long-term impacts from habitat loss related to the EW 2 Onshore Station C site and cable route that would cross three isolated habitat areas.

### 3.7.6 Impacts of Alternatives B, E, and F on Birds

**Impacts of Alternatives B, E, and F.** Alternatives B, E, and F would alter the turbine array layout compared to the Proposed Action; however, each of these alternatives would allow for installation of up

to 147 WTGs as defined in Empire's PDE. The impacts resulting from individual IPFs associated with construction and installation, O&M, and decommissioning of the Projects under Alternatives B, E, and F would be the same as those described under the Proposed Action because the same number of WTGs would be constructed throughout the Lease Area. While the WTGs may move to a different position in the Lease Area under Alternatives B, E, and F, impacts on birds would not materially change compared to those of the Proposed Action. All other offshore and onshore Project components of Alternatives B, E, and F would be the same as under the Proposed Action.

**Cumulative Impacts of Alternatives B, E, and F.** The cumulative impacts on birds would be moderate and moderate beneficial for the same reasons described for the Proposed Action. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternatives B, E, and F to the cumulative impacts on birds would be the same as those described under the Proposed Action.

#### 3.7.6.1. Conclusions

**Impacts of Alternatives B, E, and F.** As discussed above, the expected **minor** impacts and potential **minor beneficial** impacts associated with the Proposed Action would not change under Alternative B, E, or F.

**Cumulative Impacts of Alternatives B, E, and F.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative B, E, or F to cumulative impacts on birds would be undetectable. Because the impacts of the Proposed Action would not change under Alternative B, E, or F, BOEM anticipates that the cumulative impacts of Alternatives B, E, and F would be the same as described for the Proposed Action. Therefore, cumulative impacts of Alternatives B, E, and F would be **moderate** and **moderate beneficial**.

### 3.7.7 Impacts of Alternative C, D, and G on Birds

**Impacts of Alternatives C, D, and G.** The impacts resulting from individual IPFs associated with construction and installation, O&M, and decommissioning of the Projects under Alternative C, D, or G would be the same those described under the Proposed Action. Submarine and onshore cable route options around the Gravesend Anchorage (Alternative C-1) and the Ambrose Navigation Channel (Alternative C-2), to avoid the sand borrow area (Alternative D), or to use a cable bridge to cross Barnums Channel (Alternative G) are already covered under the Proposed Action as part of the PDE approach and narrowing the submarine and onshore cable route options under Alternative C, D, or G would not materially change the analyses of any IPF. All other offshore and onshore Project components would be the same as under the Proposed Action.

**Cumulative Impacts of Alternatives C, D, and G.** The cumulative impacts on birds would be moderate and moderate beneficial for the same reasons described for the Proposed Action. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternatives B, E, and F to the cumulative impacts on birds would be the same as those described under the Proposed Action.

#### 3.7.7.1. Conclusions

**Impacts of Alternatives C, D, and G.** As discussed above, the expected **minor** impacts and potential **minor beneficial** impacts associated with the Proposed Action would not change under Alternative C, D, or G.

**Cumulative Impacts of Alternatives C, D, and G.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative C, D, or G to cumulative impacts on birds would be undetectable. Because the impacts of the Proposed Action would not change under Alternative C, D, or G, BOEM anticipates that the cumulative impacts of Alternatives C, D, and G would be the same

as described for the Proposed Action. Therefore, cumulative impacts of Alternatives B, E, and F would be **moderate** and **moderate beneficial**.

### 3.7.8 Impacts of Alternative H on Birds

**Impacts of Alternative H.** The impacts resulting from individual IPFs associated with construction and installation, O&M, and decommissioning of the Projects under Alternative H would be the same those described under the Proposed Action. An alternate method of dredge and fill activity at the SBMT would not materially change the analysis of any IPF, as the Onshore Project area is heavily developed with little or no bird habitat. BOEM does not anticipate that any change in dredge and fill activity would affect undisturbed or natural areas. All other offshore and onshore Project components of Alternative H would be the same as under the Proposed Action.

**Cumulative Impacts of Alternative H.** The cumulative impacts on birds would be moderate and moderate beneficial for the same reasons described for the Proposed Action. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative H to the cumulative impacts on birds would be the same as those described under the Proposed Action.

#### 3.7.8.1. Conclusions

**Impacts of Alternative H.** As discussed above, the expected **minor** impacts and potential **minor beneficial** impacts associated with the Proposed Action would not change under Alternative H.

**Cumulative Impacts of Alternative H.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative H to the cumulative impacts on birds would be undetectable. Because the impacts of the Proposed Action would not change under Alternative H, BOEM anticipates that the cumulative impacts of Alternative H would be the same as described for the Proposed Action. Therefore, cumulative impacts of Alternative H would be **moderate** and **moderate beneficial**.

### 3.7.9 Proposed Mitigation Measures

If the reported post-construction bat monitoring results (generated as part of Empire's *Bird and Bat Monitoring Framework* [Appendix H, Attachment H-3]) indicate bird impacts deviate substantially from the impact analysis included in this EIS, then Empire must make recommendations for new mitigation measures or monitoring methods (refer to Appendix H, Table H-1).

BOEM has also proposed annual mortality reporting to minimize impacts on birds and bats (refer to Appendix H, Table H-1). As part of this measure, the lessee would prepare and submit annual reports to BOEM, USFWS, and BSEE documenting any dead (or injured) birds or bats found on vessels and structures during construction, operations, and decommissioning. The lessee would report carcasses with federal or research bands to the United States Geological Survey Bird Band Laboratory. The lessee would report occurrences of dead ESA birds or bats to BOEM, USFWS, BSEE within 24 hours of the sighting and, if practicable, carefully collect the dead specimen and preserve the material in the best possible state.

### 3.7.10 Comparison of Alternatives

Alternatives B, E, and F would have the same number of WTGs as the Proposed Action, which would result in the same impacts on species with high collision sensitivity and high displacement sensitivity; the overall impact level would not change—**minor** with **minor beneficial** impacts.

Alternative C, D, or G would not materially change the analysis compared to the Proposed Action because the cable route options that would be constructed under these alternatives are already covered

under the Proposed Action as part of the PDE approach. Therefore, the overall impact level would not change—**minor** with **minor beneficial** impacts.

Under Alternative H, an alternative method of dredge and fill activity would occur in waters around the SBMT, which would not materially change the analysis of any IPF compared to the Proposed Action because the Onshore Project area is heavily developed with little or no bird habitat. Therefore, the overall impact level would not change—**minor** with **minor beneficial** impacts.

In context of reasonably foreseeable environmental trends, BOEM anticipates that the cumulative impact of Alternatives B, C, D, E, F, G, and H in combination with ongoing and planned activities would result in **moderate** and **moderate beneficial** impacts on birds in the geographic analysis area.

# 3.8. Coastal Habitat and Fauna

This section discusses potential impacts on coastal habitat and fauna resources from the proposed Projects, alternatives, and ongoing and planned activities in the coastal habitat and fauna geographic analysis area. Coastal habitat includes flora and fauna within state waters (which extend 3 nm from the shoreline) inland to the mainland, including the foreshore, backshore, dunes, and interdunal areas. The coastal habitat and fauna geographic analysis area, as shown on Figure 3.8-1, includes the area within a 1.0-mile (1.6-kilometer) buffer of the Onshore Project area that includes the export cable landfalls, onshore export cable routes, the onshore substations, the connection from the onshore substations to the POI, and the O&M facility. This section analyzes the affected environment and environmental consequences of the Proposed Action and alternatives on coastal flora and fauna, including special-status species. The affected environment and environmental consequences of Project activities that are within the geographic analysis area and extend into state waters (i.e., HDD for cable landfalls and cable laying within 1 mile [1.6 kilometers] of cable landfalls) are presented in Sections 3.6, *Benthic Resources*; 3.13, *Finfish, Invertebrates, and Essential Fish Habitat*; 3.15, *Marine Mammals*; 3.19, *Sea Turtles*; and 3.21, *Water Quality*. Additional information on birds, bats, and wetlands is presented in Section 3.7, *Birds*, Section 3.5, *Bats*, and Section 3.22, *Wetlands*, respectively.

## 3.8.1 Description of the Affected Environment for Coastal Habitat and Fauna

The geographic analysis area is within urbanized landscapes in the New York metropolitan area, and the onshore export and interconnection cables, onshore substations, and O&M facility are primarily along or within existing roadway corridors. Vegetation almost entirely consists of landscape plants, including trees, shrubs, other ornamental plants, and maintained grass. This includes landscaped areas along roadways, within roadway medians, and in local parks and cemeteries (e.g., Green-Wood Cemetery). Wildlife is expected to be limited to those species adapted to living in urban environments, such as gulls, pigeons, squirrels, and other small rodents or other commensal wildlife. Areas that contain larger expanses of open space and natural land cover, such as parks and riparian areas associated with existing waterbodies, are expected to have higher densities of common wildlife species. However, due to the urban nature of these terrestrial areas, wildlife species expected to occur will be limited to those adapted to living in association with human-influenced landscapes, disturbance, and noise. Shorebirds may forage on the public beaches adjacent to the export cable landfall locations, and marsh islands at the periphery of the geographic analysis area may serve as foraging or nesting habitat. Invasive plant species commonly associated with disturbed and urban areas occur, often at high densities, throughout the Onshore Project area. Due to the high level of development, impervious surfaces, and other such areas that are devoid of vegetation within the onshore export and interconnection cable construction corridors, onshore substations, and O&M facility, invasive plant species are concentrated within and adjacent to disturbed wetlands and streams as well as along vegetated edges of public roadways (Empire 2022).

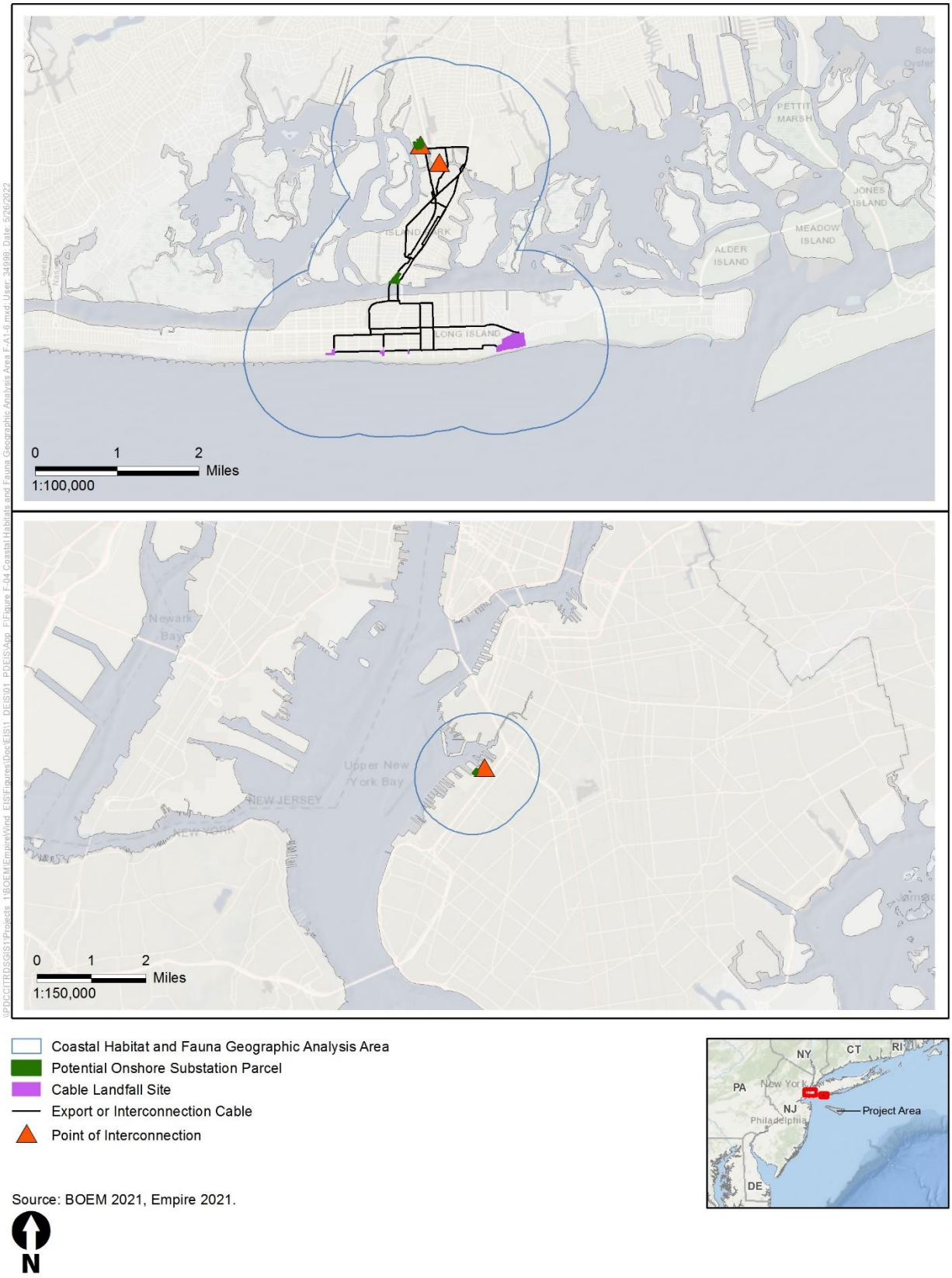


**Figure 3.8-1 Coastal Habitat and Fauna Geographic Analysis Area**

### *EW 1*

The SBMT is a commercial shipping terminal dominated by a paved lot and warehouse buildings, with over 95 percent impervious surfaces; vegetation is limited to volunteer invasives and a line of poplar trees on the north side of the 35th Street Pier (AECOM 2022). From the EW 1 landfall at SBMT, where the onshore substation would also be located, the interconnection cable route would travel northeast along an existing public roadway to the Gowanus POI. The O&M facility would be located on SBMT, directly to the south of the EW 1 onshore substation. The Gowanus POI consists of a paved lot that already contains electrical transmission infrastructure and is devoid of any vegetation. Based on the 2016 National Land Cover Database and aerial imagery, the onshore substation parcel is primarily situated within developed lands (see COP Volume 2, Figure 5.1-3; Empire 2022).

As the EW 1 interconnection cable route and onshore substation would be within an urban landscape and an area mostly devoid of vegetation, wildlife expected to occur would be limited to scavengers and those adapted to living in association with human disturbance and noise, including gulls, pigeons, and small rodents. Other seabird species and migratory birds could occur along the route; however, due to the lack, and already-fragmented nature, of natural habitat, these are not expected to occur at high densities (Empire 2022).

One plant listed as threatened under the ESA may occur in the EW 1 geographic analysis area: seabeach amaranth (*Amaranthus pumilus*) (USFWS 2022; Empire 2022). However, the primary habitat associated with the species—foredunes, non-eroding beaches, and overwash flats at the end of islands—does not exist in the EW 1 geographic analysis area. Sites visits conducted in August to October 2020 for the SBMT Improvement Project included vegetation surveys at the SBMT and seabeach amaranth and associated habitat was not observed (AECOM 2022). Three bird species and one mammal listed as threatened or endangered under the ESA may also occur or potentially occur in the geographic analysis area; these species are addressed in Section 3.7, *Birds*, and Section 3.5, *Bats*. The Empire Wind BA will provide a detailed discussion of ESA-listed species and potential impacts of the Projects on these species. Results of ESA consultation with USFWS will be included in the Final EIS.

The EW 1 Onshore Project area is not within New York State Significant Coastal Fish and Wildlife Habitats. Natural Heritage Database inquiries were submitted to the NYSDEC Division of Fish and Wildlife, and results indicated that the peregrine falcon (*Falco peregrinus*) may be present in the vicinity of the EW 1 submarine export cable route, as there is a documented breeding occurrence on the Verrazzano-Narrows Bridge (see COP Appendix N; Empire 2022); however, the bridge is outside of the geographic analysis area.

### *EW 2*

Overall, EW 2 would be situated within developed lands of variable development intensity, with vegetation primarily limited to the area within and adjacent to Onshore Substation C, as well as strips along transportation corridors (i.e., roads and rail) and maintained lawn. Four export cable landfall options (Landfalls A, B, C, and E) are currently under review for EW 2. Proposed Landfalls consist of a bare vacant parcel used for parking (Landfall A), existing paved parking lots devoid of vegetation (Landfalls B and C), and a previously disturbed vacant lot (Landfall E). Barrier beaches are present between the landfall locations and the shoreline. Long Beach (Landfalls A, B, and E) is sandy with no vegetation while Lido Beach (Landfall C) includes vegetated dunes. A total of six onshore export cable route segments are under review to traverse the island of Long Beach from the export cable landfall options to the Reynolds Channel crossing. These routes would travel along existing roads in areas dominated by high-intensity development (see COP Volume 2, Figure 5.1-4; Empire 2022). After crossing the Reynolds Channel into Island Park, a total of five cable routes under review would traverse Island Park to Onshore Substation A. These routes would travel along existing roads in areas dominated

by high- and medium-intensity development (see COP Volume 2, Figure 5.1-5; Empire 2022); there are three isolated vegetated areas (e.g., herbaceous, forest/wooded vegetation, and scrub/shrub) along onshore export cable segment IP-C between Long Beach Road and Daly Boulevard. Onshore Substation A would be on a developed parcel with no natural vegetation (see COP Volume 2, Table 5.1-2 and Figure 5.1-5; Empire 2022). EW 2 Onshore Substation C would be on the north side of Reynolds Channel along an existing railroad corridor and, if selected, would eliminate the need for the five cable routes under review that would traverse Island Park to Onshore Substation A. The EW Onshore Substation C site is composed of several active commercial properties with approximately 70 percent of the site devoid of vegetation and includes commercial buildings, supporting ancillary appurtenances, roads, and gravel parking areas. The remaining 30 percent of the site consists of vegetated perimeters (some trees and shrubs) of parking lots and an approximately 1-acre area that has been routinely disturbed with land clearing and soil disturbance.

Considering the high percentage of development within the onshore export cable route corridor, this portion of EW 2 would be suitable for species common to urban environments comprising sparsely vegetated and highly fragmented habitat. Gulls, pigeons, and seabird species may occur as transients in low densities, with seabird species increasing in relative density closer to the landfall. Species occurring along the beach may include foraging individuals or transient migrants; however, the beach is highly developed and routinely raked and therefore contains poor-quality breeding habitat. Areas in the northern portion of the onshore export cable route corridor in the vicinity of onshore export cable segments IP-C and IP-G north and west of Long Beach Road and south of Daly Boulevard are composed primarily of scrub/shrub habitats that may provide foraging and nesting habitat for wildlife species (Empire 2022). The undeveloped areas of the EW 2 Onshore Substation C site may have the potential to provide some habitat for certain urban bird species, but this area is not expected to be important habitat for any species and is completely isolated by surrounding developments.

One plant listed under the ESA may occur in the EW 2 geographic analysis area: seabeach amaranth (threatened) (USFWS 2022). As previously mentioned, seabeach amaranth habitat generally consists of foredunes, non-eroding beaches, and overwash flats at the ends of islands. Individuals or populations of seabeach amaranth have been identified as potentially occurring within Project components at Lido Beach (see COP Volume 2, Table 5.1-3; Empire 2022). BOEM notes that COP Section 5.1.1.2 and Table 5.1-3 indicate a second federally listed plant potentially present in the geographic analysis area: sandplain gerardia (endangered). However, the ESA species information in the COP is based on an Information for Planning and Consultation query from June 2021, and the species no longer occurs or potentially occurs in the geographic analysis area based on BOEM's more recent Information for Planning and Consultation queries in preparation for this EIS and the Empire Wind BA. Three bird species and one mammal listed as threatened or endangered under the ESA may also occur or potentially occur in the geographic analysis area; these species are addressed in Section 3.7, *Birds*, and Section 3.5, *Bats*. The Empire Wind BA will provide a detailed discussion of ESA-listed species and potential impacts of the Projects on these species. Results of ESA consultation with USFWS will be included in the Final EIS.

Natural Heritage Database inquiries were submitted to NYSDEC, Division of Fish and Wildlife, and results indicated that nine threatened, endangered, or species of conservation concern have been documented in the vicinity of EW 2, including seven bird species and two plant species (seabeach amaranth and sandplain gerardia) (see COP Appendix N; Empire 2022). Three significant communities were also identified as potentially occurring within the tidal channels in the vicinity of onshore export cable segments IP-C and IP-G north and west of Long Beach Road and south of Daly Boulevard and two significant natural communities, both comprising sensitive beach habitats, were identified at Landfall C and the temporary work area associated with the landfall site. A small area of the Landfall C parcel overlaps with the western tip of the state designated Nassau Beach Significant Coastal Fish and Wildlife Habitat site (New York State 2008). A review of the New York State Wildlife Action Plan found that the

geographic analysis area is most closely associated with six habitat types defined in the State Wildlife Action Plan: (1) brackish intertidal mesohabitat, (2) marine intertidal mesohabitat, (3) brackish subtidal shallow mesohabitat, (4) coastal grassland/shrubland, (5) maintained grasses and mixed cover, and (6) urban/suburban (NYSDEC 2015). These habitat types are associated with 116 SGCN,[1] of which 59 are birds, 2 are bats, and 24 are aquatic species (e.g., fish, crabs, clams). Examples of non-avian (i.e., birds and bats) SGCN that may be found in the Project area include diamondback terrapin, three-banded lady beetle, smooth greensnake, northern copperhead, black-bordered lemon moth, Jersey jair underwing, and Rambur's forktail. However, as previously stated, natural habitat is limited along the cable routes due to the developed nature of the Onshore Project area.

## 3.8.2 Impact Level Definitions for Coastal Habitat and Fauna

Definitions of impact levels are provided in Table 3.8-1. There are no beneficial impacts on coastal habitat and fauna.

**Table 3.8-1 Impact Level Definitions for Coastal Habitat and Fauna**

| Impact Level | Impact Type | Definition |
|---|---|---|
| Negligible | Adverse | Impacts on species or habitat would be so small as to be unmeasurable. |
| Minor | Adverse | Most impacts on species would be avoided; if impacts occur, they may result in the loss of a few individuals. Impacts on sensitive habitats would be avoided; impacts that do occur are temporary or short term in nature. |
| Moderate | Adverse | Impacts on species would be unavoidable but would not result in population-level effects. Impacts on habitat may be short term, long term, or permanent and may include impacts on sensitive habitats but would not result in population-level effects on species that rely on them. |
| Major | Adverse | Impacts would affect the viability of the population and would not be fully recoverable. Impacts on habitats would result in population-level impacts on species that rely on them. |

## 3.8.3 Impacts of the No Action Alternative on Coastal Habitat and Fauna

When analyzing the impacts of the No Action Alternative on coastal habitat and fauna, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on the baseline conditions for coastal habitat and fauna. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind activities, as described in Appendix F, *Planned Activities Scenario*.

### 3.8.3.1. Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for coastal habitats and fauna described in Section 3.8.1, *Description of the Affected Environment for Coastal Habitat and Fauna*, would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind activities within the geographic analysis area that contribute to impacts on coastal habitats and fauna include onshore residential, commercial, and industrial

[1] SGCN species are wildlife species experiencing a population decline (or some level of population decline) or have identified threats that may put them in jeopardy, are in need of timely management intervention or are likely to reach critical population levels in New York, or need conservation actions to maintain stable populations levels or sustain recovery (NYSDEC 2015).

development and climate change. Onshore construction activities and associated impacts are expected to continue at current trends and have the potential to affect coastal habitats and fauna. Onshore construction activities and associated impacts are expected to continue and have the potential to affect coastal habitat and fauna through temporary and permanent loss of coastal habitat and temporary noise impacts, which can cause avoidance behavior and displacement. Injury or mortality of individual animals could occur, but population-level effects would not be expected. Climate change would contribute to impacts on coastal habitats and fauna through global warming, sea level rise, and resulting modifications to habitat and ecology. Climate change is altering the seasonal timing and patterns of species distributions and ecological relationships, likely causing permanent impacts of unknown intensity (Friggens et al. 2018). Climate change and associated sea level rise results in dieback of coastal habitats caused by rising groundwater tables and increased saltwater inundation from storm surges and exceptionally high tides (USDA n.d.). Climate change may also affect coastal habitats through increases in instances and severity of droughts and range expansion of invasive species. Warmer temperatures will cause plants to flower earlier, will not provide needed periods of cold weather, and will likely result in declines in reproductive success of plant and pollinator species. Increased temperatures could lead to changes in mating, nesting, reproductive, and foraging behaviors of species. The effects of climate change on animals will likely include loss of habitat, population declines, increased risk of extinction, decreased reproductive productivity, and changes in species distribution (NJDEP 2020).

There are no ongoing offshore wind activities within the geographic analysis area for coastal habitat and fauna.

### 3.8.3.2. Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with the other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Other planned non-offshore wind activities that may affect coastal habitat and fauna primarily include onshore development activities (see Appendix F, Section F.2.13 for descriptions) These activities may result in short-term and permanent impacts on coastal habitat and fauna, including habitat degradation, removal, and conversion; and disturbance, displacement, injury, and mortality of individual wildlife species.

Planned offshore wind activities could contribute to individual displacement, injury, mortality, and habitat loss or modification via noise, land disturbance, vehicle collisions, and climate change if there is overlap with the geographic analysis area. Activities from these projects would be temporary, and some fauna would likely return to disturbed areas following completion of construction, depending on the amount of land disturbance. BOEM is not aware of any planned offshore wind activities other than the Proposed Action that would overlap the geographic analysis area for coastal habitat and fauna. However, if any planned offshore wind activities are identified and occur within the highly urbanized landscape of the geographic analysis area, impacts would be similar to those under the Proposed Action, and any adverse impacts on coastal habitats and fauna under the No Action Alternative would be minimal. While planned offshore wind activities may result in minimal onshore habitat impacts, offshore wind energy is expected to have a cumulative positive impact by helping to counteract climate change.

BOEM expects planned offshore wind activities to affect coastal habitat and fauna through the following primary IPFs.

**Noise:** Onshore construction noise associated with any planned offshore wind activities could result in temporary and highly localized impacts at the landing site, along the onshore export cable route, and at the onshore substation location. Impacts, if any, would be limited to behavioral avoidance of construction

activity and noise. Displaced wildlife could use adjacent habitat and would likely repopulate these areas once construction ceases. Construction would likely occur in the highly developed and urbanized landscape areas of the New York metropolitan area where wildlife is already habituated to human activity and noise. Therefore, no individual fitness or population-level effects on wildlife would be expected.

**Land disturbance:** BOEM anticipates that any planned offshore wind activities would require minimal disturbance of undisturbed lands and habitats given the extent of the highly developed areas and urbanized landscapes of the geographic analysis area. Some clearing of vegetation may be required for constructing the landfall, widening a transmission right-of-way, or clearing the substation footprint, but construction would be expected to generally occur in previously disturbed areas and areas generally fragmented or disconnected from other natural habitats. Use of construction and maintenance equipment could result in collisions with wildlife. However, it is anticipated that wildlife collisions would be rare because wildlife presence is expected to be limited due to the urban environment and because most individuals are expected to avoid construction areas or have the mobility to avoid construction equipment. Therefore, no individual fitness or population-level impacts on wildlife would be expected to occur during land disturbance activities, and onshore construction associated with planned offshore wind development would not be expected to appreciably contribute to cumulative impacts on wildlife.

#### 3.8.3.3. Conclusions

**Impacts of the No Action Alternative.** Under the No Action Alternative, coastal habitats and fauna would continue to be affected by existing environmental trends and ongoing activities. BOEM expects ongoing activities to have continuing temporary and permanent impacts (disturbance, displacement, injury, mortality, and habitat conversion) on coastal habitats and fauna primarily through onshore construction and climate change. BOEM anticipates that the potential impacts of ongoing construction activities on coastal habitats and fauna would be minor, but impacts from climate change could be moderate. Therefore, the No Action Alternative would result in **moderate** impacts on coastal habitats, primarily driven by climate change.

**Cumulative Impacts of the No Action Alternative.** Under the No Action Alternative, existing environmental trends and ongoing activities would continue, and coastal habitat and fauna would continue to be affected by natural and human-caused IPFs. Planned activities would contribute to the impacts on coastal habitat and fauna through construction-related activities that affect habitat, vegetation, and wildlife. Currently, there are no planned offshore wind activities proposed in the geographic analysis area. If any were to occur, they would have some potential to result in temporary disturbance and permanent loss of onshore habitat. However, habitat removal is anticipated to be minimal due to the developed and urbanized landscape of the geographic analysis area, and any impacts resulting from habitat loss or disturbance would not be expected to result in population-level effects within the geographic analysis area. BOEM anticipates the No Action Alternative would result in **moderate** impacts on coastal habitat and fauna, primarily driven by ongoing construction activities and climate change.

### 3.8.4 Relevant Design Parameters & Potential Variances in Impacts of the Action Alternatives

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The following proposed PDE parameters (Appendix E) would influence the magnitude of the impacts on coastal habitat and fauna:

- The onshore export cable routes, including routing variants, and extent of ground disturbance, which could require the removal of vegetation; and

- The EW 2 onshore substations, which could require the removal of trees and shrubs in or on the edge of the construction footprint for Onshore Substation C.

Variability of the proposed Project design exists as outlined in Appendix E. Below is a summary of potential variances in impacts:

- Onshore export cable routes and substation footprints: The route chosen (including variations of the general route) and substation footprints would determine the amount of habitat affected.

### 3.8.5 Impacts of the Proposed Action on Coastal Habitat and Fauna

The sections below summarize the potential impacts of the Proposed Action on coastal habitat and fauna and special-status species during the various phases of the Projects. Routine activities would include construction, O&M, and decommissioning of the Projects, as described in Chapter 2, *Alternatives Including the Proposed Action*. BOEM will prepare a BA for the potential effects on USFWS federally listed species. Results of consultation with USFWS pursuant to Section 7 of the ESA will be presented in the Final EIS.

**Noise:** Construction noise could lead to temporary and highly localized disturbance and displacement of wildlife. Displaced individuals would likely return to the affected areas once the noise has ended. It is possible that individuals could experience repeated stress events if they returned to the site at night, when construction has paused, only for construction to drive them away again in the morning. BOEM expects these impacts to be limited and temporary in nature. Normal operation of the substation would generate continuous noise, but BOEM expects minimal associated impacts in the context of existing noises near the proposed substations that are generated from the highly developed and urbanized landscape around the substation sites. The impacts on coastal habitats and fauna of noise from the Proposed Action would add to the impacts of other anthropogenic noise. Terrestrial fauna may habituate to noise so that it has little to no effect on their behavior or biology (Kight and Swaddle 2011). Considering that most of the onshore area where the onshore Project components would be constructed consists of the highly developed and urbanized landscape of the New York metropolitan area, terrestrial fauna in this area are likely to be already subject and habituated to anthropogenic noise. The impacts on coastal habitats and fauna from noise from the Proposed Action are anticipated to be minimal, and no individual fitness or population-level effects on wildlife would be expected.

**Land disturbance:** The expected impacts of onshore construction associated with the Proposed Action would not increase the impacts of this IPF beyond those described under the No Action Alternative. The EW 1 geographic analysis area (which also includes the O&M facility) is mostly devoid of natural habitat (i.e., is significantly altered by human development and primarily used for industrial and commercial operations) and would support species that associate with coastal urbanized areas (e.g., pigeons, seagulls, rodents). Therefore, impacts on wildlife from construction and operation of EW 1 onshore components and the O&M facility would be negligible, as no natural habitat would be affected.

Empire would implement trenchless technology (e.g., HDD or direct pipe) for the EW 2 offshore export cable landing to go under beaches and dunes, which would avoid beach and dune habitat (COP Volume 2b, Section 5.1.1.2; Empire 2022) and the state-designated Nassau Beach Significant Coastal Fish and Wildlife Habitat site; as such, temporary impacts on wildlife resulting from the landfall location would be minor. While habitats in the EW 2 geographic analysis area have also been significantly altered by human development, there are some small areas of tree and shrub habitat that could be affected, depending on the substation and onshore cable route selected; however, these more natural areas are isolated and surrounded by developed and urbanized areas.

To minimize disturbance, the majority of the proposed onshore export and interconnection cable routes would be sited in already-disturbed areas (e.g., existing roadways) to the extent practicable. Construction of EW 2 onshore export cable segment IP-C would require vegetation removal in three isolated areas between Long Beach Road and Daly Boulevard (6.44 acres herbaceous, 1.99 acres forest/wooded vegetation, and 0.41 acre scrub/shrub). Construction of EW 2 Onshore Substation C would require the removal of approximately 0.55 acre of tree/shrub habitat along the existing railroad corridor. Removal of trees would be a long-term impact while removal of scrub/shrub habitat would be short term.

Clearing and grading during construction within temporary workspaces would result in temporary loss of forage and cover for wildlife within the area. Construction of Onshore Substation C would result in short-term and permanent impacts on habitat from construction of the permanent substation facilities and use of temporary construction workspace. Any remnant habitat within the permanent substation site would be converted to developed land with landscaping for the duration of the Projects' operational lifetime. Landscaped areas would provide some habitat for species acclimated to human activity, which are the primary species types in the area given the surrounding developed and urbanized landscape. Any tree and shrub removal for onshore export cable installation would likely result in a maintained right-of-way of herbaceous/low shrub vegetation. No tree clearing is expected for EW 2 Onshore Substation A.

Empire would implement measures to avoid and minimize habitat impacts, including revegetating disturbed areas (COP Volume 2f, Table 9-1, APM 49; Empire 2022), implementing an invasive species control plan and invasive species survey (APM 48 and APM 57), limiting construction beyond existing disturbed areas (APM 55), implementing erosion and sediment control plans (APMs 45,46, 50, 52), and conducting site-specific mitigation (APM 54). Given the nature of the existing conditions of the Onshore Project areas (i.e., developed and highly urbanized with little or no natural habitat), Empire's commitment to measures to avoid and reduce habitat impacts, and the temporary nature of construction, the impacts on wildlife and habitat are expected to be minor.

#### 3.8.5.1. Impact of the Connected Action

As described in Chapter 2, infrastructure improvements have been proposed at SBMT to provide the necessary structural capacity, berthing facilities, and water depths to operate as an offshore wind hub for several proposed offshore wind projects, including the Proposed Action. These improvements include in-water activities (i.e., dredging and dredged material management, replacement and strengthening of existing bulkheads, installation of new pile-supported and floating platforms, installation of new fenders), as well as some upland activities (building construction and paving). BOEM expects the connected action to affect coastal flora and fauna through the noise and land disturbance IPFs.

**Noise:** The expected impacts of noise associated with the connected action's activities alone could affect any wildlife that may be in the vicinity of the SBMT. However, similar to under the Proposed Action, construction noise would be temporary and localized and would not be anticipated to be significantly different than the noise levels in the surrounding urban environment. If pile driving is necessary during construction, the noise would be temporary and would cease after piles are installed. Similarly, dredging vessels and other construction noise could temporarily disturb wildlife, but wildlife that may be in the area are likely already acclimated to noise in an urban environment and would be able to move away from the noise. Normal operation at the SBMT would generate continuous noise, but BOEM expects negligible long-term impacts when considered in the context of the other commercial and industrial noises in the EW 1 Onshore Project area. BOEM anticipates noise impacts associated with the connected action to be negligible.

**Land disturbance:** Improvement activities at the SBMT would remove all existing structures and approximately 40 percent of the currently paved area. After additional excavation for installation of subsurface piles, utilities, and building structures, only minor grade changes are anticipated. The site

would be repaved and new structures installed. Impacts on upland vegetation would be limited to removal of approximately 0.05 acre of volunteer invasive vegetation throughout the SBMT site and three poplar trees along the north side of the 35th Street Pier to replace a bulkhead, with each tree being approximately 4 inches in diameter at breast height. The removal of this vegetation is not anticipated to affect wildlife because it is low-quality habitat. Therefore, BOEM anticipates land disturbance associated with the connected action to be negligible.

### 3.8.5.2. Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind activities, other planned offshore wind activities, and the connected action at SBMT. Ongoing and planned non-offshore wind activities related to onshore development activities would contribute to impacts on coastal habitat and fauna through the primary IPFs of noise and land disturbance. Construction related to the connected action could affect coastal habitat and fauna through the removal of a few small trees and by generating temporary and localized noise. The construction, O&M, and decommissioning of onshore infrastructure for offshore wind activities in the geographic analysis area would also contribute to the primary IPFs of noise and land disturbance. Temporary disturbance and permanent loss of habitat onshore may occur as a result of offshore wind development. BOEM is not aware of any planned offshore wind activities other than the Proposed Action that would overlap the geographic analysis area for coastal habitat and fauna. However, if habitat removal is anticipated, it would be minimal and any related impacts would not be expected to result in individual fitness or population-level effects in the geographic analysis area.

The cumulative impact on coastal habitat and fauna would likely be moderate, mostly driven by climate change. The onshore cable routes and substation location are within highly developed areas and within the urbanized landscapes in the New York metropolitan area, where limited natural habitat and habitat connectivity are present. In context of reasonably foreseeable environmental trends, the Proposed Action would contribute an undetectable increment to the cumulative noise and land disturbance impacts on coastal habitat and fauna.

### 3.8.5.3. Conclusions

**Impacts of the Proposed Action.** In summary, activities associated with the construction, installation, O&M, and eventual decommissioning of the Proposed Action would have **minor** impacts on coastal habitats and fauna due to the developed and urbanized landscape that dominates the geographic analysis area. The primary impacts of the Proposed Action affecting habitats and wildlife would be long-term habitat loss and conversion from onshore construction at Onshore Substation C and onshore export cable segment IP-C. The primary impacts of the connected action would be related to noise and land disturbance, which could affect wildlife in the EW 1 Onshore Project area. However, given the developed nature of the EW 1 Onshore area, wildlife are likely acclimated to activities similar to those related to the connected action; therefore, BOEM anticipates impacts of the connected action would be **negligible**.

**Cumulative Impacts of the Proposed Action.** BOEM anticipates that the cumulative impacts on coastal habitat and fauna in the geographic analysis area would be **moderate**. In context of other reasonably foreseeable environmental trends in the area, the incremental impacts contributed by the Proposed Action to the cumulative impacts on coastal habitat and fauna would be undetectable. The Proposed Action would contribute to cumulative impacts primarily through the permanent impacts on habitat associated with the long-term impacts from habitat loss related to the EW 2 Onshore Station C site and cable route that would cross three isolated habitat areas.

### 3.8.6 Impacts of Alternatives B, E, and F on Coastal Habitat and Fauna

**Impacts of Alternatives B, E, and F.** Alternatives B, E, and F would alter the turbine array layout compared to the Proposed Action; however, each of these alternatives would allow for installation of up to 147 WTGs as defined in Empire's PDE. Coastal habitat and fauna impacts under Alternatives B, E, and F would be the same as those of the Proposed Action because these alternatives would differ only with respect to the WTG offshore component (WTGs in different positions in the Lease Area), and the WTGs would be outside of the geographic analysis area. Therefore, the impacts resulting from individual IPFs associated with onshore construction and installation, O&M, and decommissioning under Alternatives B, E, and F on coastal habitat and fauna would be the same as those of the Proposed Action.

**Cumulative Impacts of Alternatives B, E, and F.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternatives B, E, and F to the cumulative impacts on coastal habitat and fauna would be undetectable. The cumulative impacts on coastal habitat and fauna would be moderate for the same reasons described for the Proposed Action.

#### 3.8.6.1. Conclusions

**Impacts of Alternatives B, E, and F.** As discussed above, the expected **minor** impacts associated with the Proposed Action would not change under Alternative B, E, or F because the alternatives would only differ in offshore WTG components, which would be outside of the geographic analysis area.

**Cumulative Impacts of Alternatives B, E, and F.** Because the impacts of the Proposed Action would not change under Alternative B, E, or F, BOEM anticipates that the cumulative impacts of Alternatives B, E, and F would be the same as described for the Proposed Action. Therefore, cumulative impacts of Alternatives B, E, and F would be **moderate**.

### 3.8.7 Impacts of Alternative C, D, and G on Coastal Habitat and Fauna

**Impacts of Alternatives C, D, and G.** The impacts resulting from individual IPFs associated with construction and installation, O&M, and decommissioning of the Projects under Alternative C, D, or G would be the same as those described under the Proposed Action. Submarine and onshore cable route options around the Gravesend Anchorage (Alternative C-1) and the Ambrose Navigation Channel (Alternative C-2), to avoid the sand borrow area (Alternative D), or to use a cable bridge to cross Barnums Channel (Alternative G) are already covered under the Proposed Action as part of the PDE approach, and narrowing the submarine and onshore cable route options under Alternative C, D, or G would not materially change the analyses of any IPF. All other offshore and onshore Project components would be the same as under the Proposed Action.

**Cumulative Impacts of Alternatives, C, D, and G.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative C, D, or G to the cumulative impacts on coastal habitat and fauna would be undetectable. The cumulative impacts on coastal habitat and fauna would be moderate for the same reasons described for the Proposed Action.

#### 3.8.7.1. Conclusions

**Impacts of Alternatives C, D, and G.** As discussed above, the expected **minor** impacts associated with the Proposed Action would not change under Alternative C, D, or G.

**Cumulative Impacts of Alternatives C, D, and G.** Because the impacts of the Proposed Action would not change under Alternative C, D, or G, BOEM anticipates that the cumulative impacts of Alternatives C, D, and G would be the same as described for the Proposed Action. Therefore, cumulative impacts of Alternatives C, D, and G would be **moderate**.

### 3.8.8 Impacts of Alternative H on Coastal Habitat and Fauna

**Impacts of Alternative H.** The impacts resulting from individual IPFs associated with construction and installation, O&M, and decommissioning of the Projects under Alternative H would be the same those described under the Proposed Action. An alternate method of dredge and fill activity at the SBMT to reduce the discharge of dredged material would not materially change the analysis of any IPF, as the Onshore Project area is highly developed with a lack of natural habitats. BOEM does not anticipate any change in dredge and fill activity would affect undisturbed or natural areas. All other offshore and onshore Project components of Alternative H would be the same as under the Proposed Action.

**Cumulative Impacts of Alternative H.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative H to the cumulative impacts on coastal habitat and fauna would be undetectable. The cumulative impacts on coastal habitat and fauna would be moderate for the same reasons described for the Proposed Action.

#### 3.8.8.1. Conclusions

**Impacts of Alternative H.** As discussed above, the expected **minor** impacts associated with the Proposed Action would not change under Alternative H.

**Cumulative Impacts of Alternative H.** Because the impacts of the Proposed Action would not change under Alternative H, BOEM anticipates that the cumulative impacts of Alternative H would be the same as described for the Proposed Action. Therefore, cumulative impacts of Alternative H would be **moderate**.

### 3.8.9 Comparison of Alternatives

Because Alternatives B, C, D, E, and F involve modifications only to offshore components, and because Alternative G is already covered under the Proposed Action as part of the PDE approach, impacts on coastal habitat and fauna from those alternatives would be the same as those under the Proposed Action—**minor**.

Under Alternative H, an alternative method of dredge and fill activity would occur in waters around the SBMT, which would not materially change the analysis of any IPF compared to the Proposed Action because the Onshore Project area is highly developed with little or no habitat. Therefore, the overall impact level would not change—**minor**.

In context of reasonably foreseeable environmental trends, the cumulative impact of Alternatives B, C, D, E, F, G, and H in combination with ongoing and planned activities would be the same as that of the Proposed Action for individual IPFs—minor. Considering all the IPFs together, BOEM anticipates that the contribution of Alternative B, C, D, E, F, G, or H to the impacts from ongoing and planned activities would result in **moderate** cumulative impacts on coastal habitats and fauna in the geographic analysis area. Ongoing and planned activities contributing to impacts on coastal habitats and fauna in the geographic analysis area include climate change and habitat impacts.

# 3.11. Demographics, Employment, and Economics

This section discusses potential impacts on demographic, employment, and economic conditions from the Projects, alternatives, and ongoing and planned activities in the geographic analysis area for demographics, employment, and economics (shown on Figure 3.11-1). The demographics, employment and economics geographic analysis area includes the counties and municipalities where proposed onshore infrastructure and potential port cities are located: Kings, Nassau, and Albany Counties, including Town of Hempstead, City of Long Beach, and Village of Island Park in New York State and Nueces and San Patricio Counties in Texas (a port in the Corpus Christi, Texas area could be a starting point for transporting the OSS topsides for EW 1 and EW 2). Tables I-7 through I-24 in Appendix I provide detailed demographic and employment information for these areas, including information from the 2020 census (U.S. Census Bureau 2020). Data for New York State is also provided for reference. This section also considers the other counties that may be affected by visual or recreation and tourism impacts, which may have impacts on property values or recreation and tourism economies (i.e., Manhattan, Queens, and Suffolk in New York State and Monmouth and Ocean Counties in New Jersey). For these counties and states, data on the economic value of the recreation and tourism industries are provided in Table I-21 in Appendix I.

## 3.11.1 Description of the Affected Environment for Demographics, Employment, and Economics

***Kings, Nassau, and Albany Counties***

New York has always been one of the top tourism destinations in the world. The industry is mainly centered around the New York City region (including Brooklyn). The Long Island region is the second largest tourism region. As a result, the tourism industry is a key component and driver of these local economies (COP Volume 2e, Section 8.3; Empire 2022).

**Kings County**

The population of Kings County increased by 11.0 percent from 2000 to 2020, compared to 6.5 percent in New York State overall. The population of Kings County is younger than in the other affected New York counties and New York State as a whole, with 23.0 percent aged 0–17 and 26.6 percent aged 18–34 (U.S. Census Bureau 2019a).

In 2021, the annual unemployment rate in Kings County was approximately 10.1 percent, and the overall New York State unemployment rate was 6.9 percent (U.S. Bureau of Labor Statistics 2021a, 2021b). In 2015–2019, the unemployment rate in Kings County was relatively high (6.2 percent) compared to the other affected areas and New York State as a whole (5.5 percent) (U.S. Census Bureau 2019a). In 2020, the Kings County gross domestic product (GDP) totaled approximately $86.2 billion (U.S. BEA 2021).

Kings County (i.e., Brooklyn) is notable for the importance of coastal tourism and recreation to its economy and a relatively high proportion of seasonal housing compared with the other affected counties and municipalities in the geographic analysis area (aside from the City of Long Beach). In 2018, Kings County had 3,759 establishments, 33,229 employees, $899.2 million in total wages, and $1.8 billion in GDP resulting from tourism and recreation (National Ocean Economics Program 2018). In Kings County, nearly 1 percent of housing units are seasonally occupied (similar to Nassau County), compared to approximately 4 percent in New York State overall (U.S. Census Bureau 2019a).

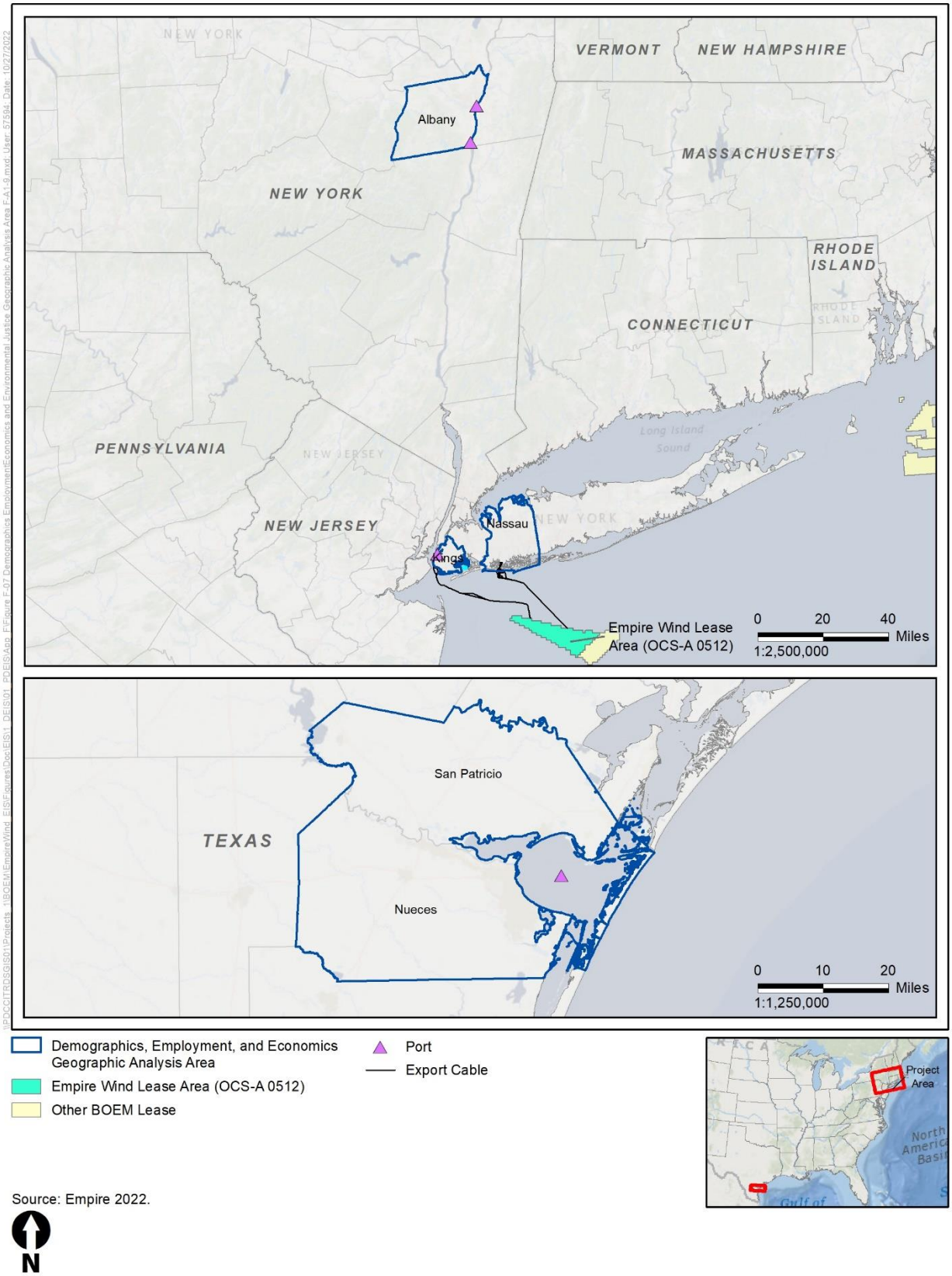


**Figure 3.11-1 Demographics, Employment, and Economics Geographic Analysis Area**

The industries that would be most affected by the Proposed Action include recreation and tourism, retail, and construction. A review of the industries that employ workers in Kings County (Table I-14 in Appendix I) reveals that Brooklyn has one of the lowest proportion of jobs in the entertainment, recreation, accommodation, and food services sectors (7.3 percent), aside from the City of Albany (4.3 percent) and Albany County (7 percent). Meanwhile, New York State overall has 9.9 percent of its jobs in the recreation and tourism-related sectors, and the City of Long Beach has the highest at 16.9 percent. In terms of other industries that may be affected by the Proposed Action, Kings County has a modest proportion of retail trade jobs (8.8 percent), compared to 9.3 percent in New York State overall, and 3.9 percent of jobs are in construction (compared to 4.1 percent in New York State as a whole) (U.S. Census Bureau 2019b). The largest proportion of jobs in Brooklyn is in Health Care and Social Assistance (31.4 percent), followed by Education Services (11.6 percent).

NOAA tracks economic activity dependent upon the ocean in its "Ocean Economy" data, which generally include commercial fishing and seafood processing, marine construction, commercial shipping and cargo-handling facilities, ship and boat building, marine minerals, harbor and port authorities, passenger transportation, boat dealers, and coastal tourism and recreation, among others. Tables I-17 and I-18 in Appendix I report data on the Ocean Economy as a whole in terms of GDP and employment, respectively. In Kings County, tourism and recreation accounted for 87.8 percent of the overall Ocean Economy GDP (NOAA 2018) (see Table I-17 in Appendix I). This category includes recreational and charter fishing, as well as commercial ferry services.

The "living resource" sector of the Ocean Economy includes commercial fishing, aquaculture, seafood processing, and seafood markets. Although the number employed or self-employed in this sector in Kings County is small compared to recreation and tourism, Brooklyn has a higher proportion of these jobs (3.9 percent) compared to Nassau County (2.5 percent), of all the Ocean Economy sectors.

**Nassau County**

The population of Nassau County increased by 4.6 percent from 2000 to 2020, compared to 11.0 percent growth in Kings County, and 6.5 percent in New York State overall. The population of Nassau County is slightly older than in the other affected New York counties and New York State as a whole, with 40.5 percent aged 35–64 and 17.5 percent aged over 65 (U.S. Census Bureau 2019a). Nassau County also has the oldest median age (42) compared to the other affected New York counties (35–40) and New York State overall (39).

In 2021, the annual unemployment rate in Nassau County was 4.5 percent, compared to the overall State of New York average of 6.9 percent (U.S. Bureau of Labor Statistics 2021a, 2021b). In 2015–2019, the unemployment rate in Nassau County was relatively low (3.9 percent) compared to the other affected areas and New York State as a whole (5.5 percent) (U.S. Census Bureau 2019a). In 2020, Nassau County had approximately $83.0 billion in GDP (U.S. BEA 2021). In 2018, Nassau County had 1,396 establishments, 17,392 employees, $421.9 million in total wages, and $794.1 million in GDP resulting from tourism and recreation (National Ocean Economics Program 2018). In Nassau County, nearly 1 percent of housing units are seasonally occupied (similar to Kings County), compared to approximately 4 percent in New York State overall (U.S. Census Bureau 2019a).

A review of the industries that employ workers in Nassau County (Table I-14 in Appendix I) reveals that Nassau County has 9.5 percent of its jobs in the entertainment, recreation, accommodation, and food services sectors compared with 9.9 percent in New York State overall. In terms of other industries that may be affected, Nassau County has a relatively high proportion of retail trade jobs (12.0 percent compared to 9.3 percent in New York State overall), and 4.9 percent of jobs are in construction (compared to 4.1 percent in New York State as a whole) (U.S. Census Bureau 2019b).

In 2018, tourism and recreation (including recreational and charter fishing, and commercial ferry services) in Nassau County accounted for 74.6 percent of the overall Ocean Economy GDP, compared to 87.8 percent in Brooklyn (NOAA 2018) (see Table I-17 Appendix I).

The "living resource" sector of the Ocean Economy, which includes commercial fishing, aquaculture, seafood processing, and seafood markets, includes 2.5 percent of the Ocean Economy jobs in Nassau, compared to 3.9 percent in Brooklyn.

**Albany County**

The population of Albany County increased by 6.9 percent from 2000 to 2020, which was similar to the population increase in New York State overall (6.5 percent). The age of the population of Albany County is comparable to New York State as a whole, with a median age of 38 compared to 39 in New York State overall.

In 2021, the annual unemployment rate for Albany County was relatively low at 4.4 percent (U.S. Bureau of Labor Statistics 2021a). In 2015–2019, the unemployment rate in Albany County (4.5 percent) was slightly lower than the rate for New York State overall (5.5 percent) (U.S. Census Bureau 2019a). The Albany County GDP totaled approximately $28.2 billion in GDP in 2020 (U.S. BEA 2021). Data on the economic value of the tourism and recreation sector for Albany County are not available from the National Ocean Economics Program for 2018 (likely because Albany is a watershed county, not a coastal county). Albany County has one of the largest percentages of seasonal housing units (1.3 percent) of the affected areas, compared to approximately 1 percent in Brooklyn and Nassau and 4 percent in New York State overall (U.S. Census Bureau 2019a).

A review of the industries that employ workers in Albany County (Table I-14 in Appendix I) reveals that Albany County has 7.0 percent of its jobs in the entertainment, recreation, accommodation, and food services sectors, which is the second lowest proportion of all the affected areas in New York State (with the lowest being in the City of Albany). In terms of other industries that may be affected, Albany County has a relatively modest proportion of retail trade jobs (8.2 percent) compared to 8.8 percent in Brooklyn, 12.0 percent in Nassau County, and 9.3 percent in New York State overall. In Albany County, 3.2 percent of jobs are in construction, which is the second lowest of any affected area in New York State (with the lowest again being the City of Albany) (U.S. Census Bureau 2019b). The sectors with the highest proportion of jobs include Public Administration (21.7 percent) and Health Care and Social Assistance (16.2 percent).

In Albany County, tourism and recreation data are not available from the National Ocean Economics Program for 2018. The Ocean Economy GDP is just 0.1 percent of the total county GDP (NOAA 2018). Marine Transportation is the only sector of the Ocean Economy for which employment data are available for Albany County in 2018 (594 employees) (NOAA 2018).

**City of Albany, Albany County**

The proposed port in Albany County is the Port of Albany in the City of Albany. The population of the City of Albany increased by 3.7 percent from 2000 to 2020, which was lower than in Albany County (6.9 percent) and New York State overall (6.5 percent). The median age of the population of the City of Albany (31 years) is lower than in any other affected area, likely due to the presence of colleges and universities. Correspondingly, the percentage of population aged 18–34 is higher in the City of Albany than in the other affected areas (37.9 percent) compared with 27.8 percent in Albany County and 24 percent in New York State overall.

In 2015–2019, the unemployment rate in the City of Albany was the highest (7.1 percent) of other affected areas (5.5 percent in New York State overall) (U.S. Census Bureau 2019a).

As in Albany County, the industries in the City of Albany with the largest proportion of jobs are Public Administration (37.9 percent) followed by Health Care and Social Assistance (19.3 percent).

The City of Albany has the lowest percentage of its jobs in the entertainment, recreation, accommodation, and food services sectors (4.3 percent) compared with the other affected areas, next to Albany County (7.0 percent). Correspondingly, the City of Albany also has the lowest percentages of seasonal homes (0.3 percent), aside from the Village of Island Park, which does not contain any seasonal homes.

### *Town of Hempstead, City of Long Beach, and Village of Island Park, Nassau County*

The affected municipalities within Nassau County include the Town of Hempstead, City of Long Beach, and Village of Island Park. Of these areas, the City of Long Beach has the most notable recreation and tourism economy, with 16.9 percent of its jobs in the entertainment, recreation, accommodation, and food services sectors (compared with 10.6 percent in the Town of Hempstead and 11.9 percent in Island Park). Long Beach also has the highest percentage of seasonal homes (approximately 6 percent) compared with any other affected area in New York State (including less than 1 percent in the Town of Hempstead and 0 percent in Island Park).

### *Nueces and San Patricio Counties, Texas*

#### Nueces County, Texas

In 2020, the population of Nueces County totaled 353,178 people, an increase of 12.6 percent from 2000. The age distribution of the population of Nueces County is comparable to that of San Patricio County, with the largest share of residents falling into the 35–64 age bracket and the median age being 36 years old.

In 2021, the annual unemployment rate in Nueces County (6.7 percent) was lower than in the neighboring San Patricio County (8.6 percent), but greater than the state average (5.7 percent) (U.S. Bureau of Labor Statistics 2021a, 2021b). In 2015–2019, the unemployment rate in Nueces County (5.7 percent) was similar to the rate for New York State overall (5.5 percent) and slightly higher than in neighboring San Patricio County (5.1 percent) (U.S. Census Bureau 2019a). In 2020, Nueces County had a GDP of approximately $18.9 billion (U.S. BEA 2021). In 2018, the National Ocean Economics Program totaled $1.5 billion in GDP across all ocean sectors in Nueces County. In 2018, Nueces County had 13,488 employees and $574.6 million in GDP resulting from tourism and recreation (National Ocean Economics Program 2018). Nueces County has the third largest percentage of seasonal housing units (3.2 percent) of the affected areas, next to San Patricio County (3.7 percent) (U.S. Census Bureau 2019a).

A review of the industries that employ workers in Nueces County (Table I-14 in Appendix I) reveals that the county has roughly 13 percent of its jobs in the entertainment, recreation, accommodation, and food services sectors. In terms of other industries that may be affected, Nueces County has a relatively modest proportion of retail trade jobs (9.8 percent). The other sectors with the highest proportion of jobs include Health Care and Social Assistance (20.8 percent) and Construction (11.1 percent) (U.S. Census Bureau 2019b).

In addition to the tourism and recreation sector, Nueces County employs individuals in offshore mineral extraction (2,453 employees) and marine transportation (558 employees). The Ocean Economy GDP is approximately 7.5 percent of the total GDP in Nueces County (NOAA 2018) (see Table I-17 in Appendix I).

**San Patricio County, Texas**

In 2020, the total population of San Patricio County was 68,755 individuals, a 6.1-percent increase from 2010, although the population experienced a slight decline between 2000 and 2010 (-3.5 percent). The age distribution of residents in San Patricio County is similar to that of Nueces County, with the largest share being aged 35–64. The median age of the county's population is 36 years.

As mentioned above, in 2021, the San Patricio County annual unemployment rate was relatively high, at 8.6 percent (U.S. Bureau of Labor Statistics 2021a). In 2015–2019, the unemployment rate in San Patricio County was 5.1 percent, which was the same as the rate for Texas overall, and just lower than the rate for New York State overall (5.5 percent) (U.S. Census Bureau 2019a). The GDP in San Patricio County was notably lower than in the neighboring Nueces County, with approximately $2.6 billion in 2020 compared to $18.9 billion (U.S. BEA 2021).

The Ocean Economy GDP totaled $588.6 million across all ocean sectors in San Patricio County. In 2018, San Patricio County employed 1,766 individuals in the tourism and recreation sector, which totaled $60.4 million in GDP (National Ocean Economics Program 2018). San Patricio County has the second largest percentage of seasonal housing units among affected areas for the proposed Projects (3.7 percent) (U.S. Census Bureau 2019a).

A review of the industries that employ workers in San Patricio County (Table I-14 in Appendix I) reveals that San Patricio County has 12.5 percent of its jobs in the entertainment, recreation, accommodation, and food services sectors compared to 12.8 percent in Nueces County. In terms of other industries that may be affected, San Patricio County has a relatively high proportion of retail trade jobs (10.6 percent compared to 9.8 percent in Nueces County), and 31.2 percent of jobs are in construction (compared to 11.1 percent in Nueces County) (U.S. Census Bureau 2019b).

In San Patricio County, tourism and recreation accounted for 10.3 percent of the overall Ocean Economy GDP, compared to 37.6 percent in Nueces County (NOAA 2018) (see Table I-17 in Appendix I). However, the Ocean Economy GDP makes up 24.7 percent of San Patricio County's total county GDP, the largest share of all affected areas (NOAA 2018) (see Table I-17 in Appendix I).

***Other Counties in Visual/Recreation and Tourism Affected Areas***

Recreation and tourism play a major role in New York's and New Jersey's environments and economies. Visitors from all over the world travel to the area to partake in a variety of onshore and marine recreational activities. Marine recreational activities include wildlife viewing tours, scuba diving, and recreational fishing and boating. Popular onshore recreational activities include beach going, surfing, golfing, and scenic viewing. In 2017, New York State reported that tourists directly spent $67.6 billion in the state, a record high for the state. In New Jersey, visitors directly spent over $45 million in the state (COP Volume 2e, Section 8.3; Empire 2022).

**New York, Queens, and Suffolk Counties, New York**

In 2020, the New York State GDP was approximately $1.42 trillion (U.S. BEA 2021). The New York County GDP totaled approximately $610.4 billion, compared to $82.3 billion in Queens and $84.8 billion in Suffolk County. In 2018, Manhattan had 9,621 establishments, 217,305 employees, $9,207.3 million in total wages, and $22.2 billion in GDP resulting from tourism and recreation—greater than in any other affected area in New York State (National Ocean Economics Program 2018). In 2018, in Suffolk County there were 2,741 establishments, 36,385 employees, $921.1 million in total wages, and $1.9 billion in GDP; and in Queens there were 1,299 establishments, 11,581 employees, $277.4 million in total wages, and $510.0 million in GDP resulting from tourism and recreation. In New York State overall, there were

22,270 establishments, 359,194 employees, $12.6 billion in total wages, and $29.0 billion in GDP resulting from tourism and recreation in 2018.

**Monmouth and Ocean Counties, New Jersey**

In 2020, the GDP for the State of New Jersey was approximately $535.8 billion (U.S. BEA 2021). In 2021, the annual New Jersey unemployment rate was approximately 6.3 percent, which was higher than that of Monmouth (4.9 percent) and Ocean (5.3 percent) Counties (U.S. Bureau of Labor Statistics 2021a, 2021b). The Monmouth County GDP in 2020 was approximately $32.0 billion compared to $19.0 billion in Ocean County (U.S. BEA 2021).

As discussed above, recreation and tourism plays a major role in New Jersey's economy. New Jersey overall had 7,949 establishments, 96,261 employees, $2.2 billion in total wages, and $4.3 billion in GDP resulting from tourism and recreation in 2018. Within New Jersey, Monmouth County has a stronger tourism and recreation economy compared with Ocean County (see Table I-21 in Appendix I). In 2018, Monmouth County had 1,324 establishments, 17,767 employees, $369.0 million in total wages, and $704.7 million in GDP resulting from tourism and recreation, compared with 1,155 establishments, 14,049 employees, $288.2 million in total wages, and $569.5 million in GDP in Ocean County.

***Trends under the No Action Alternative***

Over the Projects' proposed lifetime, BOEM does not anticipate major changes to the distribution of economic sectors in the geographic analysis area. The affected counties would continue to rely economically on coastal tourism and recreation. The geographic analysis area may experience substantial increased economic activity associated with offshore wind activities, as discussed in the next section.

## 3.11.2 Impact Level Definitions for Demographics, Employment, and Economics

Definitions of impact levels are provided in Table 3.11-1.

**Table 3.11-1 Impact Level Definitions for Demographics, Employment, and Economics**

| Impact Level | Impact Type | Definition |
|---|---|---|
| Negligible | Adverse | No impacts would occur, or impacts would be so small as to be unmeasurable. |
| | Beneficial | Either no effect or no measurable benefit. |
| Minor | Adverse | Impacts would not disrupt the normal or routine functions of the affected activity or geographic place. |
| | Beneficial | Small but measurable benefit on demographics, employment, or economic activity. |
| Moderate | Adverse | The affected activity or geographic place would have to adjust somewhat to account for disruptions due to impacts of the Projects. |
| | Beneficial | Notable and measurable benefit on demographics, employment, or economic activity. |
| Major | Adverse | The affected activity or geographic place would experience disruptions to a degree beyond what is normally acceptable. |
| | Beneficial | Large local or notable regional benefit to the economy as a whole. |

## 3.11.3 Impacts of the No Action Alternative on Demographics, Employment, and Economics

When analyzing the impacts of the No Action Alternative on demographics, employment, and economics, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on the baseline conditions for demographics, employment, and economics. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with the other planned non-offshore wind and offshore wind activities as described in Appendix F, *Planned Activities Scenario*.

### 3.11.3.1. Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for demographics, employment, and economics described in Section 3.11.1, *Description of the Affected Environment for Demographics, Employment, and Economics*, would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind activities within the geographic analysis area that contribute to impacts on demographics, employment, and economics include growth in onshore development; ongoing installation or upgrades of piers, bridges, pilings, and seawalls or submarine cables and pipelines; ongoing commercial shipping; continued port upgrades and maintenance; and ongoing effects from climate change (e.g., damage to property and coastal infrastructure) (see Section F.2 in Appendix F for a complete description of ongoing activities). These ongoing activities contribute to numerous IPFs including energy generation/security, which has implications for employment and state and regional energy markets; noise, which can affect residential and other sensitive populations; port utilization, which can affect jobs, populations, and economies; marine traffic, which can affect commercial fishing/shipping and recreation and tourism economies; land disturbance/onshore construction, which supports local population growth, employment, and economies; and climate change, which has adverse implications for demographics and economic health of coastal communities, due in part to the costs of resultant damage to property and infrastructure, fisheries and other natural resources, increased disease frequency, and sedimentation, among other factors. See Table F1-9 for a summary of potential impacts associated with ongoing non-offshore wind activities by IPF for demographics, employment, and economics.

There are no ongoing offshore wind activities within the geographic analysis area for demographics, employment, and economics.

### 3.11.3.2. Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impact of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Offshore wind could become a new industry for the Atlantic states and the nation. Several recent reports provide national estimates of employment and economic activity. These studies acknowledge that offshore wind component manufacturing and installation capacity exists primarily outside the United States; however, domestic capacity is anticipated to increase. This EIS uses available data, analysis, and projections to make reasoned conclusions on potential economic and employment impacts within the geographic analysis area. The EIS provides no analysis or conclusions about impacts outside the geographic analysis area (i.e., regional, national, or worldwide).

The BVG (2017) study estimated that during the initial implementation of offshore wind projects along the U.S. northeast coast, a base level of 35 percent of jobs, with a high probability of up to 55 percent of jobs, would be sourced from within the United States. The proportion of jobs filled within the United

States would increase as the offshore wind energy industry grows, due to growth of a supply chain and supporting industries along the East Coast, as well as a growing number of local O&M jobs for established wind facilities. By 2030 and continuing through 2056, approximately 65 to 75 percent of jobs associated with offshore wind are projected to be within the United States. Overseas manufacturers of components and specialized ships based overseas that are contracted for installation of foundations and WTGs would fill jobs outside of the United States (BVG 2017). As an example of the mix of local, national, and foreign job creation, for the five-turbine Block Island Wind Farm, turbine blade manufacturing occurred in Denmark, generator and nacelle manufacturing occurred in France, tower component manufacturing occurred in Spain, and foundation manufacturing occurred in Louisiana (Gould and Cresswell 2017).

The American Wind Energy Association (AWEA) estimates that the offshore wind industry will invest $80 to $106 billion in U.S. offshore wind development by 2030, including $28 to $57 billion invested within the United States, depending on installation levels and supply chain growth (other investment would occur in countries manufacturing or assembling wind energy components for U.S.-based projects) (AWEA 2020). Economic and employment impacts would occur nationwide, but would be most concentrated in Atlantic coastal states that host offshore wind development. The AWEA report lists over $1.3 billion in announced domestic investments in wind energy manufacturing facilities, ports, and vessel construction in Atlantic states (AWEA 2020). The AWEA report analyzes a base scenario and a high scenario for offshore wind direct impacts, turbine and supply chain impacts, and induced impacts. The base scenario assumes 20 GW of offshore wind power by 2030 and domestic content increasing to 30 percent in 2025 and 50 percent in 2030. The high scenario assumes 30 GW of offshore wind power by 2030 and domestic content increasing to 40 percent in 2025 and 60 percent in 2030. Under the base scenario, offshore wind energy development would support $14.2 billion in economic output and $7 billion in value added by 2030. Under the high scenario, offshore wind energy development would support $25.4 billion in economic output and $12.5 billion in value added by 2030. The AWEA analysis does not specify where supply chain growth would occur in the U.S.

The AWEA estimates are consistent with the University of Delaware (2019) projections, which estimate that deployment of 18.6 GW of planned and contracted offshore wind energy projects through 2030 would require capital expenditures of $68.2 billion over the next 10 years (University of Delaware 2019). The study notes that, while the offshore wind supply chain is global and the expenditures would be directed to both domestic and foreign sources, a growing number of U.S. suppliers are preparing to enter the industry. Compared to the $14.2 to $25.4 billion in offshore wind economic output (AWEA 2020), the 2019 annual GDP for states with offshore wind projects (Connecticut, Massachusetts, Rhode Island, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina) ranged from $63.5 billion in Rhode Island to $1.73 trillion in New York (U.S. BEA 2020), and totaled nearly $5.0 trillion. The $14.2 to $25.4 billion in offshore wind industry output would represent 0.3 to 0.5 percent of the combined GDP of these states.

The AWEA study estimates offshore wind would support 45,500 (base scenario) to 82,500 (high scenario) jobs—full-time equivalent (FTE) jobs at a given point in time—in the year 2030 nationwide, including direct, supply chain, and induced jobs. Most offshore wind jobs are created during the temporary construction phase. About 60 percent of jobs would be short term (development and construction) and 40 percent would be long term (O&M). A 2020 study commissioned by the Responsible Offshore Development Alliance estimated that offshore wind projects through 2030 would generate 55,989 to 86,138 job-years (an FTE job lasting 1 year) for construction and 5,003 to 6,994 long-term jobs for O&M (Georgetown Economic Services 2020). These estimates are generally consistent with the AWEA study in total jobs supported, although the Georgetown Economic Services study concludes that a greater proportion of jobs would be in the construction phase. As with the AWEA estimates of economic output, the Responsible Offshore Development Alliance study assumed that offshore wind

energy jobs would be focused in states hosting offshore wind projects, but would also be generated in other states where manufacturing and other supply chain activities occur.

In 2019, employment in New York and New Jersey combined was 13.6 million (U.S. Census Bureau 2019b). Because projected offshore wind jobs could be anywhere in the United States, the extent of impacts on the geographic analysis area cannot be clearly foreseen; however, a substantial portion of the workforce for planned New York and New Jersey offshore wind projects would likely be drawn from, or would relocate to, areas within commuting distance of ports that would be used for offshore wind staging, construction, and operations.

Some local economic activity has already begun in preparation for the anticipated offshore wind industry. For example, New York is one of several states working together with industry to develop a regional offshore wind training infrastructure to support a growing U.S. offshore wind industry. The establishment of a New York State Advisory Council on Offshore Wind Economics and Workforce Development as well as public investments will support the development of an offshore wind workforce. In 2020, the $20 million New York State Offshore Wind Training Institute was launched through State University of New York's Farmingdale State College and Stony Brook University campuses. These academic centers on Long Island are developing a plan for deploying the public funds and have issued the first solicitation for $3 million to support organizations focusing on early training and skills development for disadvantaged communities. The developers of New York's Sunrise Wind project have invested $10 million in a National Offshore Wind Training Center at Suffolk County Community College on Long Island. The training center will train and certify workers through the nation's first Global Wind Organization Training Center for offshore wind, also on Long Island. In addition, the Center of Excellence for Offshore Energy at State University of New York's Maritime College was launched with a grant from New York State; the center is working to develop classroom and online training programs (NYSERDA 2021).

In addition to the regional economic impact of a growing offshore wind industry, BOEM expects planned offshore wind activities to affect demographics, employment, and economics through the following primary IPFs.

**Energy generation/security:** Once built, over the long term, planned offshore wind could produce energy at long-term fixed costs. These projects could provide reliable prices once built compared to the volatility of fossil fuel prices. Offshore wind could significantly increase the proportion of energy from renewable sources not subject to fossil fuel costs, with a potential for 9,000 MW of power (30.7 trillion British thermal units, compared to 933.1 trillion British thermal units currently provided by all power generation sources in New York) from offshore wind development for New York (U.S. Energy Information Administration 2019). The economic impacts of offshore wind activities (including associated energy storage and capacity projects) on energy generation and energy security could be long term, minor, and beneficial.

**Lighting:** The aviation warning lighting required for offshore WTGs would be visible from some beaches and coastlines and could have effects on economic activity in certain locations; for example, if the lighting influences visitors and residents in selecting coastal locations to visit or reside in, respectively. At night, required aviation obstruction lighting on the WTGs would consist of red lights on the nacelle flashing 30 times per minute, as well as mid-tower red lights flashing at the same frequency. No readily available studies characterize the impacts of nighttime offshore lighting on economic activity. Studies cited in Section 3.18, *Recreation and Tourism*, suggest that WTGs visible from more than 15 miles (24.1 kilometers) away would have negligible effects on businesses dependent on recreation and tourism activity. The vast majority of the WTG positions envisioned offshore of the geographic analysis area would be more than 15 miles (24.1 kilometers) from coastal locations with views of the WTGs, so impacts are anticipated to be negligible. As a result, lighting on WTGs would have a continuous, long-

term negligible impact on demographics, employment, and economics, due to the distant and variable views of nighttime lighting from coastal businesses.

ADLS is an emerging technology that, if implemented, would only activate aviation warning lighting on WTGs when aircraft enter a predefined airspace. Depending on exact location and layout, ADLS would likely result in similar limits on the frequency of WTG aviation warning lighting use on offshore wind facilities. Implementation of ADLS could thus reduce the amount of time that WTG lighting is visible, thereby making WTG lighting visible only sporadically, rather than continuously, at night. This would reduce the time when WTG lighting is visible.

Nighttime construction and maintenance of offshore wind projects would require lighting for vessels in transit and at offshore construction work areas. Concurrent construction of planned offshore wind projects in the New York and New Jersey region between 2023 and 2030 (Appendix F, Table F2-1) would all potentially contribute to nighttime vessel lights. Vessel lighting would enable commercial shipping and commercial fishing operations to safely navigate around the vessels and work areas and would be visible from coastal locations, primarily while the vessels are in transit. Vessel lighting is not anticipated to affect the volume of business at visitor-oriented businesses or other businesses. Vessel lighting would be visible from coastal businesses, especially near the ports used to support offshore wind construction, but would be anticipated to have negligible impacts on demographics, employment, and economics.

**Noise:** Noise from G&G survey activities, O&M, pile driving, trenching, and vessels could result in temporary impacts on employment and economics via the impacts on marine businesses, including commercial fishing, for-hire recreational fishing, and recreational sightseeing, among others. Noise (especially from G&G surveys and pile driving) would also affect fish populations, with effects on commercial and for-hire fishing (see Section 3.9, *Commercial Fisheries and For-Hire Recreational Fishing*).

Population-level impacts on marine mammals would have impacts on employment and economic activity as a result of the impact on marine sightseeing businesses, such as whale watching tours, that benefit from the visible presence of marine mammals in the waters offshore from the geographic analysis area. As stated in Section 3.15, *Marine Mammals*, noise impacts associated with future offshore wind development could contribute to impacts on individual marine mammals. If construction activities from multiple projects occur in close spatial and temporal proximity, population-level impacts are possible; however, as noted in Section 3.15, BMPs can minimize exposure of individual mammals to harmful impacts and avoid population-level effects.

Offshore wind-related construction noise from pile driving, cable laying and trenching, and vessels are anticipated to have an impact on tour boat and for-hire fishing businesses, potentially making the affected areas temporarily unattractive for visitor-oriented businesses. Impacts would be localized and temporary.

Overall, offshore wind–generated noise could result in visitor-oriented services avoiding areas of noise and impacts on marine life important for fishing and sightseeing. Section 3.9 provides detail on potential economic impacts on commercial and for-hire fishing businesses. Both types of impacts would be localized and short term, occurring during surveying and construction, with no noticeable impacts during operations and only periodic, short-term impacts during maintenance. Noise impacts during surveys and construction would be more widespread when multiple offshore wind projects are under construction at the same time in the marine area off the coast of the geographic analysis area. As indicated in Appendix F, Table F2-1, the New York and New Jersey Lease Areas could have 1,205 WTGs installed between 2023 and 2030.

Onshore construction noise could temporarily inconvenience visitors, workers, and residents, possibly resulting in a short-term reduction of economic activity for businesses near installation sites for onshore

cables, substations, or port improvements. Because the location of onshore improvements is not known and cannot be determined until specific projects are proposed, the magnitude of noise associated with onshore construction and the number of businesses and homes affected cannot be determined. Impacts on demographics, employment, and economics from noise would be intermittent, short term, and negligible, similar to those of other onshore utility construction activity.

**Port utilization:** Planned offshore wind development would support use and expansion of ports and supporting industries in New York and New Jersey, including the ports indicated as possibly supporting construction of the proposed Projects. The major ports in the United States are seeing increased vessel visits, as vessel size also increases. Ports are also going through continual upgrades and maintenance. The New Jersey Wind Port is being developed and the Port of Paulsboro and SBMT are being upgraded specifically to support the construction of offshore wind energy facilities.

Port utilization would require a trained workforce for the offshore wind industry including additional shore-based and marine workers that would contribute to beneficial local and regional economic activity. Where existing ports are improved and channels are dredged for use in support of offshore wind, the improvements would also be beneficial to other port activity. Port utilization in the geographic analysis area associated with offshore wind would occur primarily during development and construction of projects offshore of New York and New Jersey, which are anticipated to occur primarily between 2023 and 2030. Ongoing maintenance and operational support would sustain port activity and employment at a lower level once construction is complete.

The port investment and usage generated by offshore wind would have long-term, beneficial impacts on employment and economic activity by providing employment opportunities and supporting marine service industries such as marine construction, ship construction and servicing, and related manufacturing. The most intensive beneficial impacts would occur during construction of offshore wind projects near the geographic analysis area between 2023 and 2030. The beneficial impact of offshore wind O&M services and improved port facilities would provide sustained, long-term employment and economic activity.

Offshore wind activities and associated port investment and usage would have long-term, moderate beneficial impacts on employment and economic activity by providing employment and industries such as marine construction, ship construction and servicing, and related manufacturing. If offshore wind construction results in competition for scarce berthing space and port service, port usage could potentially have short- to medium-term adverse impacts on commercial shipping (see Section 3.9).

**Presence of structures:** The structures required for planned offshore wind, including the 1,205 WTGs planned offshore New York and New Jersey (Appendix F, Table F2-1), could affect marine-based businesses. Commercial fishing operators, marine recreational businesses, and shore-based supporting services (such as seafood processing) could experience both short-term impacts during construction and long-term impacts from the presence of structures (see Section 3.9).

Although the likelihood of recreational vessels visiting offshore foundations would vary based on relative proximity to shore, increasing offshore wind development could change recreational fishing patterns within the larger socioeconomic geographic analysis area, as the tourist industry learns to make use of the structures. Businesses that would benefit from fish aggregation and reef effects—such as those that cater to highly migratory species and offshore fishing recreationists—may grow. The attraction of anglers to offshore wind structures is not anticipated to result in a volume of new recreational fishing large enough to replace or displace commercial fishing businesses by recreational fishing businesses.

In summary, as a result of fish aggregation and reef effects associated with the presence of offshore wind structures, there would be long-term impacts on commercial fishing operations and support businesses

such as seafood processing. The fishing industry is expected to be able to adapt its fishing practices over time in response to these changes. These effects could simultaneously provide new business opportunities such as fishing and tourism—and the possibility of tours for visitors interested in a close-up view of the wind structures, as has occurred for the Block Island Wind Farm.

The views of offshore WTGs could have impacts on certain businesses serving the recreation and tourism industry. Impacts could be adverse for particular locations if visitors and customers avoid certain businesses (i.e., hotels or rental dwellings) due to views of the WTGs; impacts could be neutral or beneficial if views do not affect visitor decisions or influence some visitors beneficially. As presented in Section 3.10.5.2, up to 111 WTGs associated with planned offshore wind projects would be visible from beaches and coastal areas in the geographic analysis area for recreation and tourism.

A joint research study of the University of Connecticut and Lawrence Berkeley National Laboratory found no net effects from WTGs on property values (Atkinson-Palombo and Hoen 2014). The study examined impacts of 41 onshore WTGs 0.25 to 1 mile (0.4 to 1.6 kilometers) from residences. The study noted weak evidence linking the announcement of new WTGs to adverse impacts on home prices, and found that those effects were no longer apparent after the start of WTG operations. The effects of offshore wind structures would be different from those in the report data in that offshore WTGs would be much larger than the onshore WTGs, but much farther from residences, and would appear small on the horizon.

Overall, the presence of offshore wind structures would have continuous, long-term negligible impacts on demographics, employment, and economics. As discussed above, the commercial fishing industry is anticipated to be able to adjust to changes in fishing practices to maintain the viability of the industry in the presence of offshore wind structures. The presence of structures could also result in beneficial impacts for the recreational fishing and tourism industries.

**Traffic:** Offshore wind construction and decommissioning and, to a lesser extent, offshore wind operations would generate increased vessel and highway traffic. This additional traffic would support increased employment and economic activity for marine transportation and supporting businesses, investment in the ports proposed for the Projects, and investment in other ports outside of the geographic analysis area. Increased vessel traffic would have continuous, beneficial impacts during all Project phases, with moderate impacts during construction and decommissioning.

Impacts of short-term increased vessel traffic during construction could include increased vessel traffic congestion, delays at ports, and a risk for collisions between vessels. As stated in Section 3.9, planned offshore wind projects would result in a small, incremental increase in vessel traffic, with a short-term peak during construction. Increased vessel traffic would be localized near affected ports and offshore construction areas. Congestion and delays could increase fuel costs (i.e., for vessels forced to wait for port traffic to pass), and could decrease productivity for commercial shipping, fishing, and recreational vessel businesses, whose income depends on the ability to spend time out of port. Collisions could lead to vessel damage and spills, which could have direct costs (i.e., vessel repairs and spill cleanup) as well as indirect costs from damage caused by spills.

The magnitude of increased vessel traffic is described in more detail in Section 3.16, *Navigation and Vessel Traffic*, and would depend upon the vessel traffic volumes generated by each offshore wind project, the extent of concurrent or sequential construction of wind energy projects, and the ports selected for each project. Increased vessel and highway traffic congestion and collision risk are anticipated to have negligible impacts on demographics, employment, and economics during all project phases due to the implementation of environmental protection measures.

**Land disturbance:** Offshore wind development would require onshore cable installation, substation construction or expansion, and possibly expansion of shore-based port facilities. Depending on siting,

land disturbance could result in localized, temporary disturbances of businesses near cable routes and construction sites for substations and other electrical infrastructure, due to typical construction impacts such as increased noise, traffic, and road disturbances.

These impacts would be similar in character and duration to other common construction projects, such as utility installations, road repairs, and industrial site construction. Impacts on employment would be localized, temporary, and beneficial (jobs and revenues to local businesses that participate in onshore construction), although there could be potential for adverse effects as well (lost revenue due to construction disturbances).

### 3.11.3.3. Conclusions

**Impacts of the No Action Alternative.** Under the No Action Alternative, the geographic analysis area would continue to be influenced by regional demographic and economic trends. Ongoing activities would continue to sustain and support growth of the geographic analysis area's diverse economy, based on anticipated population growth and ongoing development of businesses and industry. Tourism and recreation would continue to be important to the economies of the coastal areas. Marine industries such as commercial fishing and shipping would continue to be active and important components of the regional economy. Counties in the geographic analysis area would continue to seek to diversify their economies, protect environmental resources, and maintain or increase their year-round population.

BOEM anticipates that ongoing activities related to continued commercial shipping and commercial fishing; ongoing port maintenance and upgrades; periodic channel dredging; maintenance of piers, pilings, seawalls, and buoys; and the use of small-scale, onshore renewable energy would have **negligible** to **minor adverse** impacts and **minor beneficial** impacts on demographics, employment, and economics, driven primarily by the continued operation of existing marine industries, especially commercial fishing, recreation and tourism, and shipping; increased pressure for environmental protection of coastal resources; the need for port maintenance and upgrades; and the risks of storm damage and sea level rise.

**Cumulative Impacts of the No Action Alternative.** BOEM recognizes that while many of the jobs generated by offshore wind projects are temporary construction jobs, the combination of these jobs over multiple projects would create notable benefits during the construction phases of these projects. This would particularly be the case as the domestic supply chain for offshore wind evolves over time. Offshore wind projects also support long-term O&M jobs; long-term tax revenues; long-term economic benefits of improved ports and associated industrial land areas; diversification of marine industries, especially in areas currently dominated by recreation and tourism; and growth in a skilled marine construction workforce.

Regional offshore wind development is anticipated to generate increased investment within the geographic analysis area in ports, shipping and logistics capability (both land and marine), component laydown and assembly facilities, job training, and other services and infrastructure necessary for offshore wind construction and operations. If U.S. supply chains develop as anticipated, additional manufacturing and servicing businesses would result, either in the geographic analysis area or at other locations in the United States. While it is not possible to estimate the extent of job growth and economic output within the geographic analysis area specifically, planned offshore wind activities would result in notable and measurable benefits to employment, economic output, infrastructure improvements, and community services, especially job training, that occur as a result of offshore wind development.

Accordingly, based on the impact definitions in Table 3.11-1 in Section 3.11.2, BOEM anticipates that planned offshore wind activities in the geographic analysis area, combined with ongoing and planned activities other than offshore wind, would result in cumulative **moderate beneficial** impacts.

In addition to the beneficial economic activity from regional offshore wind development, BOEM anticipates **negligible** to **minor adverse** cumulative impacts on demographics, employment, and economics. Planned offshore wind activities are expected to affect commercial and for-hire fishing businesses and marine recreational businesses (tour boats, marine suppliers) primarily through noise and vessel traffic during construction and the presence of offshore structures during operations. These IPFs would temporarily disturb fish and marine mammal species and displace commercial or for-hire fishing vessels, potentially resulting in conflicts over other fishing grounds, increased operating costs, and lower revenue for marine industries and supporting businesses. The long-term presence of offshore wind structures would also affect these marine industries due primarily to increased navigational constraints and risks as well as potential gear damage and loss. However, temporary disturbances such as from noise and traffic would not be expected to result in measurable adverse impacts on population, employment, or economics. It is expected that temporary adverse effects would be minimized and would not disrupt community cohesion or the economies of the affected areas. The long-term presence of structures is not expected to have adverse impacts on the economy overall; rather, employment impacts would be beneficial and there could be beneficial impacts on the commercial fishing and recreation and tourism economies as well, as discussed above.

### 3.11.4 Relevant Design Parameters & Potential Variances in Impacts of the Action Alternatives

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The following design parameters for the proposed Projects (Appendix E) would influence the magnitude of the impacts on demographic, employment, or economic characteristics:

- Overall size of the Projects (the 816-MW EW 1 Project and 1,260-MW EW 2 Project in Lease Area OCS-A 0512) and number of WTGs;
- The extent to which Empire hires local residents and obtains supplies and services from local vendors;
- The onshore export cable routes, including routing variants, and extent of ground disturbance for new onshore substations;
- The time of year during which construction occurs;
- The port(s) selected to support construction, installation, and decommissioning;
- The port(s) selected to support O&M; and
- The design parameters that could affect commercial fishing and recreation and tourism because impacts on these activities affect employment and economic activity.

Variability of the proposed Project design exists as outlined in Appendix E. Below is a summary of potential variances in impacts:

- WTG number, size, and location: The level of impact related to WTGs is proportional to the number of WTGs installed; more WTGs would present greater economic benefits.
- Onshore export cable routes and substation footprints: The route chosen (including variants within the general route) and substation footprints would determine the communities that may be affected by construction activities.
- Beneficial impacts on employment and the economy in the geographic analysis area would be highly dependent on the percentage of workers, materials, equipment, vessels, and services that can be locally sourced.

- Season of construction: Construction outside of the recreation and tourism season would have a lesser impact on the recreation and tourism economy than construction during the active season.

### 3.11.5 Impacts of the Proposed Action on Demographics, Employment, and Economics

Effects on demographics, employment, and economics from the Proposed Action would include population changes due to workforce needs associated with the Proposed Action; housing needs for Proposed Action workforce; job creation; tax revenues, payroll, and other Proposed Action expenditures; and other funds provided by Empire in connection with the Proposed Action. Other effects include economic activity generated within the geographic analysis area through spending by employees or vendors; payment of personal income taxes by the Empire workforce; and spending by governments, based upon income received from Empire in connection with the Proposed Action.

Economic effects may occur in the recreation, tourism, and commercial fishing sectors, as discussed below in the analysis of individual IPFs. Impacts on commercial fisheries may in turn affect the economic health of the communities as well as the cultural identity and values—and therefore the well-being—of individuals and communities that identify as "fishing" communities. Impacts on recreation and tourism could affect the economic health of businesses and individuals that serve tourists and seasonal residents.

The Proposed Action could have a broader economic impact than indicated by its payroll and expenditures due to its position as one of the nation's first large-scale offshore wind energy projects. The approval of the Proposed Action would encourage and support continued investment in other offshore wind projects and the creation of a domestic supply chain for the offshore wind industry in the eastern United States.

Regarding demographics, jobs and economic activity, the Proposed Action's beneficial impacts on employment and the economy in the geographic analysis area would be highly dependent on assumptions regarding the percentage of workers, materials, equipment, vessels, and services that can be locally sourced.

In the COP (Appendix O; Empire 2022), Empire provides estimates of expected local economic and employment benefits of the two phases of development proposed by Empire for Lease Area OCS-A 0512. Empire's economic impact study estimates that the Proposed Action would directly support the following employment in New York State alone.

The Proposed Action is expected to support over 6,300 total job-years during the construction phase and 302 annual jobs (133 direct jobs and 169 indirect/induced jobs) during the operations phase (Tables I-23 and I-25 in Appendix I; COP Appendix O; Empire 2022). In addition to the estimated job impacts, Empire is also investing in various community development and workforce training and readiness funds in New York State. Empire estimates that the aggregate value for these funds could be between $25 million and $30 million for both EW 1 and EW 2 over the entire lifetime of the two facilities. The actual annual contributions of these funds would be relatively small, at less than a $1 million per year, and are likely to support an additional 10 to 15 jobs annually in New York State for the entire 30+ years of operation. The socioeconomic impacts of these contributions are likely to be far greater than the jobs they would support in the region. These funds would provide vital resources in supporting workforce training and readiness and help support efforts for just transition of the workforce. These investments would also help further the development of the offshore wind industry in New York State.

Tables I-23, I-24, and I-25 in Appendix I summarize the estimates of construction-phase economic activity, tax revenues (state and local and federal), and O&M-phase economic activity, respectively, generated by the Proposed Action within New York State.

A study from the New York Workforce Development Institute provided estimates of salaries for jobs in the wind energy industry that concur with Empire's projections. Anticipated salaries range from $43,000 to $96,000 for trade workers and technicians, $65,000 to $73,000 for ships' crew and officers, and $64,000 to $150,000 for managers and engineers (Gould and Cresswell 2017).

The Proposed Action would have long-term, minor beneficial impacts on employment and economic activity in the geographic analysis area, based upon anticipated short-term and modest long-term job creation, expenditures on local businesses, generation of tax revenues, and provision of grant funds. The Proposed Action would have negligible adverse impacts on demographics and housing within the geographic analysis area. As noted in Section 3.11.3.3, the growth of the overall offshore wind industry is anticipated to result in moderate beneficial impacts on employment and economics in the geographic analysis area. The Proposed Action would be part, but would not change the magnitude, of the impact.

Impacts from the Proposed Action resulting from the IPFs identified below would include beneficial, long-term impacts from increases in employment, port utilization and expansion, and vessel traffic and negligible impacts from short-term increases in noise during construction, land disturbance, and the long-term presence of offshore lighting and structures. The Proposed Action would contribute to impacts through all the IPFs. The most impactful beneficial IPFs would be increased port utilization and vessel traffic, while the most impactful adverse IPFs would be the long-term presence of offshore structures, which would affect businesses accustomed to navigating in the Lease Area. However, the Proposed Action would result in negligible incremental adverse impacts and the long-term presence of offshore structures could also have beneficial effects as a result of increased eco-tourism (e.g., people paying to charter a boat to see the wind farm, fish on the structure).

**Energy generation/security:** The Proposed Action would produce over 2,000 MW of electricity and a stable source of renewable energy, contributing to energy security and resiliency for the geographic analysis area. The Proposed Action would have long-term, localized, minor beneficial impacts on demographics, employment, and economics from energy generation/security.

**Lighting:** Lighting for vessels in transit and in the offshore work area would occur when Project construction or maintenance takes place during early-morning, dusk, or nighttime hours. Short-term vessel lighting is not anticipated to discourage tourist-related business activities and would not affect other businesses. Therefore, lighting from the Proposed Action would have short-term, negligible impacts. Vessel lighting from other offshore wind projects would have similar impacts as those of the Proposed Action, but at different locations and times. If lighting from Proposed Action vessels occurred simultaneously, the impacts of this lighting on demographics, employment, and economics would also be short term and negligible. The permanent aviation safety lighting required for the Proposed Action's WTGs could be visible from beaches and coastal locations (i.e., City of Long Beach, Monmouth County, and Ocean County), possibly affecting employment and economics in these areas if the lighting discourages visits or vacation home rentals or purchases in coastal locations where the Proposed Action's WTG lighting is visible. Lighting from all the Proposed Action's WTGs could theoretically be visible from onshore locations. All WTGs would require mid-level lighting at the halfway point between the top of the nacelle and ground level and WTGs more than 699 feet (213 meters) above ground level would require two additional flashing red lights on the back of the nacelle (Section 2.1.2.1.2). ADLS would activate the Proposed Action's WTG lighting when aircraft approach the structure, which is expected to occur less than 0.1 percent of annual nighttime hours. Even without ADLS, the presence of aviation safety lighting on the WTGs for the Proposed Action is anticipated to have a long-term, negligible impact on demographics, employment, and economics in the geographic analysis area. Use of ADLS would reduce the already negligible impact..

**Noise:** The contribution of the Proposed Action to noise from survey activities, O&M, pile driving, trenching, and vessels would affect certain marine business activities associated with commercial and for-

hire fishing, marine sightseeing, and recreational boating. As a result, the Proposed Action would have intermittent, short-term, negligible noise impacts on visitors, workers, and residents. As Project activities are expected to occur in developed areas and with the proposed APMs, the Proposed Action would have negligible impacts on demographics, employment, and economics as a result of noise.

**Port utilization:** The Proposed Action would diversify jobs and revenues in the geographic analysis area's Ocean Economy sector. In particular, the Proposed Action would enlarge and require new skills within the marine construction sector. These jobs within the Ocean Economy sector would be concentrated in Kings and Albany Counties, the locations of the proposed ports. SBMT in Kings County would be redeveloped to support the offshore wind industry as described in Section 2.1.2.4. There would be approximately 85 employees at SBMT during operations to support storage, staging, pre-assembly, and the transfer of WTG components. The offshore wind tower manufacturing facility would be developed at the Port of Albany, in Albany County. This facility would create up to 350 direct jobs in the region (Equinor 2020).

The Proposed Action could temporarily compete with the commercial fishing industry for marine workers and services during construction, potentially increasing labor and service costs and encouraging vessel owners to use services in ports not supporting offshore wind development (see Section 3.9).

Employment and economic benefits of the Proposed Action at SBMT and Port of Albany would have long-term, minor beneficial impacts. Some of the new employment may be supported by the existing workforce and would not be expected to exacerbate housing conditions in the geographic analysis area (see Appendix I). The Proposed Action would have a moderate beneficial impact on demographics, employment, and economics from port utilization due to greater economic activity and increased employment at ports used by the Proposed Action.

**Presence of structures:** Views of the offshore structures (i.e., WTGs and OSS) would be limited primarily to coastal areas of New York and New Jersey that have views of the Atlantic Ocean (i.e., Kings County, City of Long Beach, Nassau County, Suffolk County, and Monmouth County). Views of WTGs could have impacts on businesses serving the recreation and tourism industry. Considering the distance from shore and limited visibility of the offshore structures from residences, coastlines, and businesses, operation of the Proposed Action would have negligible adverse impacts on economics due to property value impacts and viewshed impacts on recreational and tourist businesses.

**Traffic:** The Proposed Action would generate vessel and highway traffic during construction, O&M, and decommissioning. Increased vessel traffic would increase the use of port and marine businesses, including tug services, dockage, fueling, inspection/repairs, and provisioning. The vessel traffic generated by the Proposed Action would result in increased business for marine transportation and supporting services in the geographic analysis area with continuous, short-term, and minor beneficial impacts during construction and decommissioning, and negligible beneficial impacts during operations.

Vessel traffic associated with the Proposed Action could also result in temporary, periodic congestion within and near ports. While there would be potential delays from increased congestion and increased risk of damage from collisions, the Proposed Action would have negligible impacts on demographics, employment, and the economy from traffic during all Project phases. Empire would implement measures to avoid, minimize, and mitigate impacts associated with vessel traffic, including rolling construction zones (APM 212), strategic timing of construction activities (APM 213), implementation of safety zones around relevant structures and vessels in a dynamic approach (APM 221), installation of AIS on all Project vessels (APM 222), use of the surrounding TSS by Project vessels (APM 223), vessel speed restrictions, and collision avoidance measures. Any potential short-term increases in onshore traffic would be mitigated through the use of APMs and would not be expected to result in measurable adverse impacts on demographics, employment, or economics.

**Land disturbance:** Construction of the Proposed Action would require onshore cable installation and substation construction on Long Island (Kings and Nassau Counties). The Proposed Action would result in localized, short-term negligible impacts as a result of disturbance of businesses near the onshore cable route and substation construction site. The Projects were sited, planned, and designed to avoid and minimize typical construction impacts such as increased noise, traffic, and road disturbances. These impacts would be similar in character and duration to those of other common construction projects, such as utility installations, road repairs, and industrial site construction. With implementation of proposed APMs (Appendix H, Table H-3), there would not be a measurable adverse impact on demographics, employment, and economics from land disturbance. Impacts on employment would be beneficial.

#### 3.11.5.1. Impact of the Connected Action

The connected action would affect demographics, employment, and economics in the geographic analysis area through the following IPFs: noise, port utilization, presence of structures, traffic, and land disturbance. The purpose of the connected action is to upgrade SBMT to enable it to serve as a staging facility and O&M facility for the offshore wind industry. The connected action includes the construction of an approximately 57,000 square-foot O&M facility containing approximately 22,000 square feet of office and support space, and approximately 35,000 square feet of warehouse facilities and associated utility space with a maximum height of 32.8 feet from grade. The outside areas around the buildings would be landscaped and include associated parking. During operations, SBMT is expected to support approximately 85 employees, with roughly 80 percent being in the professional services sector. The remaining 20 percent of employees are anticipated to work within the construction sector, a major employment industry within some of the affected geographies.

**Noise:** The connected action would contribute temporary construction noise and noise from O&M and vessels that would affect certain marine business activities associated with marine sightseeing and recreational boating. As a result, the connected action would have negligible impacts on demographics, employment, and economics resulting from noise.

**Port utilization:** NYCEDC would construct improvements at SBMT to enable it to serve as a staging facility and O&M facility for the offshore wind industry. Upgrades would include seaward bulkhead extension, bulkhead repairs, upgrades for crane positions, wharf upgrades, dredging, and fender placement for vessel berthing. These planned improvements at SBMT, including in-water work, are being separately reviewed and authorized by USACE and state and local agencies (NYCEDC 2021).

In the near term, SBMT would be used to support the EW 1 and EW 2 projects and it is expected to support different offshore wind developers and projects in the future. BOEM expects that SBMT would experience long-term, moderate beneficial impacts from greater economic activity and increased employment due to increased utilization of the marine terminal for WTG staging and an O&M facility, as well as through increased demand for vessel maintenance services, vessel berthing, loading and unloading, warehousing, capital investment for improvements, and other business activity related to offshore wind.

**Presence of structures:** The connected action would construct a seaward bulkhead extension, new wharf and crane positions for WTG component loading and unloading, a wharf for service operation vessels and crew transfer vessels, and an O&M facility at SBMT. Considering that planned uses are consistent with the zoning of SBMT for heavy industry and the context of the SBMT site within a high- and medium-intensity developed area, BOEM expects that construction and operation of the SBMT Project would have long-term, negligible impacts on existing demographics surrounding the site and long-term, moderate beneficial impacts on employment and economics due to upgrades to the SBMT site to support the offshore wind industry in the near term and for future offshore wind projects in the New York and New Jersey region.

**Traffic:** The connected action would generate vessel traffic in SBMT. The proposed facility improvements would provide marine vessel access and allow the storage, staging, pre-assembly, and transfer of materials utilized in construction, installation, and O&M of offshore wind projects. Increased vessel traffic would increase the use of port and marine businesses, including tug services, dockage, fueling, inspection/repairs, and provisioning. The vessel traffic generated by the connected action would result in increased business for marine transportation and supporting services in the geographic analysis area with minor beneficial impacts during construction and decommissioning and operations.

Vessel traffic associated with the connected action could also result in temporary, periodic congestion within and near ports, leading to potential delays and an increased risk for collisions between vessels, which would result in economic costs for vessel owners. It is anticipated that potential increases in vessel traffic would be mitigated by environmental protection measures and that there would be no measurable adverse impact on the economy. Therefore, the connected action would have negligible impacts on demographics, employment, and economics during construction and operations as a result of vessel traffic.

**Land disturbance:** The connected action would construct an O&M facility at SBMT. SBMT is entirely developed with several buildings and paving throughout and is in a developed area zoned for heavy industry. No zoning changes are anticipated to be required for the connected action. Therefore, BOEM expects that land disturbance for construction and operation of planned improvements at SBMT would have negligible impacts on demographics, employment, and economics due to land disturbance. The connected action is also expected to result in minor beneficial impacts on the economy and employment during construction and operations associated with demolition of existing buildings, construction of new buildings, and increased port activity.

### 3.11.5.2. Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned activities, and the connected action at SBMT. In context of reasonably foreseeable environmental trends, the cumulative impacts of ongoing and planned activities, including the Proposed Action, are anticipated to be moderate beneficial for employment and economics in the geographic analysis area.

**Energy generation/security:** The Proposed Action's cumulative energy security/generation impacts on demographics, employment, and economics would be notable and measurable due to increased renewable energy generation. The impacts of the Proposed Action, when combined with ongoing and planned activities, would therefore be moderate beneficial.

**Lighting:** The Proposed Action's cumulative impacts on demographics, employment, and economics as a result of lighting would be negligible. Lights on 111 WTGs associated with other offshore wind projects in the geographic analysis area for recreation and tourism (in addition to 147 WTGs from the Proposed Action—a total of 258 WTGs) could also be visible, but the resulting impacts on demographics, employment, and economics are not anticipated to be measurable. Therefore, the combined lighting impacts from ongoing and planned activities including offshore wind would be negligible.

**Noise:** The Proposed Action's cumulative impacts on demographics, employment, and economics as a result of noise would be negligible. The onshore construction noise activities from the Proposed Action are not anticipated to overlap in location with those of other offshore wind projects. Cumulative noise impacts on demographics, employment, and economics would be anticipated to be short term and negligible through the use of proposed environmental protection measures and because construction and operational activities would generally take place in areas already developed with commercial and industrial uses or offshore.

**Port utilization:** Other planned offshore wind activity would provide business activities at the same ports as the Proposed Action as well as other ports within the geographic analysis area. As noted in Section 3.11.1, port investments are ongoing and planned in response to offshore wind activity.

The Proposed Action's cumulative impacts on demographics, employment, and economics as a result of port utilization and expansion would be notable and therefore moderate beneficial. Port utilization for the offshore wind industry would contribute associated trained and skilled offshore wind workforce and would serve as an economic engine in port communities and the region as a whole.

**Presence of structures:** Across the New York and New Jersey lease areas, up to 1,352 WTGs and other offshore structures, including those of the Proposed Action, would affect employment and economics by affecting marine-based businesses. Presence of structures would have both beneficial impacts, such as by providing sightseeing opportunities and fish aggregation that benefit recreational businesses, and adverse effects, such as by causing fishing gear loss, navigational hazards, and viewshed impacts that could affect business operations and income (see Sections 3.9 and 3.18). The cumulative impacts on demographics, employment, and economics due to the presence of structures would be negligible. WTGs associated with other offshore wind projects would also be visible (see Section 3.11.3.2); however, potential adverse effects on commercial fishing and recreation would not result in measurable impacts on demographics, employment, and the economy overall. Presence of structures could also result in positive benefits for commercial fishing and recreation.

**Traffic:** The Proposed Action combined with increased traffic congestion and collision risk from ongoing and planned activities would have unmeasurable and therefore negligible impacts on demographics, employment, and economics during all Project phases. It is anticipated that any short-term increases in traffic would be mitigated through the use of environmental protection measures and that there would not be significant disruptions to community cohesion or economic activity. Increased vessel traffic would produce demand for supporting marine services, with beneficial impacts on employment and economics during all Project phases, including minor to moderate beneficial impacts during construction and decommissioning and negligible beneficial impacts during operations.

**Land disturbance:** The exact extent of land disturbance associated with other projects would depend on the locations of landfall, onshore transmission cable routes, and onshore substations for offshore wind energy projects. Cumulative impacts of the Proposed Action in combination with ongoing and planned activities would have no impact or negligible cumulative impacts on demographics, employment, and economics due to land disturbance because most activities would occur offshore or in commercially and industrially developed areas and would be mitigated through the use of environmental protection measures. Also, anticipated job creation associated with ongoing and planned offshore wind projects is notable and therefore moderate beneficial.

### 3.11.5.3. Conclusions

**Impacts of the Proposed Action.** The Proposed Action would have long-term, **negligible** to **minor beneficial** impacts on employment and economic activity in the geographic analysis area, based upon anticipated short-term and modest long-term job creation, expenditures on local businesses, generation of tax revenues, and provision of grant funds. The Proposed Action would have **negligible** adverse impacts on demographics and housing within the geographic analysis area. Impacts from the Proposed Action resulting from the IPFs identified above would include beneficial, long-term impacts from energy security/generation, port utilization and expansion, presence of structures, vessel traffic, and climate change and adverse impacts from short- and long-term increases in light, noise during construction, long-term presence of structures, vessel traffic and collisions, and land disturbance. Adverse impacts from the Proposed Action would be **negligible**.

BOEM expects that the connected action would have **negligible** impacts on demographics, employment, and economics due to noise, traffic, and land disturbance. The introduction of new facilities at SBMT for use of the marine terminal for WTG staging and an O&M facility for offshore wind projects would have **negligible** impacts on existing demographics and long-term, **minor** to **moderate beneficial** impacts on employment and economics due to the presence of structures and port utilization.

Under the Proposed Action, construction, O&M, and eventual decommissioning would occur within the range of design parameters outlined in the COP, subject to applicable mitigation measures (Appendix H). Impacts of the Proposed Action for demographics, employment, and economics are summarized as **negligible** along with **minor beneficial**.

**Cumulative Impacts of the Proposed Action.** BOEM anticipates that the cumulative impacts on demographics, employment, and economics would be **negligible** to **minor** and **moderate beneficial**. See Section 3.9 for impacts on commercial and for-hire recreational fishing, for-hire recreational boating, and associated businesses.

### 3.11.6 Impacts of Alternatives B, C, D, E, F, G, and H on Demographics, Employment, and Economics

**Impacts of Alternatives B, C, D, E, F, G, and H.** Alternatives that make minor modifications to the WTG array (Alternatives B, E, and F), narrow the selection of submarine or onshore cable routes (Alternatives C, D, and G), or result in alternate methods of dredge and fill activities (Alternative H) would not have impacts on demographics, employment, and economics that are materially different than the impacts of the Proposed Action.

Alternatives B, E, and F would alter the turbine array layout compared to the Proposed Action; however, each of these alternatives would allow for installation of up to 147 WTGs defined in Empire's PDE. Therefore, the beneficial impacts on employment and the economy would be the same as described for the Proposed Action. Alternative F would optimize the production of energy, resulting in the most cost-efficient and highest annual renewable energy production, which would result in minor beneficial impacts of Alternative F compared to Alternatives B and E. Alternative B would remove six WTG positions from the northwestern end of EW 1 to reduce impacts on Cholera Bank, scenic resources, and navigation. As such, there would still be negligible impacts on economics due to property value impacts and viewshed impacts on recreational and tourist businesses. Alternative E would create a transit lane between the EW 1 and EW 2 Projects and remove seven WTG positions. Alternative F would remove three WTG positions from the northwestern end of EW 1 to further open the area to fishing and reduce impacts on Cholera Bank. Adverse economic impacts with Alternatives B, E, and F would still be expected to be negligible. See Section 3.9 for impacts on commercial and for-hire recreational fishing, for-hire recreational boating, and associated businesses.

Under Alternatives C, D, and G, with the alternate cable routes, adverse impacts on the economy would still be expected to be negligible.

Alternative H would use an alternate method of dredge or fill activities during construction at the SBMT, requiring a permit from USACE that would reduce the discharge of dredged material. Therefore, adverse impacts on the economy would still be expected to be negligible.

**Cumulative Impacts of Alternatives B, C, D, E, F, G, and H.** In context of reasonably foreseeable environmental trends, the cumulative impacts resulting from individual IPFs combined with ongoing and planned activities under Alternatives B, C, D, E, F, G, and H would be similar to those of the Proposed Action: negligible or minor adverse impacts on demographics, employment, and economics along with cumulative moderate beneficial impacts due to new hiring and economic activity.

#### 3.11.6.1. Conclusions

**Impacts of Alternatives B, C, D, E, F, G, and H.** Accordingly, the impacts resulting from individual IPFs associated with Alternatives B, C, D, E, F, G, and H on demographics, employment, and economics would be the same as those of the Proposed Action alone: **negligible** adverse impacts due to the IPFs discussed above, along with **negligible** to **minor beneficial** impacts due to new hiring and economic activity.

**Cumulative Impacts of Alternatives B, C, D, E, F, G, and H.** In context of reasonably foreseeable environmental trends, the cumulative impacts resulting from individual IPFs combined with ongoing and planned activities under Alternatives B, C, D, E, F, G, and H would be similar to those of the Proposed Action: **negligible** to **minor** adverse impacts on demographics, employment, and economics along with overall **moderate beneficial** impacts due to new hiring and economic activity.

### 3.11.7 Comparison of Alternatives

Alternatives B, E, and F would reduce the number of WTGs compared to the Proposed Action and still maintain negligible adverse economic impacts. Alternatives C, D, and G would also be expected to have negligible adverse impacts on the economy as a result of the alternative submarine or onshore cable routes. Similarly, Alternative H is anticipated to have negligible adverse economic impacts. Alternative H proposes an alternate method of dredge or fill during SBMT construction that would require a permit from USACE and reduce the discharge of dredged material.

In context of reasonably foreseeable environmental trends, the cumulative impacts associated with Alternatives B, C, D, E, F, G, and H when each is combined with the impacts of ongoing and planned activities would be the same as for the Proposed Action—**negligible** to **minor** adverse impacts and **moderate beneficial** impacts.

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# 3.18. Recreation and Tourism

This section discusses potential impacts on recreation and tourism from the proposed Projects, alternatives, and ongoing and planned activities in the geographic analysis area. The geographic analysis area, as shown on Figure 3.18-1, includes an area that extends 40 miles (64.4 kilometers) around the borders of the Wind Farm Development Area. The geographic analysis area includes portions of New York, Kings, Queens, Richmond, Nassau, and Suffolk Counties in New York and Monmouth and Ocean Counties in New Jersey. Section 3.11, *Demographics, Employment, and Economics*, discusses the economic aspects of recreation and tourism in the geographic analysis area.

## 3.18.1 Description of the Affected Environment for Recreation and Tourism

Proposed Project facilities would be within and off the coasts of New York and New Jersey. The coastal areas support ocean-based and onshore recreation and tourist activities, such as recreational and for-hire boating and fishing, guided tours, day use of parks and beaches, outdoor sports, and scenic or wildlife viewing. As indicated in Section 3.11, *Demographics, Employment, and Economics*, recreation and tourism contribute substantially to the economies of New York's and New Jersey's coastal counties. In 2019, 265.5 million people visited New York and spent about $73.6 billion, leading to a $117.6 billion total economic impact through tourism (Empire State Development n.d.). In 2019, 116 million people visited New Jersey and spent $46.4 billion, making tourism the sixth largest employer in New Jersey (Tourism Economics 2019). Annual tourism in New Jersey's coastal communities is a $16 billion industry (NJDEP 2021).

Coastal New York and New Jersey have a wide range of visual characteristics, with communities and landscapes ranging from large cities to small towns, suburbs, rural areas, beaches, and wildlife preserves. As a result of the proximity to the Atlantic Ocean, as well as the views associated with the shoreline, the New York and New Jersey shores have been extensively developed for water-based recreation and tourism. The scenic quality of the coastal environment is important to the identity, attraction, and economic health of many coastal communities. Additionally, the visual qualities of these historic coastal towns, which include marine activities within small-scale harbors and the ability to view birds and marine life, are important community characteristics. Coastal communities provide hospitality, entertainment, and recreation for both residents and tourists.

There are several recreation areas within the geographic analysis area. Otis Pike Fire Island High Dunes Wilderness, a 7-mile stretch of undeveloped barrier island on Fire Island, is the only federally designated wilderness area within the state of New York and is the closest wilderness area in the nation to a major metropolitan area. Recreation activities within the wilderness area include hiking trails, backcountry camping opportunities, fishing, and scenic views and abundant wildlife that attract bird watchers and wildlife viewers. The Gateway National Recreation Area includes three units: the Jamacia Bay Unit (Jamacia Bay and surrounding properties in Brooklyn and Queens including the western end of the Rockaway Peninsula), the Staten Island Unit (Fort Wadsworth, Miller Field, and Great Kills), and the Sandy Hook Unit (the Sandy Hook peninsula). The Gateway National Recreation Area provides visitors green spaces and beaches alongside historic structures and cultural landscapes and provides space for recreation activities including boating, bicycle paths, bird watching, archery, camping, fishing, and guided tours.

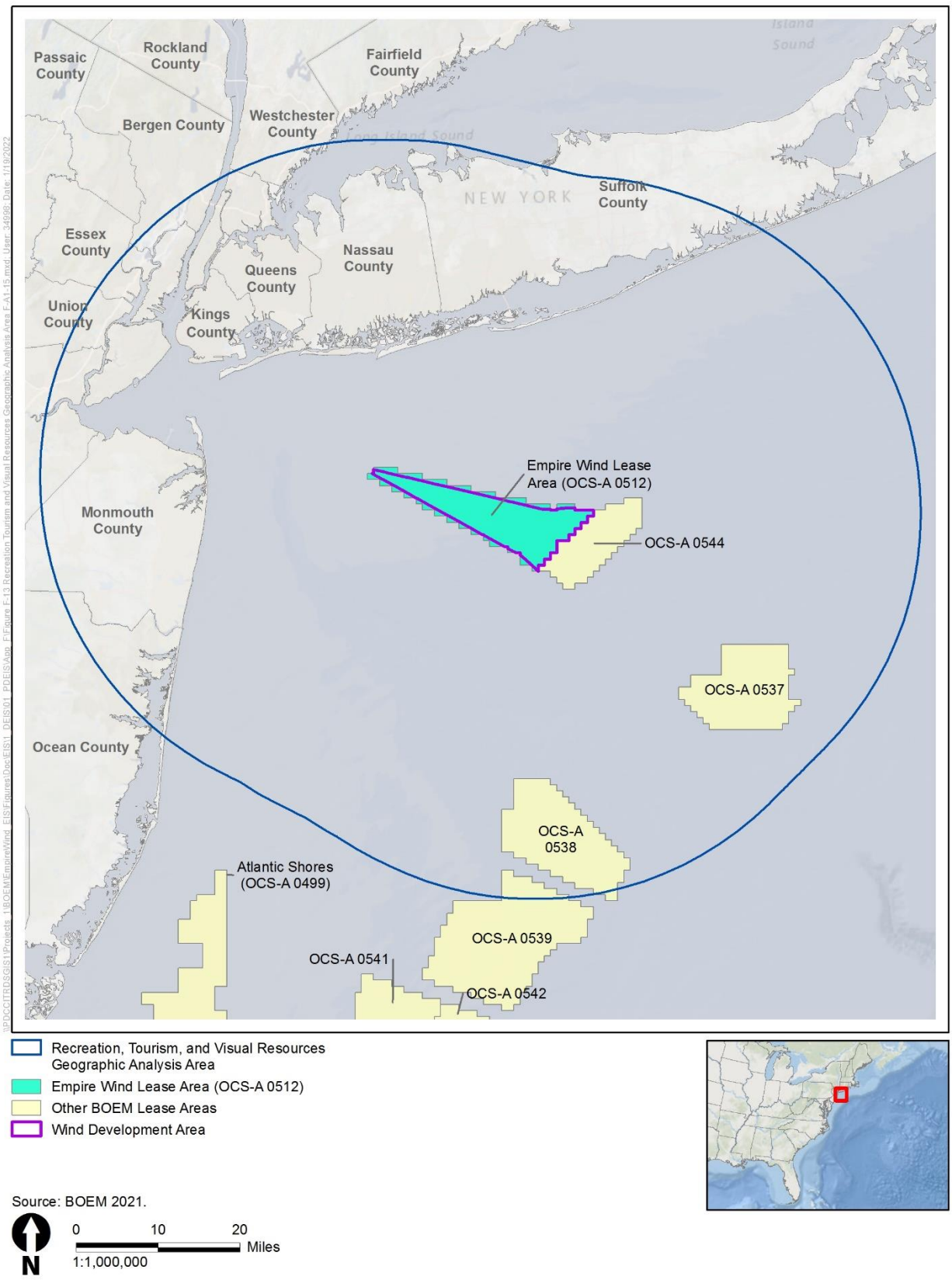


**Figure 3.18-1 Recreation and Tourism Geographic Analysis Area**

Water-oriented recreational activities in the geographic analysis area include recreational fishing and boating. Boating covers a wide range of activities, from ocean-going vessels to small boats used by residents and tourists in sheltered waters, and includes sailing, fishing, shell fishing, kayaking, canoeing, and paddleboarding. Commercial businesses offer boat rentals, such as canoes, kayaks, and private charter boats for recreation, fishing, and wildlife viewing. Many of the activities make use of coastal and ocean amenities that are free for public access. Nonetheless, these features function as key drivers for many coastal businesses, particularly those within the recreation and tourism sectors. As discussed in Section 3.11, *Demographics, Employment, and Economics*, recreation and hospitality are major sectors of the local economy, supported by ocean-based recreation uses.

Offshore wildlife viewing in charter boats, such as bird and whale watching, is particularly popular off the New York and New Jersey coasts and in the New York Harbor between spring and fall due to migrations. Some bird watching does take place on shore from Jones Beach to the Fire Island National Seashore in New York and across the Gateway National Recreation Area, which includes Jamaica Bay and the Sandy Hook peninsula. Chartered bird and seal watching tours occur at New York Harbor during the winter months. Whale watching occurs at New York Harbor and throughout the New York Bight, especially during the summer months (COP Volume 2e, Section 8.11.1.1; Empire 2022). Underwater recreation, such as diving and snorkeling to see shipwrecks, reefs, canyons, and marine wildlife, happens throughout the year in New York and New Jersey, but it is most popular between May and October (COP Volume 2e, Section 8.11.1.2; Empire 2022). Surface-based marine recreational activities popular along the New York coastline, particularly during the summer, include swimming, surfing, kayaking, paddle boarding, windsurfing, and kite boarding. Most of these activities take place off Long Island, including along the Rockaways, Long Beach, Jones Beach, and Fire Island. Surfing usually occurs along Long Beach, Jones Beach Island, Cedar Beach, and Robert Moses State Park (COP Volume 2e, Section 8.11.1.3; Empire 2022).

There is a large and robust recreational fishing industry in New York and New Jersey. In 2019, there were 13.4 million recreational saltwater angler trips (i.e., charter boats, party boats, private/rental boats, and shore) in New York and 13.3 million in New Jersey, with shore fishing representing the majority (more than half) of those trips. The areas in which sport fishing take place, such as Cholera Bank and Angler's Bank, are not within the Lease Area or within the submarine export cable siting corridors; however, fishermen may choose to travel through the Lease Area to reach the aforementioned areas. Recreational saltwater fishing takes place throughout the year but is especially prevalent from April through November, with peaks in May and June. Annual saltwater fishing tournaments also take place in the New York Bight, targeting species such as black sea bass, bluefish, striped bass, summer flounder, tautog, tuna, and shark. Recreational shell fishing occurs mainly in state waters, targeting species such as blue crabs, scallops, quahogs, Atlantic surfclam, and softshell clams (COP Volume 2e, Section 8.8.2.1; Empire 2022).

## 3.18.2 Impact Level Definitions for Recreation and Tourism

Definitions of impact levels are provided in Table 3.18-1.

**Table 3.18-1 Impact Level Definitions for Recreation and Tourism**

| Impact Level | Impact Type | Definition |
|---|---|---|
| Negligible | Adverse | Impacts on the recreation setting, recreation opportunities, or recreation experiences would be so small as to be unmeasurable. |
| | Beneficial | No effect or measurable impact. |
| Minor | Adverse | Impacts would not disrupt the normal functions of the affected activities and communities. |

| Impact Level | Impact Type | Definition |
|---|---|---|
| | Beneficial | A small and measurable improvement to infrastructure/facilities and community services, or benefit for tourism. |
| Moderate | Adverse | The affected activity or community would have to adjust somewhat to account for disruptions due to the Projects. |
| | Beneficial | A notable and measurable improvement to infrastructure/facilities and community services, or benefit for tourism. |
| Major | Adverse | The affected activity or community would have to adjust to significant disruptions due to large local or notable regional adverse impacts of the Projects. |
| | Beneficial | A large local, or notable regional improvement to infrastructure/facilities and community services, or benefit for tourism. |

## 3.18.3 Impacts of the No Action Alternative on Recreation and Tourism

When analyzing the impacts of the No Action Alternative on recreation and tourism, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on the baseline conditions for recreation and tourism. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix F, *Planned Activities Scenario*.

### 3.18.3.1. Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for recreation and tourism described in Section 3.18.1, *Description of the Affected Environment for Recreation and Tourism*, would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind activities within the geographic analysis area include commercial fishing, emplacement of submarine cables and pipelines, dredging and port improvement projects, marine minerals use and ocean dredging, military use, marine transportation, and onshore development activities (see Appendix F, Section F.2). Ongoing activities would contribute to impacts on recreation and tourism through the primary IPFs of anchoring, land disturbance, lighting, cable emplacement and maintenance, noise, presence of structures, and vessel traffic.

There are no ongoing offshore wind activities within the geographic analysis area for recreation and tourism.

### 3.18.3.2. Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Ongoing and planned non-offshore wind activities would contribute to periodic disruptions to recreation and tourism activities but are typical occurrences along the New York and New Jersey coastlines and would not substantially affect visitor use or experience. Visitors would continue to pursue activities that rely on the area's coastal and ocean environment, scenic qualities, natural resources, and establishments that provide services for recreation and tourism. See Table F1-20 for a summary of potential impacts associated with ongoing and planned non-offshore wind activities by IPF for recreation and tourism.

Planned offshore wind projects in the geographic analysis area are planned within Lease Areas OCS-A 0544 (Vineyard Mid-Atlantic Offshore Wind), OCS-A 0537 (OW Ocean Winds East LLC), OCS-A 0538 (Attentive Energy LLC), and OCS-A 0539 (Bight Wind Holdings LLC). These projects are estimated to collectively install 449 WTGs, 9 OSS, and 1,889 statute miles (1,913 kilometers) of submarine export cable and interarray cable in the geographic analysis area between 2026 and 2030.

The sections below summarize the potential impacts of planned offshore wind activities in the geographic analysis area on recreation and tourism during construction, O&M, and decommissioning of the projects. BOEM expects planned offshore wind activities to affect recreation and tourism through the primary IPFs of anchoring, land disturbance, lighting, cable emplacement and maintenance, noise, presence of structures, and vessel traffic.

**Anchoring:** Anchoring could potentially affect recreational boating in the geographic analysis area both through the presence of an increased number of anchored vessels during offshore wind construction, O&M, and decommissioning and through the creation of offshore areas with cable or scour protection where anchors of smaller recreational vessels may fail to hold.

Development of planned offshore wind projects between 2026 and 2030 would increase the number of vessels anchored offshore. The greatest volume of anchored vessels would occur in offshore work areas during construction and installation. Vessel anchoring would also occur during O&M but at a reduced frequency. Planned offshore wind projects would add an estimated 371 acres (150 hectares) of scour protection for WTG foundations and 171 acres (69 hectares) of cable protection to the geographic analysis area, which could create resistance to anchoring for recreational boats.

Anchored vessels for constriction, O&M, and decommissioning of planned offshore wind projects would have localized, intermittent, long-term impacts on recreational boating. The addition of scour and cable protection would have localized, long-term impacts on anchoring for recreational boats. BOEM expects that recreational boaters could navigate around anchored vessels and adjust the locations for dropping anchor to avoid cable and scour protection with only brief inconvenience, and impacts would be minor.

**Land disturbance:** Planned offshore wind development would require installation of landfalls, onshore export cable and interconnection cable, and onshore substations, which could result in localized, temporary disturbance to recreational activity or tourism-based businesses near construction sites. BOEM expects these impacts would be localized and temporary during construction, O&M, and decommissioning. The exact extent of impacts would depend on the locations of onshore infrastructure for planned offshore wind projects; however, the No Action Alternative would generally have localized, temporary, and minor impacts.

**Lighting:** Planned offshore wind projects would add new sources of light to onshore and offshore areas including from nighttime vessel lighting and fixed lighting at onshore substations and an estimated 449 WTGs and 9 OSS. BOEM expects that lighting at onshore substations would have negligible impacts on recreation and tourism. Impacts of vessel lighting would be temporary for the duration that the vessel is engaged in construction, O&M, or decommissioning activities and is either anchored or transiting at night. WTGs would be lit and marked in accordance with FAA and USCG requirements for aviation and navigation obstruction lighting, respectively. Impacts of lighting on WTG and OSS structures would be long term.

Aviation warning lighting required for WTGs would be visible from beaches and coastlines within the geographic analysis area and could have impacts on recreation and tourism in certain locations if the lighting influences visitor decisions in selecting coastal locations to visit. FAA hazard lighting systems would be in use for the duration of O&M for up to 449 WTGs (Appendix F, Table F2-1). The installation of these WTGs affixed with red flashing lights mounted on opposite rear sides of the nacelle and spaced

around the mast midway between the nacelle and AMSL within the offshore wind lease areas would have long-term minor to major impacts on sensitive onshore and offshore viewing locations, based on viewer distance and angle of view and assuming no obstructions. Atmospheric and environmental factors such as haze and fog would influence visibility and perception of hazard lighting from sensitive viewing locations.

A University of Delaware study evaluating the impacts of visible offshore WTGs on beach use found that WTGs visible more than 15 miles (24.1 kilometers) from the viewer would have negligible impacts on businesses dependent on recreation and tourism activity (Parsons and Firestone 2018). The study participants viewed visual simulations of WTGs in clear, hazy, and nighttime conditions (without ADLS). A 2017 visual preference study conducted by North Carolina State University evaluated the impact of offshore wind facilities on vacation rental prices. The study found that nighttime views of aviation hazard lighting (without ADLS) for WTGs close to shore (5 to 8 miles [8 to 13 kilometers]) would adversely affect the rental price of properties with ocean views (Lutzeyer et al. 2017). It did not specifically address the relationship between lighting, nighttime views, and tourism for WTGs 15 or more miles (24.1 or more kilometers) from shore. WTGs associated with planned offshore wind projects in the geographic analysis area would be more than 15 miles (24.1 kilometers) from coastal locations with views of the WTGs. For example, the nearest distance between the Mid-Atlantic Offshore Wind Lease Area and the New York or New Jersey coast is over 23 miles (37 kilometers), while the OW Ocean Winds East LLC Lease Area is more than 40 miles (64.4 kilometers) from either the New York or New Jersey coast.

The New York and New Jersey shores that are within the viewshed of planned offshore wind projects have been extensively developed. Because of the high development density, existing nighttime lighting is prevalent. Elevated boardwalks, jetties, and seawalls afford greater visibility of offshore elements for viewers in beach areas. Nighttime views toward the ocean from the beach and adjacent inland areas are diminished by ambient light levels and glare of shorefront developments. While ambient nighttime lighting may be expected within the more developed areas of the New York and New Jersey shores, within the region's national parks, wildlife refuges, and wilderness areas, darkness and the night sky and the feelings associated with open space in a high-density area are considered fundamental resources that contribute to the visitor experience (NPS 2014). Completely natural night skies are not obtainable at these parks given the surrounding urban environment of New York City; however, many of the parks do offer relatively dark night skies where visitors can experience night skies with only dim and distant artificial lights (NPS 2014).

Visible aviation warning lighting would add a developed/industrial visual element to views that were previously characterized by dark, open ocean, broken only by transient lighted vessels and aircraft passing through the view. The implementation of ADLS would activate the hazard lighting system in response to detection of nearby aircraft. The synchronized flashing of the navigational lights, if ADLS is implemented, would result in shorter-duration night sky impacts on the seascape, landscape, and viewers. The shorter-duration synchronized flashing of the ADLS is anticipated to have reduced visual impacts at night as compared to the standard continuous, medium-intensity red strobe FAA warning system due to the duration of activation.

In addition to recreational fishing, some recreational boating in the region involves whale watching and other wildlife-viewing activity. A 2013 BOEM study evaluated the impacts of WTG lighting on birds, bats, marine mammals, sea turtles, and fish. The study found that existing guidelines "appear to provide for the marking and lighting of [WTGs] that will pose minimal if any impacts on birds, bats, marine mammals, sea turtles or fish" (Orr et al. 2013). By extension, existing lighting guidelines or ADLS (if implemented) would not affect recreational fishing or wildlife viewing.

As a result, although lighting on WTGs would have a continuous, long-term, adverse impact on recreation and tourism, the impact in the geographic analysis area is likely to be limited to individual decisions by

visitors to the New York and New Jersey shores and elevated areas, with less impact on the recreation and tourism industry as a whole.

**Cable emplacement and maintenance:** An estimated 1,189 statute miles (1,913 kilometers) of submarine export cable and interarray cable would be installed in the geographic analysis area between 2026 and 2030 for planned offshore wind projects. Recreational uses would be temporarily displaced from work zones during cable installation. Cable installation could also have temporary impacts on fish and invertebrates of interest for recreational fishing, due to trenching and associated underwater noise and turbidity near the work zone. The degree of temporal and geographic overlap of each cable is unknown, although cables for some projects could be installed simultaneously. Displacement of recreational activities due to cable emplacement would be temporary and limited to the construction safety zones established for safe performance of the work. Displacement of recreational uses for cable maintenance during the O&M phase of each project would be temporary and intermittent over the life of the project.

**Noise:** Noise from operation of construction equipment, pile driving, and vehicle or vessel traffic could result in adverse impacts on recreation and tourism. Onshore construction noise near beaches, parkland, recreation areas, or other areas of public interest would temporarily disturb the quiet enjoyment of the site (in locations where such quiet is an expected or typical condition). Similarly, offshore construction noise would intrude upon the natural sounds of the marine environment. Construction noise could cause some boaters to avoid construction areas, although the most intense noise sources (such as pile driving) would originate within the safety zones that USCG may establish for areas of active construction, which would be off-limits to boaters. BOEM conducted a qualitative analysis of impacts on recreational fisheries for the construction phases of offshore wind development in the Atlantic OCS region. Results showed the construction phase is expected to have a slightly negative to neutral impact on recreational fisheries due to both direct exclusion of fishing activities and displacement of mobile target species by construction noise (Kirkpatrick et al. 2017).BOEM expects that the impact of noise on recreation and tourism during construction would be temporary and localized. Multiple construction projects at the same time would increase the number of locations within the geographic analysis area that experience noise disruptions. The impact of noise during O&M would be localized, continuous (for operation of WTGs and OSS), and long term, with brief periods of more-intense noise during occasional repair activities.

Adverse impacts of noise on recreation and tourism would also result from the adverse impacts on species important to recreational fishing and sightseeing within the geographic analysis area. Pile driving using an impact hammer would cause the most impactful noises. Because most recreational fishing takes place closer to shore, only a small proportion of recreational fishing would be affected by construction of WTGs, OSS, and submarine cables. Recreational fishing such as for tuna, shark, and marlin is more likely to be affected, as these fisheries are farther offshore than most fisheries and, therefore, more likely to experience temporary impacts resulting from the noise generated by construction for planned offshore wind projects. Construction noise could contribute to temporary impacts on marine mammals, with resulting impacts on chartered tours for whale watching or other wildlife viewing. However, planned projects are expected to comply with mitigation measures (e.g., exclusion zones, protected species observers) that would avoid and minimize underwater noise impacts on marine mammals.

Noise from operational WTGs would be expected to have little effect on finfish, invertebrates, and marine mammals, and consequently little effect on recreational fishing or sightseeing. BOEM expects that planned offshore wind construction would result in localized, temporary impacts on recreational fishing and marine sightseeing related to fish and marine mammal populations. Multiple construction projects would increase the spatial and temporal extent of temporary disturbance to marine species within the geographic analysis area. As shown in Table F2-1 in Appendix F, BOEM expects that up to four offshore wind projects (not including the Proposed Action) could be under construction simultaneously in the recreation and tourism geographic analysis area. No long-term, adverse impacts are anticipated, provided

that mitigation measures are implemented to prevent population-level harm to fish and marine mammal populations.

**Presence of structures:** The construction and installation of 449 WTGs and 9 OSS within the recreation and tourism geographic analysis area would contribute to impacts on recreational fishing and boating. The offshore structures would have long-term, adverse impacts on recreational boating and fishing through the risk of allision; risk of gear entanglement, damage, or loss; navigational hazards; space use conflicts; presence of cable infrastructure; and visual impacts. However, planned offshore wind structures could have beneficial impacts on recreation through fish aggregation and reef effects. The WTGs and OSS installed within offshore wind lease areas are expected to serve as additional artificial reef structures, providing additional locations for recreational for-hire fishing trips, potentially increasing the number of trips and revenue.

The presence of planned offshore wind structures would increase the risk of allision or collision with other vessels and the complexity of navigation within the geographic analysis area. Generally, the vessels more likely to allide with WTGs or OSS would be smaller vessels moving within and near wind farm installations, such as recreational vessels. Planned offshore wind development could require adjustment of routes for recreational boaters, anglers, sailboat races, and sightseeing boats, but the adverse impact of the planned offshore wind structures on recreational boating would be limited by the distance offshore. Recreational boating routes in the geographic analysis area mainly occur within 3 nm (5.5 kilometers) of the coastline within the New York Bight (COP Volume 2e, Section 8.7.1.1; Empire 2022).

The geographic analysis area would have an estimated 371 acres (150 hectares) of scour protection for WTG foundations and 171 acres (69 hectares) of cable protection, which results in an increased risk of entanglement. Accurate marine charts could make operators of recreational vessels aware of the locations of the cable protection and scour protection. If the hazards are not noted on charts, operators may lose anchors, leading to increased risks associated with drifting vessels that are not securely anchored. Lessees would engage with both USCG and NOAA in developing a comprehensive aid to navigation plan. Buried offshore cables would not pose a risk for most recreational vessels, as smaller-vessel anchors would not penetrate to the target burial depth for the cables. Because anchoring is uncommon in water depths where the No Action Alternative WTGs would be installed, anchoring risk is more likely to be an impact over export cables in shallower water closer to coastlines. The risk to recreational boating would be localized, continuous, and long-term.

Planned offshore wind structures could provide new opportunities for offshore tourism by attracting recreational fishing and sightseeing. The WTG and OSS structures could produce artificial reef effects. The “reef effect” refers to the introduction of a new hard-bottom habitat that has been shown to attract numerous species of algae, shellfish, finfish, and sea turtles to new benthic habitat. The reef effect could attract species of interest for recreational fishing and result in an increase in recreational boaters traveling farther from shore in order to fish. The potential attraction of sea turtles to the structures may also attract recreational boaters and sightseeing vessels. In a 2020 survey-based study, 11.4 percent of participants indicated that they would make a trip to tour offshore wind facilities 12.5 miles offshore (Parsons et al. 2020). The number of participants that indicated they would tour offshore wind facilities decreases as the project moves farther offshore. Of the respondents that reported they would take a trip, the majority of those reported they expect to only take a one-time trip. Although the likelihood of recreational vessels visiting the offshore structures would diminish with distance from shore, increasing numbers of offshore structures may encourage a greater volume of recreational vessels to travel to the offshore wind lease areas. Additional fishing and tourism activity generated by the presence of structures could also increase the likelihood of allisions and collisions involving recreational fishing or sightseeing vessels, as well as commercial fishing vessels.

As it relates to the visual impacts of structures, the vertical presence of WTGs on the offshore horizon may affect recreational experience and tourism in the geographic analysis area. Section 3.20, *Scenic and Visual Resources*, describes the visual impacts from offshore wind infrastructure. If the purpose of the viewer's sightseeing excursion is to observe the mass and scale of the WTGs' offshore presence, then the increasing visual dominance would benefit the viewer's experience as the viewer navigates toward the WTGs. However, if experiencing a vast pristine ocean condition is the purpose of the viewer's sightseeing excursion, then the increasing visual dominance may detract from the viewer's experience.

Studies and surveys that have evaluated the impacts of offshore wind facilities on tourism found that established offshore wind facilities in Europe did not result in decreased tourist numbers, tourist experience, or tourist revenue, and that Block Island Wind Farm's WTGs provide excellent sites for fishing and shell fishing (Smythe et al. 2018). A survey-based study found that for prospective offshore wind facilities (based on visual simulations), proximity of WTGs to shore is correlated to the share of respondents who would expect a worsened experience visiting the coast (Parsons and Firestone 2018).

- At 15 miles (24.1 kilometers), the percentage of respondents who reported that their beach experience would be worsened by the visibility of WTGs was about the same as the percentage of those who reported that their experience would be improved (e.g., by knowledge of the benefits of offshore wind).
- About 68 percent of respondents indicated that the visibility of WTGs would neither improve nor worsen their experience.
- Reported trip loss (respondents who stated that they would visit a different beach without offshore wind) averaged 8 percent when wind projects were 12.5 miles (20 kilometers) offshore, 6 percent when 15 miles (24.1 kilometers) offshore, and 5 percent when 20 miles (32 kilometers) offshore.
- About 2.6 percent of respondents were more likely to visit a beach with visible offshore wind facilities at any distance.

A 2019 survey of 553 coastal recreation users in New Hampshire included participants in water-based recreation activities such as fishing from shore and boats, motorized and non-motorized boating, beach activities, and surfing at the New Hampshire seacoast. Most (77 percent) supported offshore wind development along the New Hampshire coast, while 12 percent opposed it and 11 percent were neutral. Regarding the impact on their outdoor recreation experience, 43 percent anticipated that offshore wind development would have a beneficial impact, 31 percent anticipated a neutral impact, and 26 percent anticipated an adverse impact (BOEM 2021a).

Additionally, a 2020 survey-based preference study to determine attitude toward offshore wind and if the presence of offshore wind turbines affects the number of trips a beachgoer makes to the beach found that developed beaches with boardwalks and beaches that were designated as local, state, or national parks had the lowest amount of reported trip cancellation (Parsons et al. 2020). Because many of New Jersey's most visited beaches, including Atlantic City, are quite developed, long-term impacts on recreation and tourism are not expected. The beachgoers at local, state, or national park beaches self-reported as more favorable toward wind power and correspondingly appeared less inclined to cancel a trip due to the presence of wind turbines.

As described under the IPF for light, the shore areas within the viewshed of the WTGs include both highly developed areas and undeveloped national parks and wilderness areas such as Otis Pike Fire Island High Dunes Wilderness. Public beaches and tourism attractions in this area are highly valued for scenic, historic, and recreational qualities, and draw large numbers of daytime visitors during the summertime tourism seasons. When visible (i.e., on clear days, in locations with unobstructed ocean views), WTGs

would add a developed/industrial visual element to ocean views that were previously characterized by open ocean, broken only by transient vessels and aircraft passing through the view.

Based on the currently available studies, portions of the 449 WTGs associated with the No Action Alternative could be visible from shorelines (depending on vegetation, topography, weather, atmospheric conditions, and the viewers' visual acuity). WTGs visible from some shoreline locations in the geographic analysis area would have adverse impacts on visual resources when discernible due to the introduction of industrial elements in previously undeveloped views. Based on the relationship between visual impacts and impacts on recreational experience, the impact of visible WTGs on recreation would be long term, continuous, and adverse. Seaside locations could experience some reduced recreational and tourism activity, but the visible presence of WTGs would be unlikely to affect shore-based or marine recreation and tourism in the geographic analysis area as a whole.

**Traffic:** Planned offshore wind project construction and decommissioning and, to a lesser extent, planned offshore wind project operation would generate increased vessel traffic that could inconvenience recreational vessel traffic within the geographic analysis area. The impacts would occur primarily during construction, along routes between ports and the planned offshore wind construction areas. Vessel traffic for each project is not known but is anticipated to be similar to that of the Proposed Action, which is projected to generate an average of 2.8 vessel trips per day between ports and the Lease Area during construction and 1.4 vessel trips per day during operations. Between 2026 and 2030, as many as four offshore wind projects (not including the Proposed Action) could be under construction simultaneously. During such periods, assuming similar vessel counts, construction of offshore wind projects would generate an average of 11.2 vessel trips per day from Atlantic coast ports to worksites within the geographic analysis area, and operations would generate an average of 5.6 vessel trips per day. This level of increase in vessel traffic would represent only a modest increase compared to the background volumes of vessel traffic in and around the New York Bight, and BOEM expects that vessel traffic would have minor impacts on recreation and tourism in the geographic analysis area.

### 3.18.3.3. Conclusions

**Impacts of the No Action Alternative.** Under the No Action Alternative, recreation and tourism would continue to be affected by existing environmental trends and ongoing activities. BOEM anticipates that the impacts of ongoing activities (including commercial fishing, emplacement of submarine cables and pipelines, dredging and port improvement projects, marine minerals use and ocean dredging, military use, marine transportation, and onshore development activities) would have **minor** effects on recreation and tourism in the geographic analysis area because these are typical activities occurring along the New York and New Jersey coastlines and would not substantially affect visitor use or experience.

**Cumulative Impacts of the No Action Alternative.** Under the No Action Alternative, existing environmental trends and ongoing activities would continue, and recreation and tourism would continue to be affected by the primary IPFs of anchoring, land disturbance, lighting, cable emplacement and maintenance, noise, presence of structures, and vessel traffic. The impacts of planned non-offshore wind activities would be similar to the impacts of ongoing, non-offshore wind activities. Planned offshore wind activities would have localized, temporary, **minor** impacts on recreation and tourism related to land disturbance, cable emplacement and maintenance, noise, and traffic. Planned offshore wind activities would have localized, long-term, **minor** impacts on recreation and tourism due to anchoring and lighting, and localized, long-term, **minor** adverse and **minor beneficial** impacts on recreation and tourism due to the presence of structures, with beneficial impacts attributed to the anticipated reef effect resulting from installation of new offshore structures. BOEM expects the cumulative impacts of the No Action Alternative would result in **minor** impacts on recreation and tourism.

Planned offshore wind activities are expected to contribute considerably to several IPFs, the most prominent being noise and cable emplacement during construction and the presence of offshore structures during operations. Noise and cable emplacement could temporarily displace recreational uses at construction sites and affect recreational fishing and sightseeing as a result of the impacts on fish, invertebrates, and marine mammals. The long-term presence of offshore wind structures would result in increased navigational complexity, potential entanglement and loss of gear, and visual impacts from offshore structures. BOEM also anticipates that the planned offshore wind activities in the analysis area would result in **minor beneficial** cumulative impacts due to the presence of offshore structures and cable hard cover, which could provide opportunities for fishing and sightseeing due to the reef effect.

### 3.18.4 Relevant Design Parameters & Potential Variances in Impacts for the Action Alternatives

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than described in the sections below. The following proposed PDE parameters (Appendix E) would influence the magnitude of the impacts on recreation and tourism:

- The Project layout including the number, type, height, and placement of the WTGs and OSS, and the design and visibility of lighting on the structures;
- Arrangement of WTGs and accessibility of the Wind Farm Development Area to recreational boaters; and
- The duration and time of year during which onshore and nearshore construction occurs.

Variability of the proposed Project design exists as outlined in Appendix E. Below is a summary of potential variances in impacts:

- WTG number, size, location, and lighting: More WTGs and larger turbine sizes closer to shore could increase visual impacts that affect onshore recreation and tourism as well as recreational boaters. Arrangement and type of lighting systems would affect nighttime visibility of WTGs onshore.
- WTG arrangement and orientation: Different arrangements of WTG arrays may affect navigational patterns and safety of recreational boaters.
- Duration and timing of construction: Tourism and recreational activities in the geographic analysis area tend to be higher from May through September, and especially from June through August (Parsons and Firestone 2018). Impacts on recreation and tourism would be greater if Project construction were to occur during this season. A shorter or longer duration for construction activities would decrease or increase the time that recreational uses could be displaced from construction sites.

### 3.18.5 Impacts of the Proposed Action on Recreation and Tourism

The Proposed Action would install 147 WTGs, two OSS, and 375 statute miles (603.5 kilometers) of submarine export cable and interarray cable in the geographic analysis area between 2023 and 2027. BOEM expects the Proposed Action to affect recreation and tourism through the primary IPFs of anchoring, land disturbance, lighting, cable emplacement and maintenance, noise, presence of structures, and vessel traffic.

**Anchoring:** Anchoring could potentially affect recreational boating in the geographic analysis area both through the presence of an increased number of anchored vessels during offshore wind construction, O&M, and decommissioning (creating space use conflicts) and through the creation of offshore areas with cable or scour protection where anchors of smaller recreational vessels may fail to hold.

Construction of the Proposed Action between 2023 and 2027 would increase the number of vessels anchored offshore. Most construction vessels used for the Projects would maintain position using dynamic positioning, which limits the use of anchors and jack-up features. Any anchors or jack-up features would be placed within the previously cleared areas around foundations (APM 98). Empire would implement up to 1,640-foot (500-meter) safety zones around active construction sites (APM 180), which would reduce the potential for interaction between recreational and tour boats with anchored construction vessels; however, safety zones would also temporarily displace those uses from the work area. Vessel anchoring would also occur during O&M but at a reduced frequency. The Proposed Action would add an estimated 139 acres (56.3 hectares) of scour protection for WTG foundations and 23 acres (9.3 hectares) of cable protection to the geographic analysis area, which could make anchoring more difficult for recreational boats.

Anchored vessels for construction, O&M, and decommissioning of the Proposed Action would have localized, intermittent, temporary impacts on recreational boating. The addition of scour and cable protection would have localized, long-term impacts on anchoring for recreational boats. BOEM expects that recreational boaters could navigate around anchored vessels and adjust the locations for dropping anchor to avoid cable and scour protection with only brief inconvenience, and impacts would be minor.

**Land disturbance:** Construction of the Proposed Action would require installation of landfalls, onshore export cable and interconnection cable, and onshore substations, which could result in localized, temporary disturbance to recreational activity or tourism-based businesses near construction sites. Onshore construction activities could disrupt access to public use areas and degrade the recreational experience through establishment of restricted work zones and increases in traffic, noise, and construction emissions. Empire would use ultra-low diesel fuel (APM 29) and limit unnecessary idling of diesel and gasoline engines during construction (APM 34), which would reduce noise and air emissions during construction. BOEM expects impacts of land disturbance during construction, O&M, and decommissioning would be localized and temporary.

The proposed onshore substations would be in predominantly high- and medium-intensity developed areas and construction is not expected to affect recreation or tourism in the long term. Because onshore construction would not occur within national parks or wilderness areas, construction-related impacts that would affect visitor experience, such as vibrations, noise, increases in traffic, or temporary increase in air pollution, are not expected. Empire would develop a traffic management plan to limit construction-related traffic disturbance (APM 153) and use temporary construction zones to minimize areas of road closures (APM 163), which would maintain access to recreation areas and local businesses. If tourism decreases during construction, individual businesses may be affected and could experience long-term effects. More information on potential economic impacts as a result of the Proposed Action can be found in Section 3.11.5. The selection of the Onshore Substation C location could disrupt use of a marina at the Onshore Substation C site and restrict public access to a portion of the waterfront along Reynolds Channel, which would result in long-term impacts on existing recreational uses. This impact would be localized but would be long term if shoreline access is restricted at the Onshore Substation C parcel.

Overall, BOEM expects that impacts of the Proposed Action on recreation and tourism due to land disturbance would be negligible to minor, due to the temporary nature of construction impacts and limited geographic extent of impacts related to conversion of affected properties from existing uses to a use for an electric utility.

**Lighting:** The Proposed Action would add new sources of light to onshore and offshore areas including from nighttime vessel lighting, and fixed lighting on 147 WTGs, two OSS, and two onshore substations. Onshore substations would be in developed areas and BOEM expects that lighting at onshore substations would have negligible impacts on recreation and tourism. Impacts of vessel lighting would be temporary for the duration that the vessel is engaged in construction, O&M, or decommissioning activities and is

either anchored or transiting at night. WTGs would be lit and marked in accordance with FAA and USCG requirements for aviation and navigation obstruction lighting, respectively. Impacts of lighting on WTG and OSS would be long term.

Aviation warning lighting required for WTGs would be visible from beaches and coastlines within the geographic analysis area and could have impacts on recreation and tourism in certain locations if the lighting influences visitor decisions in selecting coastal locations to visit. FAA hazard lighting systems would be in use for the duration of O&M. The installation of these WTGs affixed with red flashing lights mounted on opposite rear sides of the nacelle and spaced around the mast midway between the nacelle and AMSL within the offshore wind lease areas would have long-term, minor to major impacts on sensitive onshore and offshore viewing locations, based on viewer distance and angle of view and assuming no obstructions. Atmospheric and environmental factors such as haze and fog would influence visibility and perception of hazard lighting from sensitive viewing locations.

The New York and New Jersey shores that are within the viewshed include extensively developed shores and relatively undeveloped national parks and wilderness areas. Because of the high development density, existing nighttime lighting is prevalent. Elevated boardwalks, jetties, and seawalls afford greater visibility of offshore elements for viewers in beach areas. Nighttime views toward the ocean from the beach and adjacent inland areas are diminished by ambient light levels and glare of shorefront developments, except in the national parks and wilderness areas within the geographic analysis area. Visible aviation warning lighting would add a built visual element to views that were previously characterized by dark, open ocean, broken only by transient lighted vessels and aircraft passing through the view. Empire would implement an ADLS or similar system on WTGs as a base case, pending commercial availability, technical feasibility, and agency review and approval (APM 141). The implementation of ADLS would activate the hazard lighting system in response to detection of nearby aircraft. The synchronized flashing of the navigational lights, if ADLS is implemented, would result in shorter-duration night sky impacts on the seascape, landscape, and viewers. The shorter-duration synchronized flashing of the ADLS is anticipated to have reduced visual impacts at night as compared to the standard continuous, medium-intensity red strobe FAA warning system due to the duration of activation.

As a result, although lighting on WTGs would have a long-term impact, the impact in the geographic analysis area is likely to be limited to individual decisions by visitors to the New York and New Jersey shores and elevated areas, with less impact on the recreation and tourism industry as a whole. Due to the distance of the Proposed Action's WTGs and OSS from shore and potential to implement ADLS or a similar system on WTGs, BOEM expects that aviation hazard lighting for the Proposed Action would result in a long-term, intermittent, minor impacts on recreation and tourism in the geographic analysis area. Lighting associated with vessel traffic and onshore substations would have negligible impacts on recreation and tourism.

**Cable emplacement and maintenance:** The Proposed Action would install 375 statute miles (603.5 kilometers) of submarine export cable and interarray cable in the geographic analysis area between 2023 and 2027. Cable emplacement would generate vessel traffic and trenching along cable routes, creating space use conflicts and resulting in short-term disturbance to species important to recreation and tourism. Recreational and tour boats traveling near the offshore cable routes would need to navigate around vessels and access-restricted areas associated with the offshore cable installation. Empire would work with USCG to communicate these zones and other work areas to the boating public via Local Notices to Mariners (APM 183 and APM 187). Space use conflicts with recreation and tourism related to offshore cable emplacement would result in localized, temporary, minor impacts.

Cable installation could also affect fish and marine mammals of interest for recreational fishing and sightseeing through dredging and resulting underwater noise and turbidity. Empire would install silt curtains in sensitive areas, based on sediment modeling, to reduce sediment transport (APM 93). Impacts

of cable installation on fish and marine mammals would be localized and temporary and affected species are expected to recover upon completion of the activity, resulting in minor impacts on recreation and tourism (see Section 3.19, *Sea Turtles*, and Section 3.16, *Navigation and Vessel Traffic*).

**Noise:** Noise from the operation of construction equipment, pile driving, and vehicle or vessel traffic could result in adverse impacts on recreation and tourism. Onshore construction noise near beaches, parkland, recreation areas, or other areas of public interest would temporarily disturb the quiet enjoyment of the site (in locations where such quiet is an expected or typical condition). Empire would implement measures such as use of mufflers, adjustable backup alarms, and noise barriers to reduce onshore construction noise (APM 35, APM 36, APM 42).

Similarly, offshore construction noise would intrude upon the natural sounds of the marine environment. Empire would comply with IMO noise standards on vessels used for nearshore and offshore work (APM 41). Construction noise could cause some boaters to avoid construction areas, although the most-intense noise sources (such as pile driving) would originate within the safety zones established for areas of active construction (APM 180), which would exclude recreational and tour boats. BOEM expects that the impact of noise on recreation and tourism during construction would be temporary and localized. The impact of noise during O&M would be localized, continuous (for operation of WTGs and OSS), and long term, with brief periods of more-intense noise during occasional repair activities.

Adverse impacts of noise on recreation and tourism would also result from the adverse impacts on species important to recreational fishing and sightseeing within the geographic analysis area. Pile driving using an impact hammer would cause the most impactful noises. Because most recreational fishing takes place closer to shore, only a small proportion of recreational fishing would be affected by the construction of WTGs and OSS. Recreational fishing such as for tuna, shark, and marlin is more likely to be affected, as these fisheries are farther offshore than most fisheries and, therefore, more likely to experience temporary impacts resulting from the noise generated by construction within the Lease Area.

Construction noise could contribute to temporary impacts on marine mammals, with resulting impacts on chartered tours for whale watching or other wildlife viewing. Empire would implement measures such as seasonal pile driving closures (APM 106), ramp-up measures when pile driving is initiated (APM 107), establishment of pre-clearance and shutdown zones (APM 108 and APM 110), and noise attenuation measures (APM 112) to reduce impacts of underwater noise on marine mammals. Lower levels of noise associated with cable installation activities could also affect fish species and marine mammals in the nearshore environment. Noise from operational WTGs would be expected to have little effect on finfish, invertebrates, and marine mammals, and consequently little effect on recreational fishing or sightseeing.

Overall, noise generated from construction, O&M, and decommissioning of the Proposed Action alone would have localized, temporary, minor impacts on recreation and tourism.

**Presence of structures:** The construction and installation of 147 WTGs and two OSS within the Lease Area would contribute to impacts on recreational fishing and boating. The offshore structures would have long-term, adverse impacts on recreational boating and fishing through the risk of allision; risk of gear entanglement, damage, or loss; navigational hazards; space use conflicts; presence of cable infrastructure; and visual impacts. However, future offshore wind structures could have beneficial impacts on recreation through fish aggregation and reef effects. The WTGs and OSS installed within the Wind Farm Development Area are expected to serve as additional artificial reef structures, providing additional locations for recreational for-hire fishing trips, potentially increasing the number of trips and revenue.

The presence of offshore wind structures would increase the complexity of navigation within the Lease Area and risk of allision (with fixed structures) or collision (with other vessels). The presence of structures within the Lease Area could require adjustment of routes for recreational boaters, anglers,

sailboat races, and sightseeing boats, but the impact on recreational boating would be limited by the distance offshore. Recreational boating routes in the geographic analysis area mainly occur within 3 nm (5.5 kilometer) of the coastline within the New York Bight (COP Volume 2e, Section 8.7.1.1; Empire 2022).

The Proposed Action would install an estimated an estimated 131 acres (53 hectares) of scour protection for WTG foundations and 123 acres (49.8 hectares) of cable protection in the geographic analysis area, increasing the risk of entanglement with fishing gear. Buried offshore cables would not pose a risk for most recreational vessels, as smaller-vessel anchors would not penetrate to the target burial depth for the cables. Also, because anchoring is more common in shallower water depths, anchoring risk is more likely to be an impact over export cables in shallower water closer to coastlines. The risk to recreational boating from the addition of scour and cable protection would be localized, continuous, and long term.

Construction of new offshore structures in the Lease Area could provide new opportunities for offshore tourism by attracting recreational fishing, wildlife sightseeing, and tours of offshore wind infrastructure. The WTG and OSS structures are expected to produce artificial reef effects. The "reef effect" refers to the introduction of a new hard-bottom habitat that has been shown to attract numerous species of algae, shellfish, finfish, and sea turtles to new benthic habitat. The reef effect could attract species of interest for recreational fishing, resulting in an increase in recreational boaters traveling farther from shore in order to fish. The potential attraction of sea turtles to the structures may also attract recreational boaters and sightseeing vessels. Although the likelihood of recreational vessels visiting the offshore structures would diminish with distance from shore, increasing numbers of offshore structures may encourage a greater volume of recreational vessels to travel to the Lease Area. Additional fishing and tourism activity generated by the presence of structures could also increase the likelihood of allisions and collisions involving recreational fishing or sightseeing vessels, as well as commercial fishing vessels.

As it relates to the visual impacts of structures, the vertical presence of the Proposed Action's 147 WTGs and two OSS on the offshore horizon may affect recreational experience and tourism in the geographic analysis area. Section 3.20 describes the visual impacts from offshore wind infrastructure. During construction, viewers on the New York and New Jersey Shores would see the upper portions of tall equipment such as mobile cranes. These cranes would move from WTG to WTG as construction progresses, and thus would not be long-term fixtures. Based on the duration of construction activity, visual contrast associated with construction of the Proposed Action would have a temporary, minor impact on recreation and tourism.

The visual contrast created by the WTGs during operations could have a beneficial, adverse, or neutral impact on the quality of the recreation and tourism experience depending on the viewer's values, the activity engaged in, and the purpose for visiting the area. As described in Section 3.18.3.2, studies and surveys that have evaluated the impacts of offshore wind facilities on tourism have identified variable reactions to offshore wind, with respondents having positive, neutral, or negative views of the effect that offshore wind infrastructure would have on their experience of coastal recreation (Parsons and Firestone 2018; BOEM 2021a), while a study in Europe found that established offshore wind facilities did not result in decreased tourist numbers, tourist experience, or tourist revenue (Smythe et al. 2018). The Proposed Action WTGs would be set back more than 22 miles from Gateway National Recreation Area units (see distances to KOP-2 and KOP-14 in Appendix M, Table M-5) and impacts on recreation and tourism within the recreation area are anticipated to be minor and long term.

Based on the impacts of the WTGs and OSS on navigation and fishing, the potential reef effects of these structures, and the risks to anchoring and gear loss associated with scour or cable protection, the Proposed Action would have long-term, continuous, minor beneficial and minor adverse impacts on recreation and tourism.

**Traffic:** The Proposed Action would contribute to increased vessel traffic and associated vessel collision risk along routes between ports and the offshore construction areas, and within the Lease Area during Project construction, O&M, and decommissioning. The Proposed Action is projected to generate an average of 2.8 vessel trips per day between ports and the Lease Area during construction, and 1.4 vessel trips per day during operations. This level of increase in vessel traffic would represent only a modest increase compared to the background volumes of vessel traffic in and around the New York Bight, and BOEM expects that vessel traffic would have long-term, minor impacts on recreation and tourism in the geographic analysis area.

Empire is considering the use of helicopters during construction and to support offshore O&M activities. Details on specific routes and frequency of trips are not known at this time; however, they have the potential to cross noise-sensitive recreational areas including Gateway National Recreation Area and Otis Park Fire Island High Dunes Wilderness. The mean existing sound level at Gateway National Recreation Area is estimated to be 47.3 dB (Wood 2015). Helicopters traveling at 500 feet are approximately 87 dB, which is loud enough to interrupt normal conversations. Depending on the number and frequency of helicopter trips, the impact of the additional noise from helicopter use could result in localized, continuous, and long-term impacts.

Non-routine activities such as response to spills from maintenance or repair vessels would generally require intense, temporary activity to address emergency conditions or respond to an oil spill. Non-routine activities could temporarily prevent or deter recreation or tourist activities near the site of a given non-routine event. Empire would develop an emergency plan and OSRP (APM 195 and APM 202) and provide marine coordination for vessels associated with the Projects through a central coordination hub from which all Project vessel movements would be managed and third-party traffic would be monitored (APM 177). With implementation of navigation-related mitigation measures, the impacts of non-routine activities on recreation and tourism would be minor.

#### 3.18.5.1. Impact of the Connected Action

The potential impacts of the connected action on recreation and tourism were evaluated through the following IPFs: land disturbance, lighting, and noise.

**Land disturbance:** Construction of the connected action would require demolition of existing structures and paving, excavation of fill to install support structures, installation of support structures, above-ground structures including three crane pads, paving for assembly roads and replacement of existing pavement, and construction of an O&M facility including utilities. The proposed construction activities could result in localized, temporary disturbance to recreation activities or tourism-based businesses near the construction site. The proposed SBMT enhancements would be in a developed area zoned for heavy manufacturing that generates noise, traffic, or pollutants; therefore, construction of the connected action would have negligible impacts on recreation and tourism due to land disturbance. Operation of the connected action is not expected to have impacts on recreation and tourism, as activities would be consistent with existing land use and zoning.

**Lighting:** The areas adjacent to SBMT have been extensively developed. Because of the high development density and the industrial and commercial nature of surrounding properties, existing nighttime lighting is prevalent. Permanent lighting and other utilities associated with the crane platform would be established on the wharf. Although lighting associated with the construction and operation of the connected action would have a long-term impact, the overall impact on recreation and tourism in the geographic analysis area is likely to be limited.

**Noise:** Noise from the operation of construction equipment and associated vehicle traffic could result in impacts on recreation and tourism in the areas surrounding SBMT by temporarily disturbing the natural

sounds of the marine environment or the expected quiet of recreation areas. However, onshore construction would be limited to areas zoned for heavy industries that generate ongoing noise and traffic. Noise from constructing the connected action would have temporary but negligible impacts on recreation and tourism near SBMT. Noise from operation of the connected action is not expected to have a significant adverse effect, as the proposed increases in traffic would result in a noise increase of 3 A-weighted decibels and the crane pads are farther than 1,500 feet from the closest noise sensitive receptor (see Appendix P).

### 3.18.5.2. Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind activities, other planned offshore wind activities, and the connected action at SBMT.

In context of reasonably foreseeable environmental trends, BOEM expects that the Proposed Action in combination with other ongoing and planned activities in the geographic analysis area would result in localized minor impacts on recreation and tourism related to anchoring and land disturbance. BOEM expects that lighting for the Proposed Action and other ongoing and planned activities would have negligible to minor impacts on recreation and tourism. The cumulative impacts of the Proposed Action related to cable emplacement would be minor on recreation and tourism due to the localized and temporary nature of the impacts and ability of displaced users to use alternate nearby locations during construction and installation, O&M, and decommissioning of offshore export cables. Noise created as a result of the Proposed Action in combination with other ongoing and planned activities would have minor impacts on recreation and tourism due to the localized and temporary nature of the impacts and ability of displaced users to use alternate nearby locations during construction and decommissioning. Impacts of noise on recreation and tourism during operations would be negligible and long term. The combined impacts of the presence of structures on recreation and tourism from the cumulative impacts of the Proposed Action would range from minor beneficial (related to reef effects and recreational fishing and sightseeing opportunity) to minor adverse (related to increased navigational complexity, space-use conflicts, anchoring, and gear entanglement or loss). Structures from other planned offshore wind development would generate comparable types of impacts as the Proposed Action. The geographic extent of impacts would increase as additional offshore wind projects are constructed, but the level of impacts considering the Proposed Action and other ongoing and planned activities would likely be the same. In context of reasonably foreseeable environmental trends, combined vessel traffic impacts on recreation and tourism from ongoing and planned activities, including the Proposed Action, would be temporary and minor during construction and long term and minor during operations.

### 3.18.5.3. Conclusions

**Impacts of the Proposed Action.** In summary, the impacts from individual IPFs associated with the Proposed Action alone would be **minor** adverse (related to IPFs for anchoring, land disturbance, lighting, cable emplacement, noise, and traffic) and **minor** adverse to **minor beneficial** (related to the presence of structures). IPFs could disrupt recreation and tourism during construction but be localized and temporary, and recreation and tourism could be temporarily displaced to alternate areas. During operations, the presence of offshore structures would increase navigational complexity in the Lease Area and scour and cable protection could increase the risk of gear entanglement or loss, and difficulty with anchoring. Beneficial impacts on recreation and tourism would result from the reef effect (providing additional locations for recreational for-hire fishing trips) and sightseeing attraction of offshore wind energy structures.

The connected action would have **negligible** adverse impacts on recreation and tourism from land disturbance, lighting, and noise.

**Cumulative Impacts of the Proposed Action.** In context of other reasonably foreseeable environmental trends, the contribution of the Proposed Action to the impacts of individual IPFs resulting from ongoing and planned activities (including planned offshore wind) would be **minor** adverse (related to IPFs for anchoring, land disturbance, lighting, cable emplacement, noise, and traffic) and **minor** adverse to **minor beneficial** (related to the presence of structures). Considering all IPFs together, the cumulative impact of the Proposed Action in combination with ongoing and planned activities would range from **minor** adverse to **minor beneficial**.

## 3.18.6 Impacts of Alternatives B, E, and F on Recreation and Tourism

**Impacts of Alternatives B, E, and F.** Alternatives B, E, and F would alter the turbine array layout compared to the Proposed Action; however, each of these alternatives would allow for installation of up to 147 WTGs as defined in Empire's PDE. Alternative B would remove six WTG positions closest to Cholera Bank, Alternative E would remove a row of seven WTG positions to create a separation between EW 1 and EW 2, and Alternative F would remove up to 22 WTG positions from EW 1 and optimize the layout for annual energy production. The Alternative F layout would incorporate removal of 22 WTG positions from EW 1, which would to improve access for fishing.

Further opening access to Cholera Bank and interior portions of EW 1 and creating openings within the layout or separation between EW 1 and EW 2 would all reduce space use conflicts for recreational boating, fishing, and sightseeing; risk of allision with structures; and risk of gear entanglement or loss compared to the Proposed Action. However, BOEM expects that the overall impact level would not be reduced and would be the same as that of the Proposed Action. Impacts from individual IPFs associated with Alternative B, E, or F alone would be minor adverse (related to IPFs for anchoring, land disturbance, lighting, cable emplacement, noise, and traffic) and minor adverse to minor beneficial (related to the presence of structures).

**Cumulative Impacts of Alternatives B, E, and F.** In context of other reasonably foreseeable environmental trends in the area, the contribution of Alternative B, E, or F to the cumulative impacts on recreation and tourism would generate comparable types of impacts as those of the Proposed Action. The geographic extent of impacts would increase as additional offshore wind projects are constructed, but the level of impacts considering Alternative B, E, or F and other ongoing and planned activities would likely be the same: minor adverse (related to IPFs for anchoring, land disturbance, lighting, cable emplacement, noise, and traffic) and minor adverse to minor beneficial (related to the presence of structures). Considering all IPFs together, the cumulative impacts of Alternative B, E, or F would range from minor adverse to minor beneficial.

### 3.18.6.1. Conclusions

**Impacts of Alternatives B, E, and F.** The impacts from individual IPFs associated with Alternative B, E, or F alone or in combination with ongoing and planned activities would be **minor** adverse (related to IPFs for anchoring, land disturbance, lighting, cable emplacement, noise, and traffic) and **minor** adverse to **minor beneficial** (related to the presence of structures).

**Cumulative Impacts of Alternatives B, E, and F.** Considering all IPFs together, the cumulative impacts of Alternative B, E, or F in combination with ongoing and planned activities would range from **minor** adverse to **minor beneficial**.

## 3.18.7 Impacts of Alternatives C, D, G, and H on Recreation and Tourism

**Impacts of Alternatives C, D, G, and H.** The impacts resulting from individual IPFs associated with construction and installation, O&M, and decommissioning of the Projects under Alternative C, D, G, or H would be the same as those described under the Proposed Action. Submarine and onshore cable route

options around the Gravesend Anchorage (Alternative C-1) and the Ambrose Navigation Channel (Alternative C-2), to avoid the sand borrow area (Alternative D), or to utilize a cable bridge to cross Barnums Channel (Alternative G) are already covered under the Proposed Action as part of the PDE approach and narrowing the submarine and onshore cable route options under Alternative C, D, or G would not change the analysis of any IPF. Alternative methods for dredge and fill activities under Alternative H would also have no impact on recreation and tourism.

**Cumulative Impacts of Alternatives C, D, G, and H.** In context of reasonably foreseeable environmental trends, the contribution of Alternative C, D, G, or H to the cumulative impacts on recreation and tourism would be the same as that described under the Proposed Action: minor adverse (related to IPFs for anchoring, land disturbance, lighting, cable emplacement, noise, and traffic) and minor adverse to minor beneficial (related to the presence of structures). The cumulative impacts of Alternative C, D, G, or H would be the same as described under the Proposed Action: minor adverse to minor beneficial.

#### 3.18.7.1. Conclusions

**Impacts of Alternatives C, D, G, and H.** Submarine and onshore cable route options analyzed under Alternatives C, D, and G are already covered as part of the PDE approach and narrowing the cable route options would not change the analysis of any IPF. Alternative methods for dredge and fill activities under Alternative H would also have no impact on recreation and tourism. The impacts from individual IPFs associated with Alternative C, D, G, or H would be **minor** adverse (related to IPFs for anchoring, land disturbance, lighting, cable emplacement, noise, and traffic) and **minor** adverse to **minor beneficial** (related to the presence of structures). Considering all IPFs together, the overall impacts of Alternative C, D, G, or H would range from **minor** adverse to **minor beneficial**.

**Cumulative Impacts of Alternatives C, D, G, and H.** In context of reasonably foreseeable environmental trends, the contribution of Alternatives B, C, D, E, F, G, and H to the cumulative impacts on recreation and tourism would be the same as that described under the Proposed Action: **minor** adverse (related to IPFs for anchoring, land disturbance, lighting, cable emplacement, noise, and traffic) and **minor** adverse to **minor beneficial** (related to the presence of structures).

### 3.18.8 Comparison of Alternatives

Alternatives B, E, and F would alter the turbine array layout compared to the Proposed Action; however, each of these alternatives would allow for installation of up to 147 WTGs as defined in Empire's PDE. The overall impact level would remain the same as that of the Proposed Action: **minor** adverse (related to IPFs for anchoring, land disturbance, lighting, cable emplacement, noise, and traffic) and **minor** adverse to **minor beneficial** (related to the presence of structures).

Because Alternatives C, D, and G are already covered under the Proposed Action as part of the PDE approach and narrowing the PDE for submarine and the onshore cable installation under Alternatives C, D, or G would not change the analysis of any IPF, the impacts on recreation and tourism from these alternatives would be the same as under the Proposed Action: **minor** adverse (related to IPFs for anchoring, land disturbance, lighting, cable emplacement, noise, and traffic) and **minor** adverse to **minor beneficial** (related to the presence of structures).

In context of reasonably foreseeable environmental trends, the contribution of Alternatives B, C, D, E, F, G, and H to the cumulative impacts on recreation and tourism would be the same as that of the Proposed Action: **minor** adverse (related to IPFs for anchoring, land disturbance, lighting, cable emplacement, noise, and traffic) and **minor** adverse to **minor beneficial** (related to the presence of structures). Considering all the IPFs together, BOEM anticipates that the contribution of Alternative B, C, D, E, F, G,

or H to the impacts from ongoing and planned activities would result in **minor** adverse to **minor beneficial** cumulative impacts on recreation and tourism in the geographic analysis area.

# 3.19. Sea Turtles

This section discusses existing sea turtle resources within the geographic analysis area and the potential impacts on these resources from the Proposed Action, alternatives, and ongoing and planned activities within that area. The geographic analysis area, as shown on Figure 3.19-1, includes the Northeast Shelf, Southeast Shelf, and Gulf of Mexico LMEs to capture the movement range for sea turtle species that could be affected by the Projects.

## 3.19.1 Description of the Affected Environment for Sea Turtles

Five species of sea turtle have been documented in U.S. waters of the northwest Atlantic Ocean, where almost all Project activities would occur: green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and loggerhead (*Caretta caretta*). All five species are listed under the ESA; hawksbill, Kemp's ridley, and leatherback sea turtles are listed as endangered, and green and loggerhead sea turtles are listed as threatened. Critical habitat has been designated for green, hawksbill, leatherback, and loggerhead sea turtles; however, critical habitat for these species is not within or in the vicinity of the Project area. Project vessels transiting routes to and from the Gulf of Mexico may travel through critical habitat for the Northwest Atlantic DPS of loggerhead sea turtles, specifically wintering habitat, breeding habitat, migratory habitat, or *Sargassum* habitat. Although hawksbill sea turtles have been documented in OCS waters of the northwest Atlantic Ocean, they are rare in this region and are considered unlikely to occur. This species occurs regularly in the Gulf of Mexico. However, only two vessel round trips from Corpus Christi are expected for the Projects, making impacts in the Gulf of Mexico unlikely. Therefore, hawksbill sea turtle will not be described further in this section. A description of the four species likely to occur in the Project area is provided below. Additional information on sea turtle species is provided in COP Volume II, Section 5.7.1 (Empire 2022).

Sea turtles generally migrate into or through the Project area as they travel between their northern-latitude feeding grounds and their nesting grounds in the southern U.S., the Gulf of Mexico, and the Caribbean. As ocean waters warm in the spring, sea turtles migrate northward to their feeding grounds in the Mid-Atlantic, typically arriving in the spring or summer and remaining through the fall. As water temperatures cool, most sea turtles begin their return migration to the south. Historically, this southward migration begins in October, and most turtles are gone by the first week in November. Some individuals may remain in the Mid-Atlantic into the winter when they could experience cold stunning (Empire 2022).

The best available information on the occurrence and distribution of sea turtles in the Project area is provided by a combination of sighting, stranding, and bycatch data, including:

- Site-specific aerial survey data collected by Empire (see Appendix P of the COP, summarized in Table 5.7-1 and Figure 5.7-3 in Volume 2b of the COP; Empire 2022)
- Protected Species Observer data collected in the Project area (summarized in Table 5.7-2 in Volume 2b of the COP; Empire 2022)
- Aerial survey data collected by NYSERDA and NYSDEC (Normandeau and APEM 2018; Tetra Tech and LGL 2019, 2020; Tetra Tech and Smultea Sciences 2018; Tetra Tech and LGL 2019, 2020)
- Sighting data retrieved from the Ocean Biodiversity Information System (Halpin et al. 2009; Roberts et al. 2016a, 2016b, 2017, 2018, 2020)
- Data from NOAA's Atlantic Marine Assessment Program for Protected Species surveys (NEFSC and SEFSC 2018, 2020)
- Other regional data (CETAP 1981; Kenney and Vigness-Raposa 2010; Kraus et al. 2016; NMFS 2019)

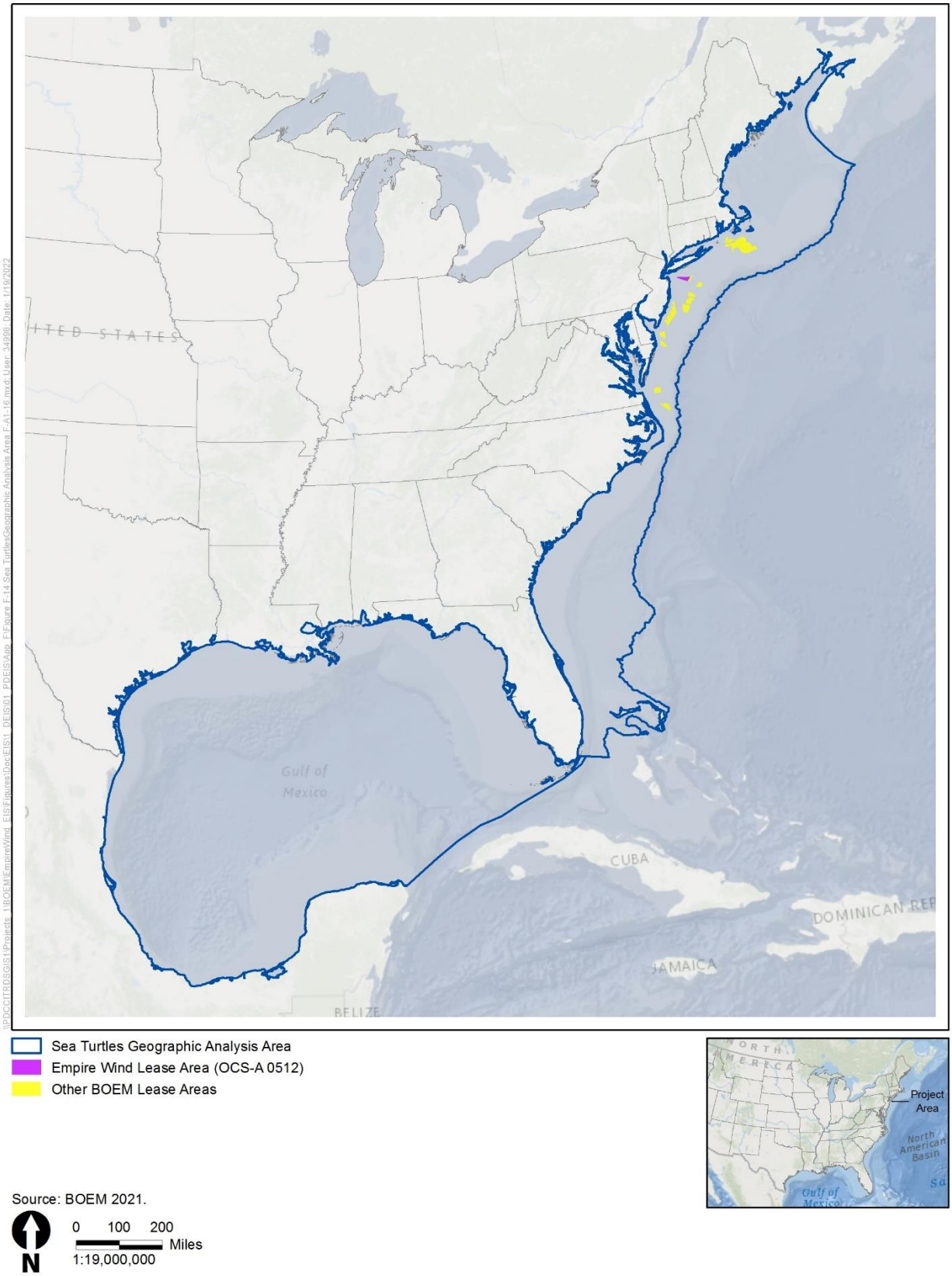


**Figure 3.19-1 Sea Turtles Geographic Analysis Area**

These data are summarized on Figure 5.7-2 in Volume 2b of the COP (Empire 2022). Species occurrence is summarized in Table 3.19-1 and described in the following paragraphs.

**Green sea turtle:** Green sea turtles found in the Project area most likely belong to the North Atlantic DPS, although Project vessels transiting through the South Atlantic and Gulf of Mexico may encounter individuals from both the North Atlantic and South Atlantic DPSs (Bass and Witzell 2000; Foley et al. 2007). This species inhabits tropical and subtropical waters around the globe. In the U.S., green sea turtles occur from Texas to Maine, as well as the Caribbean. Late juveniles and adults are typically found in nearshore waters of shallow coastal habitats (NMFS 2021a). No green sea turtle nesting has been documented on the New York coast. The adult diet is largely herbivorous, composed primarily of algae and seagrasses with occasional sponges and invertebrates (NMFS 2021a). Although they have the potential to occur year-round, green sea turtles generally occur seasonally in the Project area with the highest densities observed between June and November. Green sea turtles have been sighted in the vicinity of the Project area in relatively low numbers compared to the other three species. Seasonal densities of this species were derived from NYSERDA annual reports and are provided in Table 23 of Appendix M-2 of the COP (Empire 2022). Green sea turtles have a density of 0.00 animal per 100 $km^2$ in all four seasons. There is no population estimate for the North Atlantic DPS of green sea turtles. However, nester abundance for this DPS is estimated at 167,424 (Seminoff et al. 2015). All major nesting populations in this DPS have shown long-term increases in abundance (Seminoff et al. 2015). Nester abundance for the South Atlantic DPS is estimated at 63,332, although many nesting sites have insufficient data to estimate abundance (Seminoff et al. 2015). Long-term data are lacking to evaluate trends for this DPS. A detailed species description for green sea turtles is provided in Section 5.7.1.2 of Volume 2b of the COP (Empire 2022).

**Table 3.19-1 Sea Turtles Likely to Occur in the Project Area**

| Common Name | Scientific Name | DPS/ Population | ESA Status | Relative Occurrence in the Project Area | Seasonal Occurrence in the Project Area |
|---|---|---|---|---|---|
| Green | *Chelonia mydas* | North Atlantic | Threatened | Regular | June to November |
| Kemp's ridley | *Lepidochelys kempii* | - | Endangered | Common | June to November |
| Leatherback | *Dermochelys coriacea* | Northwest Atlantic | Endangered | Common | June to November |
| Loggerhead | *Caretta caretta* | Northwest Atlantic | Threatened | Common | June to November |

**Kemp's ridley sea turtle:** All Kemp's ridley sea turtles, including those found in the Project area, belong to a single population. This species primarily inhabits the Gulf of Mexico, although large juveniles and adults travel along the U.S. Atlantic coast. At these life stages, Kemp's ridley sea turtles occupy nearshore habitats in subtropical to warm temperate waters, including sounds, bays, estuaries, tidal passes, shipping channels, and beachfront waters. A single Kemp's ridley nest was documented on Queen's Beach, New York in 2018. However, this nest was outside the known nesting range for the species, which is essentially limited to the beaches of the western Gulf of Mexico (NMFS and USFWS 2015). The diet of Kemp's ridley sea turtles is composed of crabs, mollusks, shrimp, fish, and vegetation (Ernst et al. 1994). Kemp's ridley sea turtles could occur in the Project area year-round, but they are mainly in the region during the summer and fall. Annual density of Kemp's ridley sea turtles is provided on Figure 5.7-4 in Volume 2b of the COP (Empire 2022). Seasonal densities of this species were derived from NYSERDA

annual reports and are provided in Table 23 of Appendix M-2 of the COP (Empire 2022). Kemp's ridley sea turtles have seasonal densities of 0.001 animal per 100 $km^2$ for spring, 0.010 animal per 100 $km^2$ for summer, 0.002 animal per 100 $km^2$ for fall, and 0.000 animal per 100 $km^2$ for winter. In 2012, the population of individuals age 2 and up was estimated at 248,307 turtles (NMFS and USFWS 2015 citing Gallaway et al. 2013). Since 2009, there has been a decline in nest abundance for this population (NMFS and USFWS 2015). A detailed species description for Kemp's ridley sea turtles is provided in Section 5.7.1.2 of Volume 2b of the COP (Empire 2022).

**Leatherback sea turtle:** Leatherback sea turtles that occur in the Project area belong to the Northwest Atlantic population identified in the 2020 status review for the species (NMFS and USFWS 2020); however, this population has not been identified as a DPS or listed separately under the ESA at this time. This species is found in the Atlantic, Pacific, and Indian Oceans (NMFS 2021b). Leatherback sea turtles can be found throughout the western North Atlantic Ocean as far north as Nova Scotia, Newfoundland, and Labrador (Ernst et al. 1994). While early life stages prefer oceanic waters, adult leatherback sea turtles are generally found in mid-ocean, continental shelf, and nearshore waters (NMFS and USFWS 1992). This species does not nest along the New York coast. Leatherback sea turtle diets are composed almost exclusively of jellyfish, salps, and other gelatinous prey (Bjorndal 1997). This species displays a marked migration pattern, entering the Mid-Atlantic in spring and remaining through the summer months (Shoop and Kenney 1992). However, leatherback sea turtles could occur in the Project area throughout the year. Annual density of leatherback sea turtles is provided on Figure 5.7-6 in Volume 2b of the COP (Empire 2022). Seasonal densities of this species were derived from NYSERDA annual reports and are provided in Table 23 of Appendix M-2 of the COP (Empire 2022). Leatherback sea turtles have a seasonal density of 0.000 animal per 100 $km^2$ for spring, 0.003 animal per 100 $km^2$ for summer, 0.008 animal per 100 $km^2$ for fall, and 0.000 animal per 100 $km^2$ for winter. The best available estimate of nesting female abundance for the Northwest Atlantic population is 20,659 females. This population is currently exhibiting an overall decreasing trend in annual nesting activity (NMFS and USFWS 2020). A detailed species description for leatherback sea turtles is provided in Section 5.7.1.2 of Volume 2b of the COP (Empire 2022).

**Loggerhead sea turtle:** Loggerhead sea turtles found in the Project area belong to the Northwest Atlantic DPS. This species inhabits nearshore and offshore habitats throughout the globe (Dodd 1988). Loggerhead sea turtles occur throughout the Northwest Atlantic as far north as Newfoundland (NMFS 2021c). This species does not nest along the New York coast. Juvenile loggerhead sea turtles have omnivorous diets, consuming crabs, mollusks, jellyfish, and vegetation. Adults are carnivores, consuming primarily benthic invertebrates (Dodd 1988). Although they have the potential to occur year-round, loggerhead sea turtles generally occur seasonally in the Project area during summer and fall with the highest densities observed in the summer months. Annual density of loggerhead sea turtles is provided on Figure 5.7-2 in Volume 2b of the COP (Empire 2022). Seasonal densities of this species were derived from NYSERDA annual reports and are provided in Table 23 of Appendix M-2 of the COP (Empire 2022). Loggerhead sea turtles have a seasonal density of 0.003 animal per 100 $km^2$ for spring, 0.268 animals per 100 $km^2$ for summer, 0.002 animal per 100 $km^2$ for fall, and 0.000 animal per 100 $km^2$ for winter. The most recent population estimate for the Northwest Atlantic continental shelf, calculated in 2010, is 588,000 juvenile and adult loggerhead sea turtles (NEFSC and SEFSC 2011). The recovery units for the Northwest Atlantic DPS have shown no trend or an increasing trend in nest abundance; however, these recovery units have not met their recovery criteria for annual increases in nest abundance (Bolten et al. 2019). A detailed species description for loggerhead sea turtles is provided in Section 5.7.1.2 of Volume 2b of the COP (Empire 2022).

All four sea turtle species in the geographic analysis area are subject to regional, pre-existing threats. These threats include fisheries bycatch, loss or degradation of nesting and foraging habitat, entanglement

in fishing gear, vessel strikes, predation and harvest, disease, and climate change. Green, Kemp's ridley, and loggerhead sea turtles are also susceptible to cold stunning.

Although sea turtles possess auditory organs that are adapted for underwater hearing, hearing abilities for these species are not well studied but have been reported to be limited to low frequencies, typically below 1,600 Hz. The documented hearing range for each of the four sea turtle species is provided in Table 3.19-2.

**Table 3.19-2 Sea Turtle Hearing Ranges**

| Species | Hearing Range (Hertz) | | Source |
|---|---|---|---|
| | Minimum | Maximum | |
| Green | 50 | 1,600 | Dow Piniak et al. 2012a |
| Kemp's ridley | 100 | 500 | Bartol and Ketten 2006 |
| Leatherback | 50 | 1,200 | Dow Piniak et al. 2012b |
| Loggerhead | 50–100 | 800–1,120 | Martin et al. 2012 |

## 3.19.2 Impact Level Definitions for Sea Turtles

Definitions of impact levels are provided in Table 3.19-3.

**Table 3.19-3 Impact Level Definitions for Sea Turtles**

| Impact Level | Impact Type | Definition |
|---|---|---|
| Negligible | Adverse | Impacts on sea turtles would be undetectable or barely measurable, with no consequences to individuals or populations. |
| | Beneficial | Impacts on sea turtles would be undetectable or barely measurable, with no consequences to individuals or populations. |
| Minor | Adverse | Impacts on sea turtles would be detectable and measurable, but of low intensity, highly localized, and temporary or short term in duration. Impacts may include injury or loss of individuals, but these impacts would not result in population-level effects. |
| | Beneficial | Impacts on sea turtles would be detectable and measurable, but of low intensity, highly localized, and temporary or short term in duration. Impacts could increase survival and fitness, but would not result in population-level effects. |
| Moderate | Adverse | Impacts on sea turtles would be detectable and measurable and could result in population-level effects. Adverse effects would likely be recoverable and would not affect population or DPS viability. |
| | Beneficial | Impacts on sea turtles would be detectable and measurable and could result in population-level effects. Impacts would be measurable at the population level. |
| Major | Adverse | Impacts on sea turtles would be significant and extensive and long term in duration, and could have population-level effects that are not recoverable, even with mitigation. |
| | Beneficial | Impacts would be significant and extensive and contribute to population or DPS recovery. |

## 3.19.3 Impacts of the No Action Alternative on Sea Turtles

When analyzing the impacts of the No Action Alternative on sea turtles, BOEM considered the impacts of ongoing activities, including ongoing non-offshore wind and ongoing offshore wind activities, on the baseline conditions for sea turtles. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities as described in Appendix F, *Planned Activities Scenario*.

### 3.19.3.1. Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for sea turtles, described in Section 3.19.1, *Description of the Affected Environment for Sea Turtles*, would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore wind and offshore wind activities within the geographic analysis area that contribute to impacts on sea turtles are generally associated with coastal and offshore development, marine transport, fisheries use, and climate change. Coastal and offshore development, marine transport, and fisheries use and associated impacts are expected to continue at current trends and have the potential to affect sea turtles through accidental releases (see Table F1-23 in Appendix F for a summary of accidental releases anticipated), which can have physiological effects on sea turtles; EMF and light, which can result in behavioral changes in sea turtles; new cable emplacement and maintenance and port utilization, which can disturb benthic habitats and affect water quality; noise, which can have physiological and behavioral effects on sea turtles; the presence of structures, which can result in behavioral changes in sea turtles, effects on prey species, and increased risk of interactions with fishing gear; and vessel traffic, which increases risk of vessel collision. Global climate change is an ongoing risk for sea turtle species in the geographic analysis area. Warming and sea level rise could affect sea turtles through increased storm frequency and severity, altered habitat/ecology, altered migration patterns, increased disease incidence, increased erosion and sediment deposition, and development of protective measures (e.g., seawalls and barriers); ocean acidification may also affect sea turtles (Hawkes et al. 2009). Warming and sea level rise, with their associated consequences, and ocean acidification could lead to long-term, high-consequence impacts on sea turtles, including changes to sea turtle distribution, habitat use, migratory patterns, nesting periods, nestling sex ratios, nesting habitat quality or availability, prey distribution or abundance, and foraging habitat availability (Fuentes and Abbs 2010; Janzen 1994; Newson et al. 2009; Witt et al. 2010).

Ongoing offshore wind activities within the geographic analysis area that contribute to impacts on sea turtles include:

- Continued O&M of the Block Island project (five WTGs) installed in state waters;
- Continued O&M of the Coastal Virginia Offshore Wind project (two WTGs) installed in OCS-A 0497; and
- Ongoing construction of two offshore wind projects, the Vineyard Wind 1 project (62 WTGs and 1 OSS) in OCS-A 0501 and the South Fork project (12 WTGs and 1 OSS) in OCS-A 0517.

Ongoing O&M of the Block Island and Coastal Virginia Offshore Wind projects and ongoing construction of the Vineyard Wind 1 and South Fork projects would affect sea turtles through the primary IPFs of noise, presence of structures, and vessel traffic. Ongoing offshore wind activities would have the same type of impacts from noise, presence of structures, and vessel traffic that are described in detail in Section 3.19.3.2 for planned offshore wind activities but the impacts would be of lower intensity.

See Table F1-21 for a summary of potential impacts associated with ongoing non-offshore wind and offshore activities by IPF for sea turtles.

### 3.19.3.2. Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Planned non-offshore wind activities within the geographic analysis area that contribute to impacts on sea turtles include undersea transmission lines, gas pipelines, and other submarine cables; tidal energy projects; marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; oil and gas activities; and onshore development activities (see Section F.2 in Appendix F for a complete description of planned activities). BOEM expects planned activities other than offshore wind to affect sea turtles through several primary IPFs, including accidental releases, EMF, light, new cable emplacement and maintenance, port utilization, noise, and the presence of structures. See Table F1-21 for a summary of potential impacts associated with planned non-offshore wind activities by IPF for sea turtles.

The sections below summarize the potential impacts of other ongoing and planned offshore wind activities on sea turtles during construction, O&M, and decommissioning of the projects. Other ongoing and planned offshore wind activities in the geographic analysis area for sea turtles include the construction, O&M, and decommissioning of 30 offshore wind projects.

BOEM expects ongoing and planned offshore wind activities to affect sea turtles through the following primary IPFs.

**Accidental releases:** Ongoing and planned offshore wind activities may increase accidental releases of fuels, fluids, hazardous materials, and trash and debris due to increased vessel traffic and installation of WTGs and other offshore structures. The risk of accidental releases is expected to be highest during construction, but accidental releases could also occur during operation and decommissioning.

Ongoing and planned offshore wind activities are expected to gradually increase vessel traffic over the next 35 years, increasing the risk of accidental releases of fuels, fluids, and hazardous materials. There would also be a low risk of fuel, fluid, and hazardous materials leaks from any of the 2,884 WTGs (Table F2-1 in Appendix F) anticipated in the geographic analysis area (including ongoing and planned projects but not including the Proposed Action). The total volume of WTG fuels, fluids, and hazardous materials in the geographic analysis area is estimated at 14.3 million gallons (Table F2-3 in Appendix F). OSS and ESPs are expected to hold an additional 10.8 million gallons of fuels, fluids, and hazardous materials (Table F2-3 in Appendix F). BOEM has modeled the risk of spills associated with WTGs and determined that a release of 128,000 gallons is likely to occur no more frequently than once every 1,000 years and a release of 2,000 gallons or less is likely to occur every 5 to 20 years (Bejarano et al. 2013). Sea turtle exposure to oil spills through aquatic contact or inhalation of fumes can result in death (Shigenaka et al. 2010) or sublethal effects, including but not limited to adrenal effects, dehydration, hematological effects, increased disease incidence, hepatological effects, poor body condition, dermal effects, and skeletomuscular effects (Bembenek-Bailey et al. 2019; Camacho et al. 2013; Mitchelmore et al. 2017; Shigenaka et al. 2010; Vargo et al. 1986). Such sublethal effects would affect individual fitness but are not expected to affect sea turtle populations. In addition to direct effects on sea turtles, accidental releases can indirectly affect sea turtles through impacts on prey species (see Section 3.13, *Finfish, Invertebrates, and Essential Fish Habitat*). Given the volumes of fuels, fluids, and hazardous materials potentially involved and the likelihood of release occurrence, the increase in accidental releases associated with planned offshore wind activities is expected to fall within the range of releases that occur on an ongoing basis from non-offshore wind activities.

Increased vessel traffic would also increase the risk of accidental releases of trash and debris during construction, operation, and decommissioning of offshore wind facilities. All sea turtle species are known to ingest trash and debris, including plastic fragments, tar, paper, polystyrene foam, hooks, lines, and net fragments (Bugoni et al. 2001; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014; Tomás et al. 2002). Such ingestion can occur accidentally or intentionally when individuals mistake the debris for potential prey items (Gregory 2009; Hoarau et al. 2014; Tomás et al. 2002). Ingestion of trash and debris can result in death or sublethal effects, including but not limited to dietary dilution, chemical contamination, depressed immune system, poor body condition, reduced growth rates, reduced fecundity, and reduced reproductive success (Gall and Thompson 2015; Hoarau et al. 2014; Nelms et al. 2016; Schuyler et al. 2014). These sublethal effects would affect individual fitness, but mortality and sublethal effects associated with ingestion of trash and debris are not expected to have population-level effects. BOEM assumes that all vessels will comply with laws and regulations to minimize trash releases and expects that such releases would be small and infrequent. The amount of trash and debris accidentally released during planned offshore wind activities would likely be miniscule compared to trash releases associated with ongoing activities, including land-based activities and commercial and recreational fishing.

**EMF:** Ongoing and planned offshore wind activities would install up to 10,306 miles (16,586 kilometers) of export and interarray cables, increasing the production of EMF and heat in the geographic analysis area. EMF and heat effects would be reduced by cable burial to an appropriate depth and shielding, if necessary. Cables are also expected to be separated by a minimum distance of 330 feet, avoiding additive EMF and heat effects from adjacent cables.

Sea turtles are capable of detecting magnetic fields, and behavioral responses to such fields have been documented. The threshold for behavioral responses varies somewhat among species. Loggerhead sea turtles have exhibited responses to field intensities ranging from 0.0047 to 4,000 microteslas, and green sea turtles have responded to field intensities ranging from 29.3 to 200 microteslas (Normandeau et al. 2011); other species are expected to have similar thresholds due to similar anatomical features, behaviors, and life history characteristics. Juvenile and adult sea turtles may detect EMFs associated with ongoing and planned activities when foraging on benthic prey or resting on the bottom in relatively close proximity to cables. There are no data on EMF impacts on sea turtles associated with underwater cables. Migratory disruptions have been documented in sea turtles with magnets attached to their heads (Luschi et al. 2007), but evidence that EMF associated with planned offshore wind activities would likely result in some deviations from direct migration routes is lacking (Snoek et al. 2016). Any deviations are expected to be minor (Normandeau et al. 2011), and any increased energy expenditure due to these deviations would not be biologically significant.

Buried submarine cables can warm the surrounding sediment in contact with the cables up to tens of centimeters (Taormina et al. 2018). There are no data on cable heat effects on sea turtles (Taormina et al. 2018). However, increased heat in the sediment could affect benthic organisms that serve as prey for sea turtles that forage in the benthos. Based on the narrowness of cable corridors and expected weakness of thermal radiation, impacts on benthic organisms are not expected to be significant (Taormina et al. 2018) and would be limited to a small area around the cable. Given the expected cable burial depths, thermal effects would not occur at the surface of the seabed where sea turtles would forage. Therefore, any effects on sea turtle prey availability would be too small to be detected or meaningfully measured.

**Gear utilization:** Ongoing and planned offshore wind activities are expected to include monitoring surveys in the project areas. Sea turtles could be affected by these surveys through survey vessel traffic and interactions with survey gear. Survey vessels would produce underwater noise and increase the risk of vessel strikes. The effects of vessel noise and increased strike risk would be similar to those discussed under the *Noise* and *Traffic* IPFs.

Additional impacts on sea turtles could result from interactions with mobile (e.g., trawl, dredge) or fixed (e.g., trap, hydrophone) survey gear. Offshore wind projects are expected to use trawl surveys, among other methods, for project monitoring. The capture and mortality of sea turtles in fisheries utilizing bottom trawls are well documented (Henwood and Stuntz 1987; NMFS and USFWS 1991, 1992; NRC 1990). Although sea turtles are capable of extended dive durations, entanglement and forcible submersion in fishing gear leads to rapid oxygen consumption (Lutcavage and Lutz 1997). Based on available research, restricting tow times to 30 minutes or less is expected to prevent sea turtle morality in trawl nets (Epperly et al. 2002; Sasso and Epperly 2006). BOEM anticipates trawl surveys for offshore wind project monitoring would be limited to tow times of 20 minutes, indicating that this activity poses a negligible risk of mortality. Additional mitigation measures would be expected to eliminate the risk of serious injury and mortality from forced submergence for sea turtles caught in bottom-trawl survey gear. Tows for clam dredge surveys would have a very short duration of 120 seconds, and the survey vessels would be subject to mitigation measures similar to those for the trawl survey. Therefore, effects of dredge surveys on sea turtles would be insignificant or discountable.

The vertical buoy and anchor lines associated with monitoring surveys using fixed gear, such as fish traps or baited remote underwater video, could pose a risk of entanglement for sea turtles. While there is a theoretical risk of sea turtle entanglement in trap and pot gear, particularly for leatherback sea turtles (NMFS 2016), the likelihood of entanglement would be discountable given the patchy distribution of sea turtles, the small number of vertical lines used in the surveys, and the relatively limited duration of each sampling event. BOEM also anticipates mitigation measures would be in place to reduce sea turtle interactions during fisheries surveys. Sea turtle prey species (e.g., crabs, whelks, fish) may be collected as bycatch in trap gear. However, all bycatch is expected to be returned to the water and would still be available as prey for sea turtles regardless of their condition, particularly for loggerhead sea turtles, which are known to forage for live prey and scavenge dead organisms. Given the non-extractive nature of fixed-gear surveys, any effects on sea turtles from the collection of potential sea turtle prey would be so small that it cannot be meaningfully measured, detected, or evaluated. Therefore, indirect effects on sea turtles due to collection of potential prey items would be insignificant. Hydrophone mooring lines for passive acoustic monitoring studies pose a theoretical entanglement risk to sea turtles, similar to trap and pot surveys. However, BOEM anticipates that monitoring studies utilizing moored systems would be required to use the best available technology to reduce any potential risks of entanglement. Therefore, passive acoustic studies are expected to pose a discountable risk of entanglement to sea turtles.

Monitoring surveys are expected to occur at short-term, regular intervals over the duration of the monitoring program. Although the potential extent and number of animals potentially exposed cannot be determined without project-specific information, impacts of gear utilization on sea turtles are expected to be negligible given the negligible risk of mortality, the discountable risk of entanglement, and the insignificant effect on sea turtle prey availability.

**Lighting:** Vessels and offshore structures associated with planned offshore wind activity will produce light at night. Lighting on vessels and offshore structures could elicit attraction, avoidance, or other behavioral responses in sea turtles. In laboratory experiments, juvenile loggerhead sea turtles consistently oriented toward lightsticks of various colors and types used by pelagic longline fisheries (Wang et al. 2019), indicating that hard-shelled sea turtle species expected to occur in the vicinity of the Projects (i.e., green, Kemp's ridley, and loggerhead) could be attracted to offshore light sources. In contrast, juvenile leatherback sea turtles failed to orient toward or oriented away from lights in laboratory experiments (Gless et al. 2008), indicating that this species may not be attracted to offshore lighting. Any behavioral responses to offshore lighting are expected to be localized and temporary.

Under the planned activities scenario described in Appendix F, 2,884 WTGs and 68 OSS/ESPs would be constructed between 2023 and 2030 (Tables F2-1 and F2-2 in Appendix F). These offshore structures would have yellow flashing navigational lighting and red flashing FAA hazard lights, in accordance with

BOEM's (2021c) lighting and marking guidelines. Following these guidelines, direct lighting would be avoided, and indirect lighting of the water surface would be minimized to the greatest extent practicable. As described in the previous paragraph, offshore lighting may attract juvenile green, Kemp's ridley, and loggerhead sea turtles, based on laboratory experiments. The flashing lights on offshore structures associated with planned offshore wind activities are unlikely to disorient juvenile or adult sea turtles, as they do not present a continuous light source (Orr et al. 2013). There is no evidence that lighting on oil and gas platforms in the Gulf of Mexico, which may have considerably more lighting than offshore WTGs, has had any effect on sea turtles over decades of operation (BOEM 2019a). Therefore, lighting on offshore structures associated with planned offshore wind activities is not expected to have detectable effects on sea turtles.

**Cable emplacement and maintenance:** Ongoing and planned offshore wind activities will involve the placement and maintenance of export and interarray cables. Cable emplacement and maintenance activities disturb bottom sediment, resulting in temporary increases in suspended sediment concentrations. Cable emplacement associated with ongoing and planned offshore wind activities (not including the Proposed Action) is expected to disturb more than 36,125 acres of seabed (Table F2-2 in Appendix F) between 2023 and 2030. This acreage could be reduced if open-access offshore transmission systems are built, as have been proposed. However, such projects are not considered reasonably foreseeable at this time. During cable installation, sediment plumes would be present for up to 6 hours at a time until the activity is completed and suspended sediment settles back to the seabed; areas subject to cumulative increases in suspended sediment from simultaneous activities would be limited because the occurrence of concurrent cable installation operations is expected to be limited. The increases in suspended sediment associated with new cable emplacement and maintenance would be short term and localized to the cable corridor. There are no data on the physiological effects of suspended sediment on sea turtles. However, elevated suspended sediment may cause sea turtles to alter their normal movements and behaviors, as sea turtles would be expected to avoid the area of elevated suspended sediment. Such alterations are expected to be too small to be detected (NMFS 2020a). No effects are anticipated if sea turtles swim through the area of elevated suspended sediment. Suspended sediment is most likely to affect sea turtles if the area of elevated concentrations acts as a barrier to normal behaviors. However, no adverse effects are anticipated due to sea turtles swimming through the area of elevated suspended sediment or avoiding the area (NMFS 2020a). In addition to direct effects on sea turtle behavior, suspended sediment can indirectly affect sea turtles through impacts on prey species, including benthic mollusks, crustaceans, sponges, and sea pens. Elevated suspended sediment concentrations are shown to have adverse effects on benthic communities when they exceed 390 mg/L (NMFS 2020a citing EPA 1986). See Section 3.13, *Finfish, Invertebrates, and Essential Fish Habitat*, for a discussion of impacts on prey species.

Any dredging required prior to cable emplacement could have additional impacts on sea turtles due to impingement, entrainment, or capture in certain types of dredges. Mechanical dredging is not expected to capture, injure, or kill sea turtles (NMFS 2020b). Hopper dredges may strike, impinge, or entrain sea turtles, which may result in injury or mortality (Ramirez et al. 2017 citing Dickerson et al. 1990; Ramirez et al. 2017 citing Dickerson et al. 1991; Ramirez et al. 2017 citing Reine et al. 1998; Ramirez et al. 2017 citing Richardson 1990). The sea turtle species most often affected by dredge interactions is loggerhead sea turtles, followed by green sea turtles, then Kemp's ridley sea turtles (Ramirez et al. 2017). However, the risk of interactions between hopper dredges and sea turtles is expected to be lower in the offshore environment where dredging for offshore wind cables would most likely occur (Michel et al. 2013; NMFS 2020b). The risk of injury or mortality of individual sea turtles due to dredging associated with planned offshore wind activities is considered low, and population-level effects are unlikely to occur.

**Noise:** Ongoing and planned offshore wind activities would generate anthropogenic noise from aircraft, G&G surveys, offshore wind turbines, pile driving, cable laying, and vessels. These noise sources have

the potential to affect sea turtles through behavioral or physiological effects. The potential impacts associated with each noise source are discussed separately in the following paragraphs.

Helicopters may be used to transport crew during construction or operation of offshore wind facilities. When aircraft travel at relatively low altitude, non-impulsive aircraft noise has the potential to elicit stress or behavioral responses (e.g., diving or swimming away or altered dive patterns) (BOEM 2017; NSF and USGS 2011; Samuel et al. 2005). Helicopters transiting to offshore wind facilities are expected to fly at sufficient altitudes to avoid behavioral effects on sea turtles, with the exception of WTG inspections, take-off, and landing. Any behavioral responses elicited during low-altitude flight would be temporary, dissipating once the aircraft leave the area; these responses are not expected to be biologically significant.

G&G surveys would be conducted for site assessment and characterization activities associated with offshore wind facilities. Site assessment and characterization activities are expected to occur intermittently over a 2- to 10-year period at locations spread throughout much of the geographic analysis area. Although schedules for many planned offshore wind activities are still being developed, it would be possible to avoid overlapping noise impacts on sea turtles by scheduling site assessment and characterization activities to avoid conducting simultaneous G&G surveys in proximity to each other. Such surveys can generate high-intensity, impulsive noise that has the potential to affect sea turtles through auditory injuries, stress, disturbance, and behavioral responses. TTS or PTS could occur if sea turtles are close to survey activities. However, TTS and PTS are considered unlikely, as sea turtles are expected to avoid survey activities and survey vessels would travel quickly (NSF and USGS 2011). BOEM has concluded that underwater noise associated with G&G surveys for offshore wind activities would likely result in temporary displacement and behavioral effects or biologically insignificant physiological effects (BOEM 2019a) and has developed Project Design Criteria and BMPs for offshore wind data collection activities (e.g., G&G surveys) to minimize impacts on protected species (BOEM 2021b) that lessees will be required to follow. Any resulting impacts on individual sea turtles are not expected to result in stock or population-level effects.

Operating WTGs generate non-impulsive underwater noise that is audible to sea turtles. Monitoring data indicate that $SPL_{RMS}$ produced by operating turbines generally range from 110 to 125 dB in the 10-Hz to 8-kilohertz frequency range (Tougaard et al. 2020). Noise levels produced by WTGs are expected to decrease to ambient levels within a relatively short distance from the turbine foundations (Kraus et al. 2016; Thomsen et al. 2015). At Block Island Wind Farm, turbine noise reaches ambient noise levels within 164 feet (50 meters) of the turbine foundations (Miller and Potty 2017). Maximum noise levels anticipated from operating WTGs are below recommended thresholds for sea turtle injury and behavioral effects, and noise levels are expected to reach ambient levels within a short distance of turbine foundations. Additionally, studies suggest that sea turtles acclimate to repetitive underwater noise in the absence of an accompanying threat (Bartol and Bartol 2011; Hazel et al. 2007; Navy 2018). Therefore, no noise impacts on sea turtles are anticipated from operating WTGs.

Construction of ongoing and planned offshore wind projects will generate impulsive pile-driving noise during foundation installation. Pile driving is expected to occur for 4 to 6 hours at a time as 2,884 WTGs and 68 OSS/ESPs are constructed between 2023 and 2030 (Tables F2-1 and F2-2 in Appendix F). The intense, impulsive noise associated with pile driving can cause behavioral or physiological effects. Potential behavioral effects of pile driving noise include altered dive patterns, short-term disturbance, startle responses, and short-term displacement (NSF and USGS 2011; Samuel et al. 2005). Potential physiological effects include temporary stress response and, close to the pile-driving activity, TTS or PTS. Behavioral effects and most physiological effects are expected to be of short duration and localized to the ensonified area. PTS could permanently limit an individual's ability to locate prey, detect predators, or find mates and could therefore have long-term effects on individual fitness. BOEM expects that sea turtles would be displaced for 6 to 14 hours per day during foundation installation, depending on the type of turbine foundation. Therefore, any disruptions to foraging or other normal behaviors would be

temporary and increased energy expenditures associated with this displacement are expected to be small. It is possible that pile driving could displace animals into areas with lower habitat quality or higher risk (e.g., vessel collision or fisheries interaction). Multiple construction activities within the same calendar year could potentially affect migration, foraging, breeding, and individual fitness. The magnitude of impacts would depend upon the locations, duration, and timing of concurrent construction; such impacts could be long term and of high intensity and high exposure level. For example, individuals repeatedly exposed to pile driving over a significant period of time (e.g., a season, a year, or a life stage) may incur energetic costs associated with avoidance movements that would be sufficient to cause long-term effects on individual fitness (Navy 2018). However, habituation may occur in sea turtles (Hazel et al. 2007), potentially reducing avoidance and reducing the impacts of repeated exposures.

Noise-producing activities associated with cable laying include route identification surveys, trenching, jet plowing, backfilling, and cable protection installation. Modeling based on noise data collected during cable laying operation in Europe estimates that underwater noise levels would exceed 120 dB in a 98,842-acre area surrounding the source (Bald et al. 2015; Nedwell and Howell 2004; Taormina et al. 2018). As the cable-laying vessel and equipment would be continually moving, the ensonified area would also move. Given the dynamic nature of the ensonified area, a given location would not be ensonified for more than a few hours. Therefore, it is unlikely that cable-laying noise would result in adverse effects on sea turtles.

Vessels generate low-frequency (10 to 100 Hz) (MMS 2007), non-impulsive noise that could affect sea turtles. Vessel noise overlaps with the hearing range of sea turtles and may elicit behavioral responses, including startle responses and changes in diving patterns, or a temporary stress response (NSF and USGS 2011; Samuel et al. 2005). Vessel activity associated with planned offshore wind activities is expected to peak in 2024 when up to 379 vessels could be involved in construction of offshore wind facilities (BOEM 2019b). This increase in vessel activity could cause repeated, intermittent impacts on sea turtles resulting from short-term, localized behavioral responses, which would dissipate once the vessel leaves the area. BOEM considers these behavioral effects to be unlikely given the patchy distribution of sea turtles in the geographic analysis area, and, therefore, no stock or population-level effects would be expected.

**Port utilization:** The increased size of vessels and increased volume of vessel traffic associated with planned offshore wind activities will likely result in port expansion within the geographic analysis area. At least two proposed offshore wind projects are considering port expansion, and other ports along the East Coast may be upgraded to accommodate the development of offshore wind projects. Increased port utilization and expansion results in increased noise associated with vessels or pile driving for port expansion and increased suspended sediment concentrations during port expansion activities, including dredging and pile driving. The impacts of vessel noise on sea turtles are expected to be short term and localized, as previously described for the noise IPF in this section. Impacts on water quality associated with increased suspended sediment would also be temporary and localized, as previously described for the new cable emplacement and maintenance IPF in this section. Additionally, the area affected by benthic disturbance would be small compared to available foraging habitat.

Increased port utilization may require dredging at ports or within navigation channels to accommodate the large ships required to carry WTG components. In addition to benthic disturbance and increased suspended sediment concentrations, dredging can affect sea turtles through impingement, entrainment, or capture in the dredges, as described for the new cable emplacement and maintenance IPF in this section. These impacts would be localized to nearshore habitats, and typical mitigation measures (e.g., timing restrictions) are expected to minimize risk to sea turtles. Therefore, risks of injury or mortality are considered low and population-level effects are unlikely to occur.

**Presence of structures:** An estimated 2,884 WTGs and 68 OSS/ESPs could be built in the geographic analysis area for planned and ongoing offshore wind activities. These structures would occupy open-water, pelagic habitat and would provide presently unavailable hard structure within the water column. Approximately 4,259 acres of hard scour protection would be installed around the WTG foundations, and an additional 2,646 acres of hard protection would be installed around the export and interarray cables (Table F2-2 in Appendix F). The rock and concrete material used for scour protection and cable protection represents presently unavailable benthic hard structure on the seabed. The installation of WTGs and OSS/ESPs and hard protection could result in hydrodynamic changes; obstructions that cause loss of fish gear resulting in entanglement or ingestion by sea turtles; habitat conversion from open-water pelagic and benthic soft substrates to structurally complex, mid-water and benthic hard bottom; new areas of prey aggregation; avoidance or displacement; and behavioral disruption.

The presence of WTGs and OSS/ESPs could alter local hydrodynamic patterns at a fine scale. Water flows are reduced immediately downstream of foundations but return to ambient levels within a relatively short distance (Miles et al. 2017). The downstream area affected by reduced flows is dependent on pile diameter. For monopiles (i.e., the structures with the largest diameter), effects are expected to dissipate within 300 to 400 feet. Although effects from individual structures are highly localized, the presence of an estimated 2,877 WTGs and 68 OSS/ESPs associated with ongoing and planned offshore wind activities (not including the Proposed Action) could result in regional impacts on wind wave energy, mixing regimes, and upwelling (van Berkel et al. 2020). These localized and regional alterations to hydrodynamics could have impacts on sea turtle prey species. Fine-scale effects on water flow could have localized impacts on prey distribution and abundance. Regional hydrodynamic effects could affect prey species at a broader scale. Effects on surface currents could influence patterns of larval distribution (Johnson et al. 2021) and seasonal mixing regimes could influence primary productivity, both of which could in turn affect the distribution of fish and invertebrates on the OCS (Chen et al. 2018; Lentz 2017; Matte and Waldhauer 1984). Hydrodynamic alterations due to the presence of WTGs could increase primary productivity in the vicinity of the structures (Carpenter et al. 2016; Schultze et al. 2020). However, such an increase would be highly localized and the increased productivity may be consumed by filter feeders colonizing the structures (Slavik et al. 2019) rather than leading to increased prey abundance for sea turtles.

In-water structures associated with ongoing and planned activities may serve as artificial reefs, resulting in increased recreational fishing activity in the vicinity of the structures. An increase in recreational fishing activity increases the risk of sea turtles becoming entangled in or ingesting lost fishing gear, which could injure or kill sea turtles. Specifically, entanglement and hooking can cause abrasions, loss of limbs, or increased drag resulting in reduced swimming efficiency and decreased ability to forage or avoid predators (Berreiros and Raykov 2014; Gregory 2009; Vegter et al. 2014). Between 2016 and 2018, 186 sea turtles were observed to have been hooked or entangled by recreational fishing gear. Although recreational fishermen would be expected to disperse effort across many WTG foundations to avoid overcrowding, risk of entanglement and ingestion of fishing gear could increase as fishermen and sea turtles are attracted to the structures.

Although the artificial reef effect could increase risk of interactions with recreational fishing gear, this effect could also benefit sea turtles due to prey aggregation. In-water structures result in the conversion of open-water and soft-bottom habitat to hard-bottom habitat. This habitat conversion attracts and aggregates prey species (Causon and Gill 2018; Taormina et al. 2018), essentially creating artificial reefs. The aggregation of prey at artificial reefs can result in increased foraging opportunities for sea turtles. In the Gulf of Mexico, green, Kemp's ridley, leatherback, and loggerhead sea turtles have been documented in the presence of offshore oil and gas platforms (Gitschlag and Herczeg 1994; Gitschlag and Renauld 1989; Hastings et al. 1976; Rosman et al. 1987), indicating that sea turtles are likely to use habitat created by in-water structures in the geographic analysis area. However, increased foraging opportunities are not

expected to be biologically significant given the broad geographic range used by sea turtles on their annual foraging migrations compared to the localized scale of artificial reef effects.

Although sea turtle prey may be aggregated through the reef effect, it may also aggregate sea turtle predators. In field surveys of artificial and natural reefs off North Carolina conducted by Paxton et al. (2020), higher densities of large, reef-associated predators, specifically transient predators, were observed on artificial reefs than natural reefs. The aggregation of transient predators (e.g., sharks, barracuda, jacks, mackerel) at artificial reefs was associated with greater vertical relief (Paxton et al. 2020), indicating that the vertical structure provided WTG foundations may attract relatively high densities of sharks. The attraction of both sea turtles and their predators to offshore wind structures may increase predation risk for sea turtles. Although the potential for increased predation risk associated with the presence of structures may affect individual sea turtles, it is not expected to result in population-level effects given the localized scale of artificial reef effects compared to the geographic range of sea turtles.

The presence of offshore wind facility structures could result in sea turtle avoidance and displacement, which could potentially move sea turtles into areas with lower habitat value or with a higher risk of vessel collision or fisheries interactions. Any avoidance or displacement is expected to be short term. The presence of structures could also displace commercial or recreational fishing vessels to areas outside of offshore wind farms. Assuming fishing vessels are displaced to adjacent areas, risk of interaction with fishing vessels would not be greater than current risk given the patchy distribution of sea turtles. Presence of structures could potentially lead to a shift in gear types due to displacement. If displacement leads to an overall shift from mobile to fixed gear types, there could be an increased number of vertical lines in the water, increasing the risk of sea turtle interactions with fishing gear.

Disruption of normal behaviors, such as foraging and migration, could occur due to the presence of offshore structures. Although 2,884 WTG and 68 OSS/ESP structures are anticipated (2,952 total structures), spacing would be sufficient to allow sea turtles to utilize habitat between and around structures for foraging, resting, and migrating. Although migrations could be temporarily interrupted as sea turtles stop to forage or rest around structures, the presence of structures is not expected to result in measurable changes in sea turtle migratory patterns.

**Traffic:** Planned offshore wind activities would result in increased vessel traffic due to vessels transiting to and from individual lease areas during construction, operation, and decommissioning.

Vessel strikes are an increasing concern for sea turtles. The percentage of stranded loggerhead sea turtles with injuries that were apparently caused by vessel strikes increased from approximately 10 percent in the 1980s to over 20 percent in 2004, although some stranded turtles may have been struck post-mortem (NMFS and USFWS 2007). Sea turtles are expected to be most vulnerable to vessel strikes in coastal foraging areas and may not be able to avoid collisions when vessel speeds exceed 2 knots (Hazel et al. 2007). Average vessel speeds in the geographic analysis area may exceed 10 knots. Increased vessel traffic may result in sea turtle injury or mortality. Vessel activity associated with planned offshore wind activities is expected to peak in 2024 when up to 379 vessels could be involved in construction of offshore wind facilities. This increase in traffic would only be a small, incremental increase in overall traffic in the geographic analysis area (see Section 3.16, *Navigation and Vessel Traffic*).

The risk of vessel strike from offshore wind vessels would be dependent on the density of sea turtles in each project area, as well as the stage of the project, time of year, number of vessels utilized for each project, and speed of each vessel. Collision risk is expected to be greatest when offshore wind vessels transit between the offshore wind lease areas and ports utilized by each project, as vessel speeds would be highest and turtles are expected to be most susceptible to strike in coastal foraging areas. The increased collision risk associated with this incremental increase in vessel traffic may result in injury or mortality of individual sea turtles. The risk would be greatest for species with the highest densities in a given project

area. The increased risk of vessel strike would not be expected to have stock or population-level impacts on sea turtles given their low densities in the geographic analysis area and patchy distribution. Additionally, BOEM expects minimization measures for vessel impacts would be required for planned offshore wind activities, further reducing the risk of injury or mortality for sea turtles.

#### 3.19.3.3. Conclusions

**Impacts of the No Action Alternative.** Under the No Action Alternative, sea turtles would continue to be affected by existing environmental trends and ongoing activities.

The No Action Alternative, including ongoing non-offshore wind and offshore wind activities, would result in **negligible** to **minor** adverse impacts on sea turtles. Adverse impacts would result mainly from vessel traffic. BOEM anticipates that adverse impacts associated with ongoing activities, especially those associated with the traffic and noise IPFs, would be **minor**. Other adverse impacts associated with ongoing activities would be **negligible**, particularly those impacts associated with the EMF, accidental releases, and lighting IPFs. Overall, BOEM anticipates that adverse impacts associated with ongoing activities would be **minor**.

**Cumulative Impacts of the No Action Alternative.** For the No Action Alternative, BOEM expects that ongoing and planned activities would result in continuing temporary to permanent impacts on sea turtles. Considering all IPFs together, ongoing activities, planned activities other than offshore wind, and planned offshore wind activities would result in **minor** impacts, largely due to pile-driving noise and the presence of structures, with some **minor beneficial** impacts possible. Habitat conversion and prey aggregation associated with the presence of structures could result in **minor beneficial** impacts due to increased foraging opportunities for sea turtles. These effects would be localized and are not expected to affect individual fitness.

### 3.19.4 Relevant Design Parameters & Potential Variances in Impacts of the Action Alternatives

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in impacts similar to or less than those described in the sections below. The following PDE parameters (Appendix E) would influence the magnitude of the impacts on sea turtles:

- Foundation types used for WTGs and OSS;
- The number of foundations installed; and
- The size of foundations installed.

Variability of the Project design exists as described in Appendix E. Below is a summary of potential variances in impacts:

- WTG foundation number: the number of WTG foundations installed affects the duration of pile driving. The more WTG foundations, the longer the duration of pile driving would be.
- WTG foundation size: the size of the pile affects the amount of noise produced during pile driving and thus the size of the ensonified area. Generally, a larger pile would result in a larger ensonified area.

Although variation is expected in the design parameters, the impact assessments in Sections 3.19.5 through 3.19.8 evaluate impacts associated with the maximum-case scenario for sea turtles identified in Appendix E.

### 3.19.5 Impacts of the Proposed Action on Sea Turtles

As described in Section 2.1.1, the Proposed Action includes the construction of up to 147 WTGs and two OSS and the installation of up to 299 miles (260 nm) of interarray cables and 76 miles (66 nm) of export cables between 2023 and 2027. The Proposed Action also includes 35 years of O&M over a 35-year commercial lifespan and decommissioning activities at the end of commercial life. BOEM expects the Proposed Action to affect sea turtles through the following primary IPFs.

**Accidental releases:** The Proposed Action may increase accidental releases of fuels, fluids, hazardous materials, and trash and debris during construction, operation, and decommissioning. The Proposed Action would comply with all laws regulating at-sea discharges of vessel-generated waste (APM 121), further reducing the likelihood of an accidental release. Empire has developed an OSRP (see COP Appendix F) with measures to avoid accidental releases and a protocol to respond to such a release (APM 103). APM 121 and the OSRP (APM 103), described in Appendix H, are included as part of the Proposed Action and considered in the final impact determinations presented in Section 3.19.3.2. Therefore, accidental releases are considered unlikely. BOEM is proposing additional mitigation measures for the Projects (Appendix H, Table H-1). These additional BOEM-proposed measures include marine debris awareness training for vessel operators, employees, and contractors engaged in offshore activities for the Projects. This additional measure would be expected to further reduce the risk of an accidental release but is not expected to change the impact determinations presented in Section 3.19.5.3.

**EMF:** During operation, the Proposed Action would result in the production of EMFs and heat. EMFs could cause migratory deviations, and heat has the potential to affect benthic species, which serve as prey for some sea turtle species, as described in Section 3.19.3.2. Empire would bury cables to a minimum depth of 6 feet (1.8 meters) wherever possible (APM 101). In areas where sufficient cable burial is not feasible, surface cable protection would be utilized. APM 101, described in Appendix H, is included as part of the Proposed Action and considered in the final impact determinations presented in Section 3.19.5.3. Cable burial and surface protection, where necessary, would minimize EMF and heat exposure. Any potential impacts on sea turtles from EMFs and heat associated with the Proposed Action are expected to be too small to be measured.

**Gear utilization:** Monitoring surveys for the Proposed Action may include otter trawling, trap sampling, video and still imaging, Sediment Profile and Plan View Imaging, and grab sampling. As described in Section 3.19.3.2, mobile gear surveys (e.g., trawl surveys) have the potential to capture sea turtles, and fixed-gear surveys with vertical lines (e.g., trap surveys) have the potential to entangle sea turtles. Trawl surveys for the Proposed Action would be limited to avoid mortality of sea turtles if incidentally captured (Epperly et al. 2002; Sasso and Epperly 2006); BOEM anticipates capture probability in otter trawls to be low and expects incidentally caught turtles to resume normal behavior upon release. Therefore, the risk to sea turtles from otter trawl surveys would be negligible. The likelihood of entanglement in trap surveys for the Proposed Action would be discountable given the patchy distribution of sea turtles, the small number of vertical lines used in the surveys, and the relatively limited duration of each sampling event. Additionally, trap surveys would be required to utilize mitigation measures to further reduce entanglement risk (e.g., ropeless gear, biodegradable components).

Sea turtles could also be affected by these surveys through survey vessel traffic. Survey vessels would produce underwater noise and increase the risk of vessel strikes. The effects of vessel noise and increased strike risk would be similar to those discussed under the *Noise* and *Traffic* IPFs.

In addition to direct effects on sea turtles, monitoring surveys may indirectly affect these species through capture of prey items. However, biological monitoring for the Projects is expected to be non-extractive, returning captured organisms at the end of each sampling event. Therefore, indirect effects on sea turtles due to collection of potential prey items would be insignificant, as described in Section 3.19.3.2.

Monitoring survey sampling events are expected to be short term, occurring at fixed intervals over the duration of the monitoring program. Impacts of gear utilization for the Proposed Action on sea turtles are expected to be negligible given the negligible risk of mortality, the discountable risk of entanglement, and the insignificant effect on sea turtle prey availability.

**Lighting:** Vessels and offshore structures associated with the Proposed Action would have deck and safety lighting. The incremental contribution associated with the Proposed Action would be lighting of up to 147 WTGs and two OSS, a small fraction of the light sources anticipated under the No Action Alternative. As discussed in Section 3.19.3.2, light may elicit temporary, localized behavioral impacts in sea turtles, including attraction or avoidance. Empire would light WTGs and OSS in compliance with FAA and USCG standards and BOEM best practices (APM 168 and APM 219) and would avoid intentionally illuminating the water surface (APM 91). Empire has additionally proposed the use of an ADLS to minimize the time that FAA-required lighting is illuminated on the offshore structures associated with the Proposed Action (APM 88). APMs 88, 91, 168, and 219, described in Appendix H, are included as part of the Proposed Action and considered in the final impact determinations presented in Section 3.19.5.3. Given the APMs in place, light associated with the Proposed Action is not expected to have an effect on sea turtles.

**Cable emplacement and maintenance:** The Proposed Action would involve the placement and maintenance of 375 miles (326 nm) of export and interarray cables. The incremental contribution of the Proposed Action is a 1,895-acre area of seabed disturbance for the emplacement of export and interarray cables. As described in Section 3.19.3.2, cable emplacement and maintenance activities disturb bottom sediment, temporarily increasing suspended sediment concentrations, which could result in behavioral effects on sea turtles or effects on sea turtle prey species. Empire has sited cable routes to avoid sensitive benthic habitats, including eelgrass beds, where feasible (APM 122), minimizing impacts on unique sea turtle foraging habitats. APM 122, described in Appendix H, is included as part of the Proposed Action and considered in the final impact determinations presented in Section 3.19.5.3. New cable emplacement is expected to affect only a small percentage of foraging habitat available to sea turtles, and any effects on sea turtles or their prey species would be localized and short term. Recolonization and recovery of prey species is expected to occur within 2 to 4 years (Van Dalfsen and Essink 2001) but could occur in as little time as 100 days (Dernie et al. 2003). Given the short-term and localized nature of impacts and the available sea turtle habitat in the geographic analysis area, impacts of new cable emplacement and maintenance on sea turtles are expected to be too small to be measured.

**Noise:** Underwater anthropogenic noise sources associated with the Proposed Action would include operating WTGs, pile driving during construction, cable laying during construction, vessels, and potentially helicopters and drilling during construction. As described in Section 3.19.3.2, these noise sources have the potential to affect sea turtles through behavioral or physiological effects. Underwater sound propagation modeling for drilling, impact pile driving, and vibratory pile driving was conducted in support of the COP (see Appendices M-1 and M-2 of the COP; Empire 2022). The potential impacts associated with each noise source are discussed separately in the following paragraphs.

Helicopters may be used to support construction or operation of the Proposed Action. As described in Section 3.19.3.2, aircraft traveling at relatively low altitude has the potential to elicit stress or behavioral responses in sea turtles. BOEM assumes helicopters transiting to and from the Project area would fly at sufficient altitudes to avoid behavioral effects on sea turtles, with the exception of WTG inspections, take-off, and landing. Any behavioral responses elicited during low-altitude flight would be temporary, dissipating once the aircraft leave the area, and are not expected to be biologically significant.

Drilling could occur if pile driving is not possible for the entire piling installation. However, the probability of such an action is considered low. Modeling results indicate that if drilling were required,

sea turtles would have to be within less than 328 feet (100 meters) of the pile to experience auditory injury or behavioral effects (COP Appendix M-1; Empire 2022).

HRG surveys would be conducted prior to construction to support final engineering design and after cable emplacement to confirm burial of submarine export and interarray cables. As described in Section 3.19.3.2, G&G survey noise could affect sea turtles through auditory injuries, stress, disturbance, and behavioral responses. However, HRG survey equipment produces less-intense noise, operates in smaller areas than other G&G survey equipment (e.g., seismic air guns), and is unlikely to result in injury given that sea turtles are expected to avoid survey activities and vessels would travel quickly (NSF and USGS 2011). HRG surveys will be required to follow the Project Design Criteria and BMPs for offshore wind data collection activities (BOEM 2021b). Additionally, any G&G surveys conducted for the Proposed Action would comply with a Project-specific Letter of Authorization, which would include measures to minimize HRG survey impacts on marine mammals that would also benefit sea turtles (i.e., use of ramp-up procedures).

As discussed in Section 3.19.3.2, operating WTGs generate non-impulsive underwater noise that is audible to sea turtles. However, maximum noise levels anticipated from operating WTGs are below recommended thresholds for sea turtle injury and behavioral effects, and noise levels are expected to reach ambient levels within a short distance of turbine foundations. Therefore, no noise impacts on sea turtles are anticipated from operating WTGs.

The loudest source of underwater noise associated with the Proposed Action would be pile driving during construction, specifically impact pile driving. As noted above, underwater sound propagation modeling for vibratory and impact pile driving was conducted in support of the COP (see Appendices M-1 and M-2, respectively, of the COP; Empire 2022). Modeling results indicated that the extent of the ensonified area associated with vibratory pile driving for the Projects is relatively small (distance from the pile generally less than 328 feet [100 meters]) compared to the ensonified area produced during impact pile driving. Therefore, this impact evaluation focuses on impact pile driving.

For a typical installation of 31.5-foot (9.6-meter) monopiles (COP Volume 2, Appendix M-2, Tables I-47 through I-50: Empire 2022), impact pile driving sound levels could exceed recommended sea turtle injury thresholds within up to 1.1 miles (1.71 kilometers) during the summer months without sound mitigation. Assuming 10 dB of noise attenuation due to noise mitigating technology, which is the level of attenuation generally achievable by a single noise abatement system (Bellman et al. 2020) and required for mitigation in the Proposed Action's Letter of Authorization, impact pile driving levels could exceed recommended sea turtle injury thresholds at distances up to 1,148 feet (350 meters) during summer months. Without mitigation, sound levels could exceed recommended sea turtle behavioral thresholds within up to 1.4 miles (2.31 kilometers) of pile driving. Assuming 10 dB of noise attenuation due to noise-mitigating technology, recommended sea turtle behavioral thresholds could be exceeded within up to 2,526 feet (770 meters) of pile driving. Because it is possible that some monopiles (up to 17) will be more difficult to install, modeling was also conducted for 31.5-foot (9.6-meter) monopiles under a difficult-to-drive scenario (COP Volume 2, Appendix M-2, Tables I-51 through I-54; Empire 2022). Under this scenario, sea turtles that remain within up to 1.8 miles (2.84 kilometers) of pile driving in the summer months could experience PTS without noise mitigation. Assuming 10 dB of noise attenuation, sea turtles that remain within up to 2,559 feet (780 meters) of pile driving could experience PTS. Without noise mitigation, recommended sea turtle behavioral thresholds could be exceeded within up to 2.3 miles (3.73 kilometers) of pile driving during summer months. Assuming 10 dB of noise attenuation, radial distances to recommended behavioral thresholds could be reduced to 1.0 mile (1.59 kilometers).

For 36.1-foot (11-meter) monopiles, impact pile driving sound levels in summer months could exceed recommended sea turtle injury thresholds within up to 1.0 mile (1.58 kilometers), without sound mitigation. Assuming 10 dB of noise attenuation, the distance to the recommended sea turtle injury

thresholds could be reduced to 984 feet (300 meters) of pile driving. Without mitigation, sound levels could exceed recommended sea turtle behavioral thresholds within up to 1.5 miles (2.45 kilometers) of pile driving. Assuming the use of 10 dB of noise attenuation due to noise-mitigation technology, the distance to recommended sea turtle behavioral thresholds could be reduced to 2,756 feet (840 meters) from the source of pile driving.

Average numbers of sea turtles predicted to receive sound levels above behavioral and PTS exposure criteria were modeled assuming a maximum-case 2-year construction scenario of two monopiles and three pin piles being installed per day, with 96 monopiles and 24 pin piles being installed in Year 1 and 51 monopiles and no pin piles being installed in Year 2 (COP Volume 2, Appendix M-2, Tables 10, 14, I-17, and I-18; Empire 2022) (Table 3.19-4). Without noise mitigation, up to five Kemp's ridley sea turtles, three leatherback sea turtles, and 12 loggerhead sea turtles are expected to be exposed to sound levels exceeding recommended injury thresholds. Assuming 10 dB of noise attenuation, no sea turtles are expected to be exposed to sound levels exceeding recommended injury thresholds. Without noise mitigation, up to one green sea turtle, 33 Kemp's ridley sea turtles, 18 leatherback sea turtles, and 538 loggerhead sea turtles are expected to be exposed to sounds levels exceeding recommended behavioral thresholds. Assuming 10 dB of noise attenuation, up to eight Kemp's ridley sea turtles, one leatherback sea turtle, and 96 loggerhead sea turtles are expected to be exposed to sound levels exceeding recommended behavioral thresholds.

**Table 3.19-4 Mean Number of Sea Turtles Predicted to Receive Sound Levels Above Injury and Behavioral Thresholds over 2-Year Construction Period**

| Species | Injury ($L_E$) | | Behavior ($L_p$) | |
|---|---|---|---|---|
| | Attenuation (dB) | | Attenuation (dB) | |
| | 0 | 10 | 0 | 10 |
| Green turtle | 0 | 0 | 1 | 0 |
| Kemp's ridley turtle | 5 | 0 | 33 | 8 |
| Leatherback turtle | 3 | 0 | 18 | 1 |
| Loggerhead turtle | 12 | 0 | 538 | 96 |

Source: COP Volume 2, Appendix M-2, Tables I-17 and I-18; Empire 2022.
$L_E$ = sound exposure level (decibel re 1 µPa square second); $L_p$ = root-mean-square sound pressure (decibel re 1 µPa)

As described in Section 3.19.3.2, pile driving can result in behavioral and physiological effects on sea turtles. Empire has proposed measures to avoid, minimize, and mitigate impacts of pile driving noise on sea turtles (Appendix H, Attachment H-1), including utilization of protected species observers to monitor and enforce appropriate monitoring and exclusion zones (APM 108, APM 109, APM 110, APM 111), soft-start procedures (APM 107), noise-reducing technologies (APM 112), and seasonal pile driving restrictions (APM 106) with no pile driving occurring between July and October when sea turtle densities in the Project area are generally highest. APMs 106 through 112, described in Appendix H, are included as part of the Proposed Action and considered in the final impact determinations presented in Section 3.19.5.3. With these measures in place, no significant injuries to sea turtles are expected. Temporary behavioral and physiological effects are expected to occur, but no stock or population-level effects are anticipated. BOEM is proposing additional mitigation measures for the Projects (Appendix H, Table H-1). These additional BOEM-proposed measures include preparation and implementation of a pile driving monitoring plan providing for sound attenuation and monitoring of sea turtles during pile driving, sound field verification to determine the appropriate size of monitoring and exclusion zones, minimum size requirements for exclusion zones, extended monitoring duration for sea turtles in the monitoring zone, and protected species observer coverage requirements. Furthermore, the Project-specific Letter of

Authorization would include mitigation measures for marine mammals that would also benefit sea turtles (i.e., time-of-day restrictions, use of soft-start procedures, and use of noise mitigation techniques that achieve a 10-dB attenuation). The additional measures would be expected to further minimize pile-driving noise effects on sea turtles but are not expected to change the impact determinations presented in Section 3.19.5.3.

As described in Section 3.19.3.2, noise-producing activities associated with cable laying may include trenching, jet plowing, backfilling, and cable protection installation. The incremental contribution of the Proposed Action is noise-producing activities associated with an additional 326 nm of export and interarray cables. The incremental impacts of the Proposed Action are not expected to exceed noise impacts of cable-laying activities under the No Action Alternative, which are not expected to result in adverse effects on sea turtles.

As described in Section 3.19.3.2, vessels associated with the Proposed Action would generate low-frequency, non-impulsive noise that could elicit behavioral or stress responses in sea turtles. It is estimated that up to 18 vessels could be utilized during construction of each phase of the Proposed Action. Additional vessels would be used during operation and decommissioning. Effects of vessel noise on individual sea turtles are expected to be temporary and localized.

**Presence of structures:** The Proposed Action would include construction of up to 147 WTGs and two OSS and installation of up to 254 acres of hard scour protection around the WTG foundations and export and interarray cables. As described in Section 3.19.3.2, the installation of WTGs and OSS and hard protection could result in hydrodynamic changes, entanglement or ingestion of lost fishing gear, habitat conversion and prey aggregation, avoidance or displacement, and behavioral disruption.

The presence of WTGs and OSS could alter local hydrodynamic patterns at a fine scale, which could have localized impacts on prey distribution and abundance. However, these localized impacts may not translate to impacts on sea turtle prey species.

The presence of structures may have an artificial reef effect, resulting in increased recreational fishing activity in the vicinity of the WTGs and OSS. An increase in fishing activity would increase risk of entanglement or ingestion of lost fishing gear, which can lead to sea turtle injury or death. Any increase in interactions with fishing gear is not expected to be detectable. The artificial reef effect could also result in beneficial impacts on sea turtles due to prey aggregation. The aggregation of prey species would increase sea turtle foraging opportunities around offshore wind facility structures, potentially leading to increased habitat use around the WTGs. However, the artificial reef effect could also attract sea turtle predators (i.e., sharks) (Paxton et al. 2020). Predator attraction may result in increased risk of predation for sea turtles.

The presence of offshore wind facility structures could result in sea turtle avoidance and displacement, which could potentially move sea turtles into areas with lower habitat value or with a higher risk of vessel collision or fisheries interactions. However, the habitat quality for sea turtles does not greatly vary within and around the Lease Area. Any avoidance or displacement is expected to be short term. The presence of structures could also displace commercial or recreational fishing vessels to areas outside of wind energy facilities or result in gear shifts. Risk of interaction with fishing vessels is not expected to be greater than current risk, but gear shifts that result in an increased number of vertical lines in the water would increase the risk of sea turtle interactions with fishing gear. Disruption of normal behaviors, such as foraging and migration, could occur due to the presence of offshore structures. Although migrations could be temporarily interrupted as sea turtles stop to forage or rest around structures, the presence of structures is not expected to result in measurable changes in sea turtle migratory patterns.

**Traffic:** The Proposed Action would result in increased vessel traffic due to vessels transiting to and from the Project area during construction, operation, and decommissioning. As described in Section 3.19.3.2, vessel strikes are an increasing concern for sea turtles and could result in injury or death of individual sea turtles. Risk of injury or death would be highest for loggerheads, which have the highest density in the Project area. Vessel strike is most likely to occur when Project vessels are transiting to and from the Project area. Empire expects 18 vessels to be used during each phase of construction, and the number of vessels transiting the Project area during operation is expected to be lower. This increase in traffic would only be a small, incremental increase in overall traffic in the geographic analysis area. Empire has proposed the use of dedicated lookouts to reduce the risk of collisions with marine mammals and sea turtles (APM 123) and site-specific training on vessel strike avoidance measures for all crew members (APM 120). Empire has proposed additional measures to avoid, minimize, and mitigate impacts associated with vessel traffic on marine mammals, including vessel speed restrictions and collision avoidance measures (APMs 113 and 115), which would also benefit sea turtles. These APMs, described in Appendix H, are included as part of the Proposed Action and considered in the final impact determinations presented in Section 3.19.5.3. Given the small, incremental increase in vessel traffic compared to existing traffic and the measures that would be taken to avoid, minimize, and mitigate vessel traffic impacts, the increased collision risk associated with the incremental increase in vessel traffic due to Project vessels would not be expected to have stock or population-level impacts on sea turtles. BOEM is proposing additional mitigation measures for the Projects (Appendix H, Table H-1). These additional BOEM-proposed measures include minimum separation distances and vessel speed and heading changes to avoid sea turtle strikes. These additional measures would be expected to further minimize vessel traffic effects on sea turtles but are not expected to change the impact determinations presented in Section 3.19.5.3.

### 3.19.5.1. Impact of the Connected Action

Infrastructure improvements have been proposed at SBMT to provide the necessary structural capacity, berthing facilities, and water depths to operate as an offshore wind hub for several proposed offshore wind projects, including the Proposed Action. These improvements include in-water activities (i.e., dredging and dredged material management, replacement and strengthening of existing bulkheads, installation of new pile-supported and floating platforms, installation of new fenders) that may affect sea turtles. Some upland activities included in the improvements also have the potential to affect sea turtles. These improvements at SBMT are not being undertaken by Empire but are considered a connected action for the Projects and are therefore evaluated in this section. BOEM expects the connected action to affect sea turtles through the following primary IPFs.

**Lighting:** The connected action would lead to increased artificial light in the Project area. The number of lamp poles would be kept to a minimum, and changes in lighting of the water surface are expected to be negligible relative to the high levels of artificial light in Upper New York Bay. Given the small change in water surface lighting and the unlikely presence of sea turtles in the Project area for the connected action, light at SBMT is not expected to have an effect on sea turtles.

**Noise:** Underwater anthropogenic noise sources associated with the connected action would include pile driving during construction and vessels during construction and operation. As described in Section 3.19.3.2, these noise sources have the potential to affect sea turtles through behavioral or physiological effects. The potential impacts associated with each noise source are discussed separately in the following paragraphs.

The connected action would include installation of 36-inch (0.9-meter) steel pipe piles and steel sheet piles. Pipe piles would be installed using a vibratory hammer for the majority of installation. An impact hammer would be used to drive the final 10 to 15 feet (3 to 4.5 meters). Sheet piles would be installed entirely using a vibratory hammer. To evaluate pile driving impacts, the NMFS Greater Atlantic Regional

Fisheries Office Acoustics Tool[1] was used to calculate distances to recommended regulatory thresholds for sea turtles. Noise levels associated with pile driving for the connected action would not exceed recommended injury thresholds for sea turtles (AECOM 2021). Noise levels may exceed recommended behavioral thresholds for sea turtles up to approximately 131 to 151 feet (40 to 46 meters) from impact pile driving. For vibratory pile driving, sea turtles may experience behavioral effects within up to approximately 33 feet (10 meters) of the pile. Given the small distances to behavioral thresholds and unlikely sea turtle presence in the Project area for the connected action, pile-driving noise impacts would be extremely unlikely to occur.

As described in Section 3.19.3.2, vessels associated with the connected action would generate low-frequency, non-impulsive noise that could elicit behavioral or stress responses in sea turtles. During construction, less than one vessel per day is expected to be used. During operation, up to nine vessels may transit to and from SBMT per week. Any effects of vessel noise on individual sea turtles are expected to be temporary and localized. Based on the small volume of vessel traffic associated with the connected action, vessel noise impacts would be extremely unlikely to occur.

**Port utilization:** In-water activities for the SBMT improvements include dredging and dredged material management, which may affect sea turtles through physical interactions with the dredge and increased suspended sediments, as described in Section 3.19.3.2. Habitat disturbance and modification associated with dredging may also affect benthic prey species.

Dredging for the connected action could affect sea turtles through physical interactions (i.e., impingement, entrainment, or capture). Dredging at SBMT would utilize a clamshell dredge with an environmental bucket. As noted in Section 3.19.3.2, mechanical dredging, including the use of a clamshell dredge, is not expected to capture, injure, or kill sea turtles (NMFS 2020b). Additionally, turbidity curtains would be used for a large proportion of the dredge area, excluding sea turtles from most active dredging areas. Therefore, effects of physical interactions with the dredge are not expected to occur.

Dredging for the connected action would result in temporary increases in suspended sediment concentrations in the associated Project area. As described in Section 3.19.3.2, increased suspended sediment concentrations could result in behavioral effects on sea turtles or on sea turtle prey species. Any behavioral effects would be too small to be detected (NMFS 2020a), and no effects are anticipated if sea turtles swim through the area of elevated suspended sediment. Turbidity curtains would be used for a large proportion of the dredge area, minimizing water quality impacts and excluding sea turtles from most active dredging areas. Additionally, BMPs to reduce turbidity (e.g., slow bucket withdrawal) would be used. Increased suspended sediment concentrations could also affect prey species. However, any effects on sea turtles or their prey species would be localized and short term, as described in Section 3.19.3.2. Given the localized and temporary or short-term nature of the effects, the use of turbidity curtains, and the unlikely presence of sea turtles, any effects of increased suspended sediments on sea turtles would be discountable.

Habitat disturbance and modification associated with dredging could result in short-term reductions in foraging habitat or short-term effects on prey availability for some sea turtle species. Benthic communities would be expected to recover within 1 year of disturbance (NMFS 2017). Dredging may increase water depths by up to 21 feet (6.4 meters), which is not expected to have a substantial impact on benthic community composition following recolonization of the dredge area. Dredging is not expected to alter the sediment composition compared to the existing substrate in the dredge area. Given there would be no change in sediment composition, subsequent changes in benthic community composition would not

[1] Available at: https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-consultation-technical-guidance-greater-atlantic.

be expected. However, the surface sediments following dredging may contain increased concentrations of contaminants, which may affect recolonizing benthic invertebrates. Although habitat disturbance and modification may result in reductions in foraging habitat availability or prey availability, these reductions would be short term, and there would be no changes in the benthic community composition. Contaminants in the sediment could affect the recolonized benthic community. However, sea turtle foraging in the Project area for the connected action is extremely unlikely and the affected area would be very small relative to available sea turtle foraging habitat. Therefore, any effects on sea turtles due to habitat disturbance and modification would be discountable.

**Traffic:** The connected action would result in increased vessel traffic during construction of the infrastructure improvements and during operation of SBMT as an offshore wind hub. As described in Section 3.19.3.2, vessel strikes could result in injury or death of sea turtles.

Only a small number of vessels would be used for construction of the connected action. All construction vessels would have a large below-water envelope but would be operating at slow speeds. Less than one vessel visit per day is expected during construction. Additionally, sea turtles are not generally found in the Project area for the connected action and would be excluded from a large portion of this Project area by turbidity curtains deployed to minimize impacts on water quality during construction. Based on the low volume of traffic, unlikely sea turtle presence in the Project area for the connected action, and sea turtle exclusion by turbidity curtains, vessel strikes associated with construction traffic would be extremely unlikely to occur.

During operation, approximately nine vessel trips (i.e., 18 one-way trips) are expected each week. This increase in vessel traffic represents less than a 0.2-percent increase compared to existing vessel traffic utilizing the Port of New York (i.e., 5,355 vessels per week). Additionally, a majority of vessel traffic at SBMT (i.e., seven of nine weekly vessels) would operate at slow speeds and would have large envelopes, displacing a large volume of water and repelling aquatic fauna in proximity to the vessel. Therefore, vessel strike risk would be minimal for these vessels. Given the very small increase in vessel traffic compared to existing traffic levels and the slow speeds of the majority of vessels utilizing SBMT, vessel strike risk for sea turtles during operation of the connected action would be discountable.

### 3.19.5.2. Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind activities, other planned offshore wind activities, and the connected action at SBMT. Ongoing and planned non-offshore wind activities within the geographic analysis area that contribute to impacts on sea turtles include undersea transmission lines, gas pipelines, and other submarine cables; tidal energy projects; marine minerals use and ocean-dredged material disposal; military use; marine transportation; fisheries use and management; oil and gas activities; and onshore development activities. The connected action would improve the SBMT facility to support offshore wind activities, increase the water depth for berthing larger vessels, and generate vessel traffic during use of the facility for staging of offshore wind turbine components. Ongoing and planned offshore wind activities in the geographic analysis area for sea turtles include the construction, O&M, and decommissioning of 30 planned offshore wind projects.

In the context of reasonably foreseeable environmental trends, the contribution of the Proposed Action to the impacts of accidental releases from ongoing and planned activities on sea turtles would likely be negligible. BOEM assumes all vessels would comply with laws and regulations to properly dispose of marine debris and minimize releases of fuels/fluids/hazardous materials. Additionally, large-scale releases are unlikely and impacts from small-scale releases would be localized and short term. Export and interarray cables from the Proposed Action and planned offshore wind development would add an estimated 11,646 miles (18,742 kilometers) of buried cable to the geographic analysis area, producing

EMF in the immediate vicinity of each cable during operation (Table F2-1), of which the Proposed Action represents less than 4 percent. In context of reasonably foreseeable environmental trends, the contribution of the Proposed Action to impacts of EMF and heat from ongoing and planned activities in the geographic analysis area would be negligible given the small area that would be affected by the Projects.

The 149 structures for the Proposed Action represent only 4.8 percent of the 3,101 offshore wind structures anticipated on the OCS for existing and planned offshore wind farms, including the Proposed Action. In context of reasonably foreseeable environmental trends, the contribution of the Proposed Action to light on the OCS associated with ongoing and planned activities would be negligible given the large volume of existing vessel traffic and the relatively small number of offshore structures anticipated for the Proposed Action.

The 1,913 acres of seabed disturbance, including anchoring disturbance, associated with the proposed Projects represents only 1 percent of the 188,839 acres of seabed expected to be disturbed on the OCS due to ongoing and planned offshore wind farms, including the Proposed Action. In context of reasonably foreseeable environmental trends, the contribution of the Proposed Action to impacts of new cable emplacement and maintenance from ongoing and planned activities would be negligible.

Planned offshore wind activities would generate comparable types of noise impacts to those of the Proposed Action. The most significant sources of noise are expected to be pile driving followed by vessels. The 149 structures for the Proposed Action represent only 4.8 percent of the 3,101 offshore wind structures anticipated on the OCS for ongoing and planned offshore wind farms, including the Proposed Action, although some foundations at other planned wind farms may be installed without impact pile driving. Project vessels would represent only a small fraction of the large volume of existing traffic in the geographic analysis area. In context of reasonably foreseeable environmental trends, the contribution of the Proposed Action to noise impacts on sea turtles from ongoing and planned activities would be negligible given the magnitude of ongoing and planned activities.

The 149 structures for the Proposed Action represent only 4.8 percent of the 3,101 offshore wind structures anticipated on the OCS for ongoing and planned offshore wind farms, including the Proposed Action. In context of reasonably foreseeable environmental trends, the contribution of the Proposed Action to impacts on sea turtles due to the presence of structures from ongoing and planned activities would be negligible.

In context of reasonably foreseeable environmental trends, the contribution of the Proposed Action to impacts of vessel traffic from ongoing and planned activities would be negligible given the large volume of existing vessel traffic in the geographic analysis area.

### 3.19.5.3. Conclusions

**Impacts of the Proposed Action.** Construction, operation, and decommissioning of the Proposed Action would result in **negligible** to **minor** adverse impacts on sea turtles and could include **minor beneficial** impacts. Adverse impacts would result mainly from pile-driving noise. Beneficial impacts could result from the presence of structures. Impact determinations for each IPF are provided in the following paragraphs.

Adverse impacts associated with accidental releases, EMF, light, new cable emplacement and maintenance, aircraft noise, G&G survey noise, WTG noise, cable-laying noise, disturbed hydrodynamic patterns associated with the presence of structures, entanglement or ingestion of fishing gear associated with the presence of structures, avoidance or displacement associated with the presence of structures, and behavioral disruptions associated with the presence of structures would be **negligible**. These impacts are expected to be unlikely to occur and localized, temporary, or too small to be measured.

Adverse impacts associated with pile-driving noise, vessel noise, displacement into higher-risk areas associated with the presence of structures, and vessel traffic would be **minor**. These impacts are generally expected to be localized and temporary, although some may be long term. Adverse effects on individual sea turtles may occur due to these impacts, but no stock or population-level effects are anticipated.

Habitat conversion and prey aggregation associated with the presence of structures could result in **minor beneficial** impacts due to increased foraging opportunities for sea turtles. These effects would be localized and are not expected to affect individual fitness.

BOEM expects that the connected action alone would have **negligible** impacts on sea turtles due to light, noise, port utilization, and vessel traffic. These impacts would be unlikely to occur and, if they did occur, would be localized, temporary or short term, or too small to be measured.

An assessment of the impacts of the Proposed Action on ESA-listed sea turtles and sea turtle critical habitat will be provided in the Projects' BA. Based on this assessment, BOEM determined that the Proposed Action was not likely to adversely affect hawksbill sea turtle, given that impacts associated with the limited number of vessel transits in the Gulf of Mexico would be extremely unlikely to occur. The Proposed Action may affect and is likely to adversely affect green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle. BOEM also concluded that vessel transits through loggerhead sea turtle critical habitat would not affect any essential physical and biological features. Therefore, the Proposed Action is expected to have no effect on designated critical habitat for the Northwest Atlantic Ocean DPS of loggerhead sea turtle.

**Cumulative Impacts of the Proposed Action.** In context of other reasonably foreseeable environmental trends in the area, the contribution of the Proposed Action and the connected action to the impacts of individual IPFs on sea turtles from ongoing and planned activities would range from **negligible** to **minor** adverse and would also include **minor beneficial** impacts. Considering all IPFs together, BOEM anticipates that the cumulative impacts associated with all ongoing and planned activities, including the Proposed Action, would result in **minor** impacts on sea turtles. BOEM made this determination because the anticipated impact would be detectable and measurable, but these impacts would not result in population-level impacts. The main drivers for this impact rating are impact pile-driving noise, vessel noise, the presence of structures, and vessel traffic. The Proposed Action would contribute to the overall impact rating primarily through impact pile-driving noise, vessel noise, and the presence of structures.

### 3.19.6 Impacts of Alternatives B, E, and F on Sea Turtles

**Impacts of Alternatives B, E and F.** Alternatives B, E, and F would alter the turbine array layout but each alternative would allow for installation of up to 147 WTGs as defined in Empire's PDE. The impacts resulting from individual IPFs associated with construction and installation, O&M, and decommissioning of the Projects under Alternatives B, E, and F would be the same as those described under the Proposed Action because the same number of WTGs would be constructed throughout the Lease Area. While the WTGs may move to a different position in the Lease Area under Alternatives B, E, and F, impacts on sea turtles would not materially change compared to the Proposed Action. All other offshore and onshore Project components of Alternatives B, E, and F would be the same as under the Proposed Action. Measures discussed in Appendix H would provide the same degree of minimization of impacts on sea turtles if implemented for any of these alternatives.

**Cumulative Impacts of Alternatives B, E and F.** In context of reasonably foreseeable environmental trends, the contribution of Alternatives B, E, and F to the impacts of individual IPFs from ongoing and planned activities would be the same as that of the Proposed Action. The cumulative impacts on sea turtles of ongoing and planned activities in combination with Alternative B, E, or F would be the same level as described under the Proposed Action.

#### 3.19.6.1. Conclusions

**Impacts of Alternatives B, E, and F.** Given that impacts on sea turtles are not expected to be measurably different compared to impacts under the Proposed Action, the impacts associated with these alternatives would not change the anticipated impact rating. Therefore, BOEM anticipates that impacts under Alternatives B, E, and F would have **negligible** to **minor** adverse impacts with potential **minor beneficial** impacts.

**Cumulative Impacts of Alternatives B, E, and F.** In context of reasonably foreseeable environmental trends, the contribution of Alternatives B, E, and F to the impacts of individual IPFs from ongoing and planned activities would be the same as that of the Proposed Action and would range from **negligible** to **minor**, with potential **minor beneficial** impacts. The cumulative impacts on sea turtles of ongoing and planned activities in combination with Alternative B, E, or F would be the same level as described under the Proposed Action.

### 3.19.7 Impacts of Alternative C, D, and G on Sea Turtles

**Impacts of Alternatives C, D, and G.** Alternatives C-1, C-2, D, and G would include variations in the export cable routes for the Projects. Alternatives C-1 and C-2 would allow BOEM to select a specific export cable route for EW 1. Alternative C-1 would pass through the anchorage area in Gravesend Bay. Alternative C-2 is an alternative route along the Ambrose Navigation Channel to avoid the anchorage area in Gravesend Bay. Under Alternative D, the export cable route for EW 1 would avoid the sand borrow area offshore of Long Island. Under Alternative G, the onshore cable route for EW 2 would use a cable bridge to cross Barnums Channel. Alternative export cable routes would not change or reduce impacts on sea turtles. Therefore, the impacts of Alternatives C-1, C-2, D, and G would not differ from the impacts anticipated under the Proposed Action. Measures discussed in Appendix H would provide the same degree of minimization of impacts on sea turtles if implemented for any of these alternatives.

**Cumulative Impacts of Alternatives C, D, and G.** Cumulative impacts of Alternatives C, D, and G would be the same as described for the Proposed Action.

#### 3.19.7.1. Conclusions

**Impacts of Alternatives C, D, and G.** Given that impacts on sea turtles are not expected to differ from those under the Proposed Action, BOEM anticipates that impacts under Alternatives C-1, C-2, D, and G would have **negligible** to **minor** adverse impacts with potential **minor beneficial** impacts.

**Cumulative Impacts of Alternatives C, D, and G.** In context of reasonably foreseeable environmental trends, the contribution of Alternatives C, D, and G to the impacts of individual IPFs from ongoing and planned activities would be the same as that of the Proposed Action and would range from **negligible** to **minor**, with potential **minor beneficial** impacts. The cumulative impacts on sea turtles of ongoing and planned activities in combination with Alternative C, D, or G would be the same level as described under the Proposed Action.

### 3.19.8 Impacts of Alternative H on Sea Turtles

**Impacts of Alternative H.** Alternative H would utilize a method of dredge or fill activities for construction of the EW 1 landfall that would reduce the discharge of dredged material. Dredging would be conducted using a mechanical clamshell dredge, which sea turtles are expected to avoid (NMFS 2018), or similar method. Dredged sediments would be dewatered on site to reduce turbidity effects. Under Alternative H, effects of suspended sediments would be minimized and effects of physical interactions with the dredge would be minimized or avoided, compared to other dredging methods. Although impacts would be reduced, BOEM anticipates this reduction would not be sufficient to reduce the overall impact

determination because of the relatively small portion of the Project area encompassed by Alternative H. Measures discussed in Appendix H would provide the same degree of minimization of impacts on sea turtles if implemented for this alternative.

**Cumulative Impacts of Alternative H.** Cumulative impacts of Alternative H would be the same as described for the Proposed Action.

#### 3.19.8.1. Conclusions

**Impacts of Alternative H**. Given that impact determinations for sea turtles are not expected to differ from those under the Proposed Action, BOEM anticipates that impacts under Alternative H would have **negligible** to **minor** adverse impacts with potential **minor beneficial** impacts.

**Cumulative Impacts of Alternative H.** In context of reasonably foreseeable environmental trends, the contribution of Alternative H to the impacts of individual IPFs from ongoing and planned activities would be the same as that of the Proposed Action and would range from **negligible** to **minor**, with potential **minor beneficial** impacts. The cumulative impacts on sea turtles of ongoing and planned activities in combination with Alternative H would be the same level as described under the Proposed Action.

### 3.19.9 Proposed Mitigation Measures

BOEM has proposed measures to minimize impacts on sea turtles (Appendix H). If one or more of the measures analyzed are adopted by BOEM, some adverse impacts would be further reduced.

- **Marine debris awareness training:** Marine debris and trash awareness training would minimize the risk of sea turtle ingestion of or entanglement in marine debris. While adoption of this measure would decrease risk to sea turtles under the Proposed Action, it would not alter the impact determination of negligible for accidental spills and releases.
- **Pile-Driving Monitoring Plan, Alternative Monitoring Plan, protected species observer coverage, sound field verification, shutdown zones, and monitoring zones for sea turtles:** The development of an Alternative Monitoring Plan, protected species observer coverage, shutdown zones, and monitoring zones for sea turtles would minimize the potential for exposure to sound levels above recommended thresholds during impact pile driving. The development of a Pile-Driving Monitoring Plan and sound field verification would increase the accountability of underwater noise mitigation during pile driving. While adoption of these measures would decrease risk to sea turtles during impact pile driving or increase accountability during this construction activity under the Proposed Action, it would not alter the impact determination of minor for impact pile-driving noise.
- **Geophysical surveys:** Compliance with Project Design Criteria and BMPs for Protected Species would minimize risk to sea turtles during HRG surveys. While adoption of this measure would decrease risk to sea turtles under the Proposed Action, it would not alter the impact determination of negligible for HRG activities.
- **Operational Sound Field Verification Plan:** The development of an Operational Sound Field Verification Plan would allow BOEM to confirm that impacts of operating WTG noise do not exceed predicted impacts based on existing monitoring data and modeling efforts. While adoption of this measure would improve accountability of WTG operational noise under the Proposed Action, it would not alter the impact determination of negligible for WTG noise.
- **Sampling gear, gear identification, lost survey gear, survey training, sea turtle disentanglement, sea turtle identification and data collection, sea turtle handling and resuscitation guidelines, and take notification:** The regular hauling of sampling gear, survey staff training, sea turtle disentanglement, and handling and resuscitation guidelines would reduce risk of entanglement or effects of entanglement in fisheries survey gear. Gear identification and lost survey gear would

improve accountability in the case of gear loss. Sea turtle identification and data collection and take notification would improve accountability for documenting take associated with fisheries surveys. While adoption of these measures would reduce risk and improve accountability under the Proposed Action, it would not alter the impact determination of negligible for gear utilization.

- **Periodic underwater surveys, and reporting of monofilament and other fishing gear around WTG foundations:** Periodic underwater surveys and reporting of monofilament and other fishing gear around WTG foundations would reduce the risk of entanglement associated with the presence of structures. While adoption of this measure would reduce risk to sea turtles under the Proposed Action, it would not alter the impact determination of minor associated with the presence of structures.
- **Look out for sea turtles and reporting:** Measures to minimize vessel interactions would reduce the risk of vessel strike. While adoption of this measure would reduce risk to sea turtles under the Proposed Action, it would not alter the impact determination of minor for vessel traffic.
- **Monthly/annual reporting requirements and meeting requirements for sea turtle take documentation:** Reporting requirements and meeting requirements to document take would improve accountability for documenting take associated with the Proposed Action. While adoption of these measures would improve accountability, it would not alter the overall impact determination of minor for the Proposed Action.

### 3.19.10 Comparison of Alternatives

Construction, O&M, and decommissioning of Alternatives B, C, D, E, F, G, and H would have the same overall **negligible** to **minor** adverse impacts and **minor beneficial** impacts on sea turtles as described under the Proposed Action. Alternatives B would result in fewer impacts on Cholera Bank, an important fishing area, due to the removal of up to six WTG positions from the northwestern end of EW 1. Alternative E, which creates a 1-nm setback between EW 1 and EW 2 by the removal of up to seven WTG positions, and Alternative F would improve access for fishing; however, the resultant increase in vessel traffic through the Project area could increase the occurrence of vessel noise, vessel strikes, accidental releases of fuels/fluids/hazardous materials and trash and debris, permitted discharges, and the risk of fishing gear entanglement and loss within the Project area. Alternatives C-1, C-2, and D were included as part of the PDE and maximum-case scenarios evaluated for the Proposed Action and therefore do not represent any change from the Proposed Action. Alternative G would involve changes to only the onshore portion of the EW 2 export cable route; therefore, the impact of Alternative G on sea turtles would be the same as that of the Proposed Action. Alternative H would reduce effects of dredge and fill activities for construction of the EW 1 landfall but would not measurably reduce impacts on sea turtles compared to the Proposed Action.

# 3.22. Wetlands

This section discusses potential impacts on wetlands from the proposed Projects, alternatives, and ongoing and planned activities in the geographic analysis area. The wetlands geographic analysis area, as shown on Figure 3.22-1, includes all subwatersheds that intersect the Onshore Project area. See Section 3.21 for a discussion of impacts on water quality.

## 3.22.1 Description of the Affected Environment for Wetlands

The National Wetlands Inventory (NWI) and NYSDEC wetland data were used to determine the potential presence of wetlands. A preliminary reconnaissance of the onshore portion of EW 1 was conducted in December 2018 to verify the presence of mapped wetland identified by the NWI and NYSDEC wetland data and to assess potential presence of unmapped wetlands. The EW 2 Project components were not under consideration at the time of the preliminary reconnaissance; therefore, the analysis of EW 2 was conducted based on NWI and NYSDEC wetland data. In order to confirm the extent and presence of regulated wetlands, Empire will conduct a wetland delineation to identify the wetlands under jurisdiction of USACE and NYSDEC. Authorization from USACE and NYSDEC is required prior to dredge or fill of jurisdictional wetlands. CWA Section 404 requires that all appropriate and practicable steps be taken first to avoid and minimize impacts on jurisdictional wetlands; for unavoidable impacts, compensatory mitigation is required to replace the loss of wetlands.

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR 328.3(c)(16)). Under the New York State code of regulations (6 CRR-NY 661.4), tidal wetlands are more broadly defined in that vegetation is not a requirement to be considered wetland. Wetlands are important features in the landscape that provide numerous beneficial services or functions. Some of these include protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters, providing aesthetic value, ensuring biological productivity, filtering pollutant loads, and maintaining surface water flow during dry periods. New York's coastal wetlands, including the wetlands in the geographic analysis area, protect coastal water quality by acting as a sink for land-derived nutrients and contaminants, constitute an important component of coastal food webs, provide valuable wildlife habitat, and protect upland and shoreline areas from flooding and erosion.

The acreage of NWI wetland communities present within the geographic analysis area is shown in Table 3.22-1.

**Table 3.22-1 NWI Wetland Communities in the Geographic Analysis Area**

| Wetland Community | Acres | Percent of Total |
|---|---|---|
| Estuarine and Marine Wetland | 6,493 | 96 |
| Freshwater Emergent Wetland | 204 | 3 |
| Freshwater Forested/Shrub Wetland | 72 | 1 |
| **Total** | **6,769** | **100.0%** |

Source: USFWS 2021.

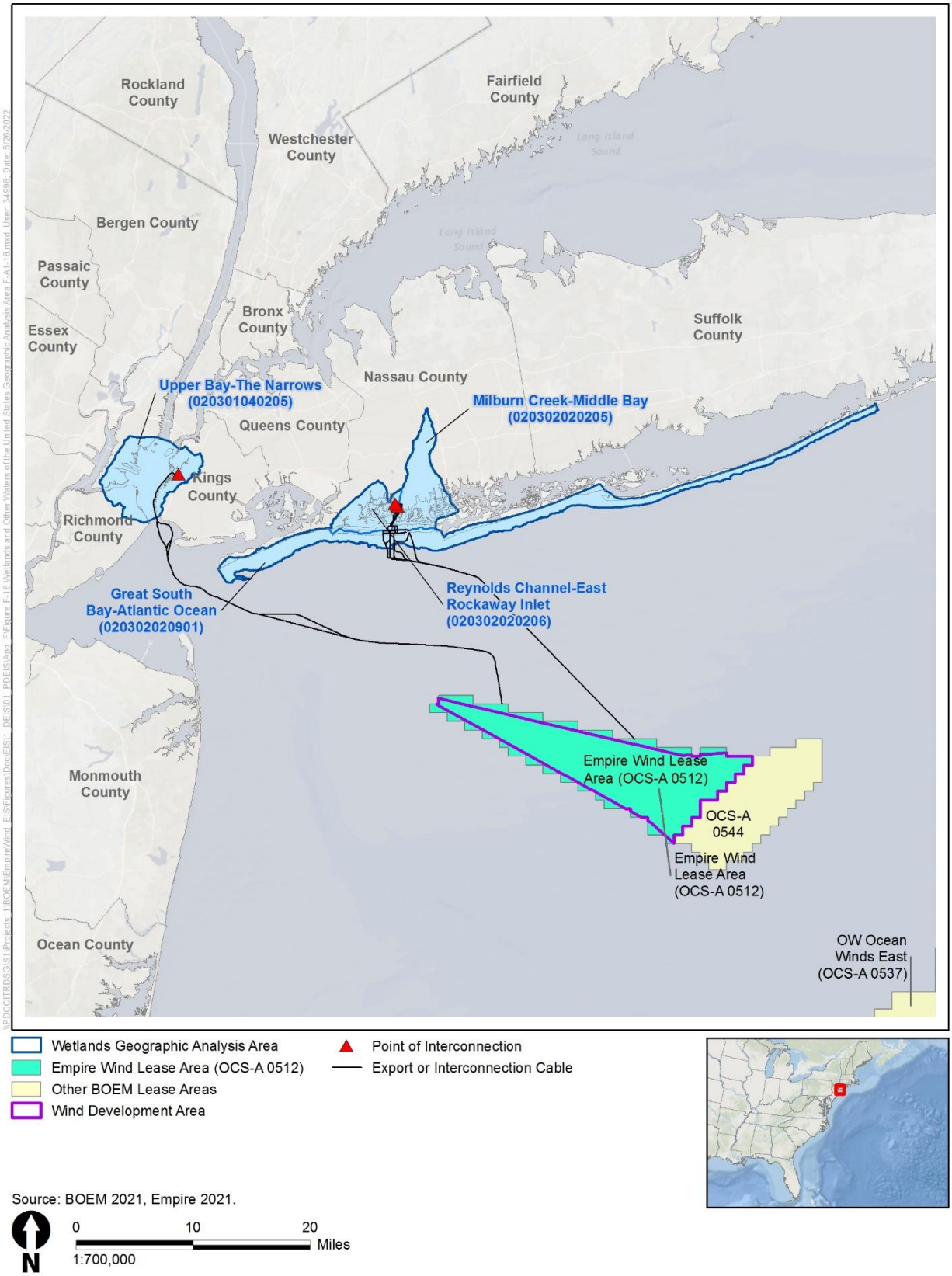


**Figure 3.22-1 Wetlands Geographic Analysis Area**

### *EW 1*

The EW 1 submarine export cable route would extend across the New York Bight into Lower New York Bay, up the Narrows, and into Upper New York Bay before it makes landfall. The Upper Bay-the Narrows subwatershed (hydrologic unit code [HUC] 020301040205) encompasses the submarine export cable's approach/landfall and the EW 1 substation and the location under consideration for the O&M facility. The EW 1 interconnection cable route, onshore substation, and O&M facility site are situated above the bank of the Upper Bay. The Upper Bay, in the vicinity of the onshore portions of the Projects, is classified by the NWI as an excavated subtidal estuarine system with an unconsolidated bottom and by NYSDEC wetland data as a littoral zone; the NWI classification is not considered wetland because it is a deepwater habitat that lacks vegetation. NWI mapping indicates that a small portion of the Upper Bay would overlap the interconnection cable route, the onshore substation, and the O&M facility. NYSDEC mapping indicates that the littoral zone of the Upper Bay would partially overlap the onshore substation. However, based on observations during the preliminary site reconnaissance, the bank is mainly composed of industrial properties with bulkheaded marine terminals and the Upper Bay terminates at the bulkhead. It is anticipated that any regulated adjacent area associated with the Upper Bay would be truncated along the banks at the seaward edge of all manmade structures (e.g., bulkheads, riprap, roads). Based on desktop analysis and observations made during the preliminary site reconnaissance, field delineations were not completed for the export cable landfall location, the EW 1 onshore interconnection cable route, the onshore substation, or the O&M facility due to the developed nature of the area and lack of wetland resources identified (Empire 2022).

### *EW 2*

The EW 2 submarine export cable routes would extend across the New York Bight before they make landfall. The Great South Bay-Atlantic Ocean subwatershed (HUC 020302020901) encompasses the submarine export cables' approaches/landfalls and a portion of the onshore export cable routes on Long Beach Barrier Island. The Reynolds Channel-East Rockaway Inlet (HUC 020302020206) and Milburn Creek-Middle Bay subwatershed (HUC 020302020205) encompass the remaining EW 2 onshore Project elements, with all three substation locations and the interconnection location in the Reynolds Channel-East Rockaway Inlet (HUC 020302020206). Four export cable landfall options (Landfalls A, B, C, and E) are currently under review for EW 2. The NWI does not map any wetlands in the Landfall A, B, and C footprints, but does map 1.59 acres of estuarine and marine deepwater in Landfall C footprint. The estuarine and marine deepwater classification is not considered wetland because it is a deepwater habitat and lacks vegetation. NYSDEC wetland data do not map any wetlands in the Landfall A, B, C, or E footprints. There are also small areas of estuarine and marine wetland (less than 0.01 acre) within the LB-A and LB-G cable corridors, but these wetland areas would be outside of the actual cable disturbance area because these cable segments would be placed in already disturbed road rights-of-way.

A total of nine onshore export cable route segments are under review to traverse the island of Long Beach from the export cable landfall options to the Reynolds Channel crossing. These routes would travel along existing roads and the Long Island Rail Road right-of-way in areas dominated by high-intensity development with no mapped wetlands crossed (see COP Volume 2, Figure 5.2-5 and Table 5.2-3; Empire 2022). At the Reynolds Channel crossing options, the NWI maps the channel as estuarine and marine deepwater and estuarine and marine wetland (on the south side of the channel) in the cable crossing corridor and NYSDEC maps the channel as a littoral zone and coastal shoals, bars, and mudflat in the cable crossing corridor. The NWI estuarine and marine deepwater habitats are not considered wetland because they are deepwater habitats that lack vegetation. It should be noted that the NWI does not map any wetlands in the cable crossing corridor at the western Reynolds Channel crossing option; the estuarine and marine wetland is within the eastern cable crossing corridor option.

Based on a review of aerial imagery, the banks of Reynolds Channel are highly modified, with the southern bank consisting of a mix of riprap and natural shoreline that quickly transitions to industrial properties, and the north bank consisting of bulkheading and docks associated with an active marina. After crossing the Reynolds Channel into Island Park, a total of eight cable route segments under review would traverse Island Park to the onshore substation. These cable route segments travel along existing roads in areas dominated by high- and medium-intensity development (see COP Volume 2, Figure 5.1-5; Empire 2022). The NWI identifies estuarine and marine wetland at cable segment IP-C's crossing corridor of Barnums Channel. The NWI identifies estuarine and marine wetland at cable segment IP-F's crossing corridor of Barnums Channel where the cable would be placed on a constructed above-water cable bridge. The NWI identifies palustrine emergent/scrub-shrub, palustrine emergent, and estuarine and marine wetland at cable segment IP-G's crossing corridor of Barnums Channel where the cable would be placed on an above-water cable bridge (similar to IP-F) or attached to the existing Long Beach Road bridge. In addition, cable segment IP-E (only needed if IP-G is constructed) would cross NWI-mapped estuarine and marine deepwater and riverine waters, and NYSDEC-mapped littoral zone waters associated with a channel that runs under Daly Boulevard through a bridge or large culvert that spans the distance of the road corridor (approximately 175 feet). The IP-E cable segment would be placed just off the road and above the bridge/large culvert and, therefore, would avoid these resources.

No wetlands are mapped by the NWI or NYSDEC at the Onshore Substation A site. NWI and NYSDEC data indicate that Reynolds Channel would extend into the EW 2 Onshore Substation C site by a maximum of 40 feet (12 meters); however, a review of aerial imagery indicates that historical alterations to the shoreline, including bulkheading, have resulted in a more artificial and linear bank than portrayed by NWI and NYSDEC mapped boundaries. The result of these shoreline alterations is that the current bank of Reynolds Channel appears to approximately align with the boundary of the EW 2 Onshore Substation C site (Empire 2022).

### 3.22.2 Impact Level Definitions for Wetlands

As described in Section 3.3, this EIS uses a four-level classification scheme to characterize potential beneficial and adverse impacts of alternatives, including the Proposed Action. The definitions of impact levels are provided in Table 3.22-2. There are no beneficial impacts on wetlands.

**Table 3.22-2 Impact Level Definitions for Wetlands**

| Impact Level | Impact Type | Definition |
|---|---|---|
| Negligible | Adverse | Impacts on wetlands would be so small as to be unmeasurable and impacts would not result in a detectable change in wetland quality and function. |
| Minor | Adverse | Impacts on wetlands would be minimized and would be relatively small and localized. If impacts occur, wetlands would completely recover. |
| Moderate | Adverse | Impacts on wetlands would be minimized; however, permanent impacts would be unavoidable. Compensatory mitigation required to offset impacts on wetland functions and values and would have a high probability of success. |
| Major | Adverse | Impacts on wetlands would be minimized; however, permanent impacts would be regionally detectable. Extensive compensatory mitigation required to offset impacts on wetland functions and values would have a marginal or unknown probability of success. |

## 3.22.3 Impacts of the No Action Alternative on Wetlands

When analyzing the impacts of the No Action Alternative on wetlands, BOEM considered the impacts of ongoing activities, including non-offshore wind and ongoing offshore wind activities, on the baseline conditions for wetlands. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with the other planned non-offshore wind activities as described in Appendix F, *Planned Activities Scenario*.

### 3.22.3.1. Impacts of the No Action Alternative

Under the No Action Alternative, baseline conditions for wetlands described in Section 3.22.1, *Description of the Affected Environment for Wetlands*, would continue to follow current regional trends and respond to IPFs introduced by other ongoing non-offshore wind and offshore wind activities. Ongoing non-offshore activities within the geographic analysis area that may contribute to impacts on wetlands are associated with onshore construction and development activities. These activities and associated impacts are expected to continue and have the potential to affect wetlands through temporary and permanent loss of wetlands, which can affect the functions wetlands provide (e.g., water quality improvement) in the watershed. All projects would be required to comply with federal, state, and local regulations related to the protection of wetlands by avoiding or minimizing impacts. If impacts would not be entirely avoided, mitigation would be anticipated for projects to compensate for lost wetlands.

There are no ongoing offshore wind activities within the geographic analysis area for wetlands.

### 3.22.3.2. Cumulative Impacts of the No Action Alternative

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with the other planned non-offshore wind activities and planned offshore wind activities (without the Proposed Action).

Other planned non-offshore wind activities that may affect wetlands primarily include onshore development activities (see Appendix F, Section F.2.13 for descriptions). These activities could permanently (e.g., permanent fill placement) and temporarily (e.g., temporary fill placement or vegetation clearing) affect wetlands or areas near wetlands. All projects would be required to comply with federal, state, and local regulations related to the protection of wetlands by avoiding or minimizing impacts. If impacts would not be entirely avoided, mitigation would be anticipated for projects to compensate for lost wetlands. See Table F1-24 for a summary of potential impacts associated with ongoing and planned non-offshore wind activities by IPF for wetlands.

Impacts on wetlands from planned offshore wind projects may occur if onshore activity from these projects overlaps with the geographic analysis area. BOEM is not currently aware of any planned offshore wind projects other than the Proposed Action that would overlap the geographic analysis area for wetlands. However, there is potential for planned offshore wind projects to site landfalls and onshore infrastructure within the same subwatersheds that are intersected by Proposed Action onshore infrastructure. If any planned offshore wind activities occur within the highly urbanized landscape of the geographic analysis area, BOEM expect that impacts would be similar to those under the Proposed Action (Section 3.22.5), including impacts related to land disturbance.

BOEM expects planned offshore wind activities to affect wetlands through the following primary IPF.

**Land disturbance:** The locations of onshore components for planned offshore wind projects are not known at this time. However, given the proximity to Long Island, export cables from other lease areas (particularly lease areas in the New York Bight) could landfall within the geographic analysis area. Construction of onshore components (e.g., export cables, onshore substation) for planned offshore wind

projects is anticipated to require clearing, excavating, trenching, fill, and grading, which could result in the loss or alteration of wetlands, causing adverse effects on wetland habitat, water quality, and flood and storage capacity functions. Fill material permanently placed in wetlands during construction would result in the permanent loss of wetlands, including any habitat, flood and storage capacity, and water quality functions that the wetlands may provide. If a wetland were partially filled and fragmented or if wetland vegetation were trimmed, cleared, or converted to a different vegetation type (e.g., forest to herbaceous), habitat would be altered and degraded (affecting wildlife use) and water quality and flood/storage capacity functions would be reduced by changing natural hydrologic flows and reducing the wetland's ability to impede and retain stormwater and floodwater. On a watershed level, any permanent wetland loss or alteration could reduce the capacity of regional wetlands to provide wetland functions.

Temporary wetland impacts may occur from construction activity that crosses or is adjacent to wetlands, such as rutting, compaction, and mixing of topsoil and subsoil. Where construction leads to unvegetated or otherwise unstable soils, precipitation events could erode soils, resulting in sedimentation that could affect water quality in nearby wetlands. The extent of wetland impacts would depend on specific construction activities and their proximity to wetlands. These impacts would occur primarily during construction and decommissioning; impacts during O&M would only occur if new ground disturbance was required, such as to repair a buried component.

Given that the geographic analysis area is within urbanized landscapes in the New York metropolitan area and onshore project components associated with planned offshore wind projects would likely be sited in disturbed areas (e.g., along existing roadways), BOEM anticipates wetland impacts to be minor. In addition, BOEM expects planned offshore wind projects would be designed to avoid wetlands to the extent feasible, and would be required to comply with federal, state, and local regulations related to the protection of wetlands by avoiding or minimizing impacts. This would include compliance with the New York State Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Construction Activities and implementation of sediment controls and a SWPPP to avoid and minimize water quality impacts during onshore construction. Any in-wetland work would require a CWA Section 404 permit from USACE and a Section 401 Water Quality Certification from NYSDEC, as well as authorization from NYSDEC under the Tidal Wetlands Act. If impacts would not be avoided or minimized, mitigation would be anticipated for projects to compensate for lost wetlands.

### 3.22.3.3. Conclusions

**Impacts of the No Action Alternative.** Under the No Action Alternative, wetlands would continue to be affected by existing environmental trends and ongoing activities. Land disturbance from onshore construction periodically would cause temporary and permanent loss of wetlands. All activities would be required to comply with federal, state, and local regulations related to the protection of wetlands by avoiding or minimizing impacts. If impacts would not be entirely avoided or minimized, mitigation would be anticipated for projects to compensate for lost wetlands. Therefore, the No Action Alternative would result in **minor** impacts on wetlands.

**Cumulative Impacts of the No Action Alternative.** Under the No Action Alternative, existing environmental trends and ongoing activities would continue, and wetlands would continue to be affected by natural and human-caused IPFs. Planned activities could cause impacts that would be similar to the impacts of the Proposed Action. Currently, there are no planned offshore wind activities proposed in the geographic analysis area. If any were to occur, they would have some potential to result in temporary disturbance and permanent loss of wetlands. All activities would be required to comply with federal, state, and local regulations related to the protection of wetlands, thereby avoiding or minimizing impacts. If impacts would not be entirely avoided, mitigation would be anticipated for projects that would allow wetlands to recover to the extent possible. Considering the IPFs and regulatory requirements for avoiding,

minimizing, and mitigating impacts on wetlands, BOEM anticipates the No Action Alternative would result in **minor** cumulative impacts in the geographic analysis area, primarily through land disturbance.

### 3.22.4 Relevant Design Parameters & Potential Variances in Impacts of the Action Alternatives

This EIS analyzes the maximum-case scenario; any potential variances in the proposed Project build-out as defined in the PDE would result in similar or lesser impacts than those described in the sections below. The following proposed PDE parameters (Appendix E) would influence the magnitude of the impacts on wetlands:

- The onshore export cable routing variants within the Onshore Project area

An onshore export cable route with less wetlands within or adjacent to the right-of-way would have less potential for direct and indirect impacts on wetlands.

### 3.22.5 Impacts of the Proposed Action on Wetlands

The Proposed Action could affect wetlands through the following primary IPF.

**Land disturbance:** Based on NWI data, there is little actual wetland within most of the affected area of the onshore Project components due to the developed nature of the Onshore Project area and the siting of onshore components in mostly previously disturbed areas (e.g., existing road rights-of-way). NYSDEC data do not map any wetlands within the footprints of the EW 1 onshore Project components. No NWI wetlands are mapped within the footprints of the EW 1 or EW 2 onshore substations, the O&M facility, or landfalls. While there would be NWI-mapped deepwater habitats crossed by the EW 2 onshore cable routes, there are only a few areas where wetlands are present (Table 3.22-3). Most of the wetland area is related to nearshore and adjacent areas to Reynolds Channel and Barnums Channel. As previously stated, there are small areas of estuarine and marine wetland (less than 0.01 acre) within the LB-A and LB-G cable corridors, but these wetland areas would be outside of the actual cable disturbance area because these segments would be placed in already disturbed road rights-of-way. The areas of NYSDEC-mapped wetlands within the onshore Project footprint and cable corridors are listed in Appendix I, Section I.3, *Wetlands*, Table I-25.

**Table 3.22-3 NWI Wetland Communities Potentially Affected by the EW 2 Project**

| Route Feature | Wetland Community | Acres |
|---|---|---|
| LB-A | Estuarine and Marine Wetland | <0.01 |
| LB-G | Estuarine and Marine Wetland | <0.01 |
| Reynolds Channel Crossing | Estuarine and Marine Wetland | 0.39 |
| IP-C[1] | Estuarine and Marine Wetland | 0.12 |
| IP-F[1] | Estuarine and Marine Wetland | 0.30 |
| IP-G[1] | Palustrine emergent/scrub-shrub | 7.20 |
| | Estuarine and Marine Wetland | 5.21 |
| | Palustrine emergent | 0.27 |
| | **Total** | **13.64** |

Source: Empire 2022.
Note: The table presents wetland areas within the cable corridor that could be susceptible to potential impacts and not necessarily the area of wetland that would actually be affected during construction and operations. For example, segment IP-C could cross Barnums Channel via open trench or trenchless (e.g., HDD) methods, which would have very different impacts on wetlands.
[1] Includes Barnums Channel crossing.

Empire is evaluating both open cut and HDD methods to cross Reynolds Channel. If HDD is used, then the wetland would likely be avoided and there would be no direct impact on the wetland from cable installation. If open cut is employed at the Reynolds Channel crossing, then up to 0.39 acre of the wetland would be affected. Similarly, for the IP-C Barnums Channel crossing, if HDD is employed then wetland impacts would be avoided, and if trenching is employed then there would be a small area of wetland temporarily affected (up to 0.12 acre). With either method, impacts would be short term and BOEM does not anticipate any long-term or permanent impacts on the wetlands or their functions, and the total temporary impact of 0.51 acre would represent less than 0.01 percent of this wetland type in the geographic analysis area. The IP-F cable segment that crosses Barnums Channel would consist of a cable bridge over the channel that would use up to two support columns (pile caps) within the channel to support the truss system that would hold the cables above the waters. These supports would include up to three 1.5-foot (0.5-meter) diameter steel pipe piles per pile cap, for a total of six steel pipe piles within the channel. The IP-G cable corridor crossing of Barnums Channel has over 12 acres of wetland in the crossing corridor. Any crossing solution (whether open cut, HDD, or cable bridge) would result in a greater potential for impacts on wetlands compared to the IP-C and IP-F crossings. Empire assessed several crossing methods of Barnums Channel along the IP-G cable corridor and determined that HDD was not practicable as a crossing method, and that trenching and a cable bridge would be feasible. Details of Empire's alternatives analysis for the Barnums Channel crossing are presented in Appendix O, *Alternatives Analysis for Corps Permit Application*.

The installation of permanent support columns in Barnums Channel to support a cable bridge would constitute a permanent impact on the channel. If access is required through wetlands during construction at EW 2, Empire would install temporary matting to protect vegetation root systems, reduce compaction, and minimize ruts (COP Volume 2f, Table 9-1, APM 65; Empire 2022). Temporary workspaces would be restored to pre-construction conditions to the extent possible. Revegetation monitoring at EW 2 would be conducted consistent with a landscaping restoration plan, which will be provided for agency review and approval, as applicable, within wetlands and adjacent areas that were temporarily disturbed during Project construction to ensure that functionality is restored in these areas (COP Volume 2f, Table 9-1, APM 73; Empire 2022).

Excavation, soil stockpile, and grading may increase the potential for erosion and sedimentation to wetlands down gradient, which could affect wetland water quality. Empire would develop and implement a SWPPP that would use erosion and sedimentation controls and BMPs to avoid and minimize these impacts during onshore construction (COP Volume 2f, Table 9-1, APMs 60, 61, 71, 75; Empire 2022). Additionally, during onshore construction, dewatering may be required. If dewatering is needed, Empire would develop a site-specific dewatering plan to protect nearby wetlands in accordance with a Project-specific SWPPP, approved by the applicable agencies, as necessary (COP Volume 2f, Table 9-1, APM 62; Empire 2022). Dewatering activities would be temporary and water drawdown would be minimal. In addition to the aforementioned measures to avoid and minimize wetland impacts, Empire has committed to implementing various other APMs to reduce wetland impacts (COP Volume 2f, Table 9-1, APMs 58, 59, 63, 64, 66-70, 72, 74; Empire 2022). Therefore, potential adverse impacts on wetlands from construction activities would be short term and localized.

All earth disturbances from construction activities would be conducted in compliance with the New York State Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Construction Activities and implementation of sediment controls and a SWPPP to avoid and minimize water quality impacts during onshore construction. If ground-based delineations identify wetlands within the footprint of an onshore facility, permanent wetland impacts would require a CWA Section 404 permit from USACE and a Section 401 Water Quality Certification from NYSDEC, as well as authorization from NYSDEC under the Tidal Wetlands Act. If permanent impacts would not be avoided or minimized,

mitigation would be anticipated to compensate for lost wetlands. Empire would comply with all requirements of any issued permits.

BOEM would not expect normal O&M activities to involve further wetland alteration. The onshore cable route and associated facilities generally have no maintenance needs unless a fault or failure occurs; therefore, O&M is not expected to affect wetlands. In the event of a fault or failure, impacts would be expected to be short term and negligible. Decommissioning of the onshore Project components would have similar impacts as construction.

### 3.22.5.1. Impact of the Connected Action

As described in Section 3.22.3.1, the NWI and field reconnaissance did not identify any emergent, vegetated wetlands around the EW 1 Onshore Project area, including the SBMT where the connected action activities would occur. However, NYSDEC littoral zone wetlands and an area of SAV do exist in the vicinity of the connected action. The connected action would affect wetlands through the following IPFs: discharges and presence of structures.

**Discharges:** Localized increases in total suspended sediment resulting in localized turbidity would be expected during dredging and during installation of the bulkheads and piles. While there are no emergent, vegetated wetlands within the Project site, there is an area of SAV approximately 700 feet downstream of the site near the shoreline between the 40$^{th}$ Street and 42$^{nd}$ Street piers, and NYSDEC littoral zone tidal wetlands are present on site. BMPs used during construction would minimize total suspended sediment increases in the water column. These measures include use of turbidity curtains during dredging in the basins, use of an environmental bucket, and slow withdrawal of the bucket through the water column. Pile driving would result in minimal and localized increases in turbidity (i.e., 5 to 10 mg/L above ambient within 300 feet of the activity) that would not be expected to reach the area of SAV to the south. Because the SAV is in a relatively protected location between two piers and the Project would use BMPs during construction to minimize sediment resuspension, the Project would not be expected to result in significant impacts on wetlands or SAV. Turbidity associated with the Project activities would be minimal and temporary in nature and would result in localized, short-term, and minor impacts on NYSDEC littoral zone tidal wetlands, as resuspended sediments would dissipate relatively quickly with the tidal currents.

**Presence of structures:** NYSDEC littoral zone tidal wetlands are primarily located along the riprap slopes on the northern and southern faces of the 35$^{th}$ Street Pier and at the end of the interpier basin between the 35$^{th}$ and 39$^{th}$ Street Piers. These areas are currently covered by a layer of bedding stone and riprap armor stone, which would remain in place with the connected action. Installation of piles associated with the proposed wharves would result in the loss of less than 0.01 acre of these littoral zone tidal wetlands, and the installation of deck surfaces atop these piles would result in shading of 0.07 acre over the same tidal wetlands. Impacts on NYSDEC littoral zone tidal wetlands would be minor.

**Agency-proposed mitigation measures:** Mitigation proposed in Appendix H would require NYCEDC to mitigate for impacts on mapped tidal littoral zone wetlands from fill and shading in consultation with New York State agencies (Table H-1).

### 3.22.5.2. Cumulative Impacts of the Proposed Action

The cumulative impacts of the Proposed Action considered the impacts of the Proposed Action in combination with other ongoing and planned non-offshore wind activities, other planned offshore wind activities, and the connected action at SBMT. Ongoing and planned non-offshore wind activities related to onshore development activities would contribute to impacts on wetlands through the primary IPF of land disturbance. The connected action could affect wetlands through discharges and presence of structures (shading). The construction, O&M, and decommissioning of onshore infrastructure for offshore

wind activities in the geographic analysis area would also contribute to the primary IPF of land disturbance. Temporary disturbance and permanent loss of wetland may occur as a result of offshore wind development. BOEM is not aware of any planned offshore wind activities other than the Proposed Action that would overlap the geographic analysis area for wetlands. If wetland alteration or loss is anticipated, it would likely be minimal, the overall scale of impacts is expected to be small, and any activities that would result in these impacts would be required to comply with federal, state, and local regulations related to the protection of wetlands by avoiding or minimizing impacts.

The cumulative impact on wetlands would likely be minor, mostly driven by land disturbance. In context of reasonably foreseeable environmental trends, the impacts on wetlands under the Proposed Action may add to the impacts of ongoing and planned land disturbance. Impacts due to onshore land use changes are expected to include a gradually increasing amount of wetland alteration and loss, although a significant portion of the geographic analysis area is highly urbanized and developed with few wetlands. The future extent of land disturbance from ongoing activities and planned non-offshore wind activities over the next 35 years is not known with as much certainty as the extent of land disturbance that would be caused by the Proposed Action, but based on regional trends is anticipated to be similar to or greater than that of the Proposed Action.

If a planned project were to overlap the geographic analysis area or even be co-located (partly or completely) within the same right-of-way corridor that the Proposed Action would use, then the impacts of those planned projects on wetlands would be of the same type as those of the Proposed Action alone; the degree of impacts may increase, although the location and timing of planned activities would influence this. For example, repeated construction in a single right-of-way corridor would be expected to have less impact on wetlands than construction in an equivalent area of undisturbed wetland. All earth disturbances from construction activities would be conducted in compliance with the New York State Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Construction Activities and implementation of sediment controls and a SWPPP to avoid and minimize water quality impacts during onshore construction. Any work in wetlands would require a CWA Section 404 permit from USACE and a Section 401 Water Quality Certification from NYSDEC, as well as authorization from NYSDEC under the Tidal Wetlands Act; any wetlands permanently lost would require compensatory mitigation. Therefore, in context of reasonably foreseeable environmental trends, combined land disturbance impacts on wetlands from ongoing and planned activities, including the Proposed Action, would likely be minimal.

### 3.22.5.3. Conclusions

**Impacts of the Proposed Action.** The activities associated with the proposed Projects may affect wetlands through short-term disturbance from activities within or adjacent to these resources. Considering the avoidance, minimization, and mitigation measures required under federal and state statutes (e.g., CWA Section 404), construction of the Proposed Action would likely have **negligible** to **minor** impacts on wetlands. The connected action activities would have no effect (i.e., **negligibl**e) on emergent, vegetated wetlands due to the lack of that type of wetlands in the area where activities are proposed and minor effects on NYSDEC littoral zone wetlands and SAV.

**Cumulative Impacts of the Proposed Action.** BOEM anticipates that the cumulative impacts on wetlands in the geographic analysis area would be **minor**. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by the Proposed Action to the cumulative impacts on wetlands would be undetectable. The Proposed Action would contribute to the overall impact rating primarily through short-term impacts on wetlands from onshore construction activities in and adjacent to these resources. Measurable impacts would be small and the resource would likely recover completely when the affecting agent (e.g., temporary construction activity) is gone and remedial or mitigating action is taken.

### 3.22.6 Impacts of Alternatives B, E, and F on Wetlands

**Impacts of Alternatives B, E, and F.** Alternatives B, E, and F would alter the turbine array layout compared to the Proposed Action; however, each of these alternatives would allow for installation of up to 147 WTGs as defined in Empire's PDE. The impacts on wetlands of Alternatives B, E, and F would be the same as those of the Proposed Action because these alternatives would differ only with respect to offshore components, and offshore components of the proposed Projects have no potential impacts on wetlands. The impacts resulting from the land disturbance IPF associated with onshore construction under Alternatives B, E, and F on wetlands are expected to be minimal and would be the same as those of the Proposed Action.

**Cumulative Impacts of Alternatives B, E, and F.** The cumulative impacts on wetlands would be minor for the same reasons described for the Proposed Action. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternatives B, E, and F to the cumulative impacts on wetlands would be the same as those described for the Proposed Action for the reason described above.

#### 3.22.6.1. Conclusions

**Impacts of Alternatives B, E, and F.** As discussed above, the expected **negligible** to **minor** impacts associated with the Proposed Action would not change under Alternatives B, E, and F because the alternatives would only differ in offshore components, and offshore components would not contribute to impacts on wetlands; the same construction, O&M, and decommissioning activities would still occur.

**Cumulative Impacts of Alternatives B, E, and F.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternatives B, E, and F to the cumulative impacts on wetlands would be undetectable. Because the impacts of the Proposed Action would not change under Alternatives B, E, or F, BOEM anticipates that cumulative impacts of Alternatives B, E, and F would be the same as described for the Proposed Action. Therefore, cumulative impacts of Alternatives B, E, and F would be **minor**.

### 3.22.7 Impacts of Alternative C on Wetlands

**Impacts of Alternative C.** Wetland impacts under Alternative C would be the same as those of the Proposed Action because submarine export cable route options that would traverse Gravesend Anchorage (Alternative C-1) or the Ambrose Navigation Channel (Alternative C-2) have no potential impacts on wetlands. The impacts resulting from the land disturbance IPF associated with onshore construction under Alternative C on wetlands would be the same as those of the Proposed Action.

**Cumulative Impacts of Alternative C.** The cumulative impacts on wetlands would be minor for the same reasons described for the Proposed Action. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative C to the cumulative impacts on wetlands would be the same as those described for the Proposed Action.

#### 3.22.7.1. Conclusions

**Impacts of Alternative C.** As discussed above, the expected **negligible** to **minor** impacts associated with the Proposed Action would not change under Alternative C because the alternative would only differ in offshore components, and offshore components would not contribute to impacts on wetlands; the same construction, O&M, and decommissioning activities would still occur.

**Cumulative Impacts on Alternative C.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative C to the cumulative impacts on wetlands would be

undetectable. Because the impacts of the Proposed Action would not change under Alternative C, BOEM anticipates that cumulative impacts of Alternative C would be the same as described for the Proposed Action. Therefore, cumulative impacts of Alternative C would be **minor**.

## 3.22.8 Impacts of Alternative D on Wetlands

**Impacts of Alternative D.** The impacts resulting from the land disturbance IPF associated with construction and installation, O&M, and decommissioning of the Projects under Alternative D would be the same those described under the Proposed Action. Landfall and onshore export cable route options to avoid the sand borrow area (Alternative D) are already covered under the Proposed Action as part of the PDE approach, and narrowing the landfall and onshore export cable route options under Alternative D would not materially change the analyses of the land disturbance IPF. All other onshore Project components would be the same as under the Proposed Action and selection of a submarine export cable route option to avoid the sand borrow area (Alternative D) would not affect wetlands.

**Cumulative Impacts of Alternative D.** The cumulative impacts on wetlands would be minor for the same reasons described for the Proposed Action. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative D to the cumulative impacts on wetlands would be the same as those described for the Proposed Action.

### 3.22.8.1. Conclusions

**Impacts of Alternative D.** As discussed above, the expected **negligible** to **minor** impacts associated with the Proposed Action would not change under Alternative D.

**Cumulative Impacts of Alternative D.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative D to the cumulative impacts on wetlands would be undetectable. Because the impacts of the Proposed Action would not change under Alternative D, BOEM anticipates that cumulative impacts of Alternative D would be the same as described for the Proposed Action. Therefore, cumulative impacts of Alternative D would be **minor**.

## 3.22.9 Impacts of Alternative G on Wetlands

**Impacts of Alternative G.** Under Alternative G, the Barnums Channel cable crossing would be limited to cable segment IP-F, which would consist of an elevated cable bridge across Barnums Channel adjacent to the Long Island Rail Road railway bridge in order to avoid tidal wetlands. Analysis completed for Empire's USACE permit application determined that crossing Barnums Channel with a cable bridge adjacent to the Long Island Rail Road railway bridge would reduce impacts within the tidal channel itself compared to other EW 2 route options for the Barnums Channel crossing or alternate construction methods (details of Empire's alternatives analysis for the Barnums Channel crossing are presented in Appendix O, *Alternatives Analysis for Corps Permit Application*). The IP-F cable bridge crossing would require installation of support footings within the channel; however, this would occur along a corridor already containing both the railroad bridge and another utility bridge on the eastern side of the railroad crossing. Because the northern and southern sides of the crossing comprise an existing parking lot and a tank farm, respectively, impacts on wetlands and natural habitats on either side of the crossing would be avoided. Compared to the Proposed Action's IP-C crossing option, segment IP-F would have less wetland impact because IP-C could be constructed using the open trench method across Barnums Channel under the PDE, which could directly affect the estuarine and marine wetland at the crossing. Compared to the Proposed Action's IP-G crossing of Barnums Channel, segment IP-F is anticipated to have less impact on wetlands. Although IP-G could also cross Barnums Channel with an elevated cable, either via attachment to the existing Long Beach Road bridge or a newly constructed elevated cable bridge (similar to segment IP-F), there are greater areas of wetland along the IP-G cable corridor around Barnums Channel compared

to the IP-F cable corridor (see Table 3.22-3). Therefore, the IP-G cable crossing presents a greater potential for wetlands to be affected during construction and operations.

**Cumulative Impacts of Alternative G.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative G to the cumulative impacts on wetlands would be less than the Proposed Action because, under the PDE approach of the Proposed Action, other crossing options for Barnums Channel could result in greater potential impacts on tidal wetlands. The impacts under Alternative G would still be undetectable, like those of the Proposed Action. Even though there would be less potential impact on tidal wetlands, BOEM does not anticipate the overall impact on wetlands for Alternative G to differ substantially from those of the Proposed Action. Therefore, BOEM anticipates that cumulative impacts of Alternative G would be the same as described for the Proposed Action: minor.

#### 3.22.9.1. Conclusions

**Impacts of Alternative G.** Wetland impacts under Alternative G would be reduced compared to those of the Proposed Action, which includes other crossing options of Barnums Channel that could result in greater wetland impacts. The expected **negligible** to **minor** impacts associated with the Proposed Action would not change under Alternative G because while impacts on wetlands would be minimized, wetland impacts would still occur at the Barnums Channel crossing. BOEM expects that wetland impacts would be small and localized and would not result in a detectable change in wetland quality or function.

**Cumulative Impacts of Alternative G.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative G to the cumulative impacts on wetlands would be the same as those of the Proposed Action. Offshore wind projects would contribute to wetland impacts in the geographic analysis area but the overall scale of impacts is expected to be small, and compliance with mitigation measures and regulations would minimize these impacts. Because the impacts of the Proposed Action would not substantially change under Alternative G, BOEM anticipates the cumulative impacts of Alternative G would be the same as the Proposed Action. Therefore, the cumulative impacts of Alternative G would be **minor**.

### 3.22.10 Impacts of Alternative H on Wetlands

**Impacts of Alternative H.** The impacts resulting from the land disturbance IPF associated with construction and installation, O&M, and decommissioning of the Projects under Alternative H would be the same those described under the Proposed Action. An alternate method of dredge and fill activity at the SBMT would not change the analysis of the IPF. All other offshore and onshore Project components of Alternative H would be the same as under the Proposed Action.

**Cumulative Impacts of Alternative H.** The cumulative impacts on wetlands would be minor for the same reasons described for the Proposed Action. In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative H to the cumulative impacts on wetlands would be the same as those described for the Proposed Action.

#### 3.22.10.1. Conclusions

**Impacts of Alternative H.** As discussed above, the expected **negligible** to **minor** impacts associated with the Proposed Action would not change under Alternative H.

**Cumulative Impacts of Alternative H.** In context of reasonably foreseeable environmental trends, the incremental impacts contributed by Alternative H to the cumulative impacts on wetlands would be undetectable. Because the impacts of the Proposed Action would not change under Alternative H, BOEM

anticipates that cumulative impacts of Alternative H would be the same as described for the Proposed Action. Therefore, cumulative impacts of Alternative H would be **minor**.

### 3.22.11 Comparison of Alternatives

The **negligible** to **minor** impacts on wetlands under the Proposed Action would be the same under Alternatives B, E, and F because these alternatives would differ only with respect to offshore components, and offshore components of the proposed Projects have no potential impacts on wetlands and are outside of the wetlands geographic analysis area.

Alternative C or D would not change the analysis compared to the Proposed Action because the cable route options that would be constructed under these alternatives are already covered under the Proposed Action as part of the PDE approach and the specific cable route options that would be constructed under Alternative C or D have no potential impacts on wetlands. Therefore, the impact level on wetlands would not change: **negligible** to **minor**.

Alternative G would not change the analysis compared to the Proposed Action because while impacts on wetlands would be minimized, permanent wetland impacts are still not anticipated and short-term wetland impacts are still likely to occur at inland crossings. BOEM expects that wetland impacts would be small and localized and would not result in a detectable change in wetland quality or function. Therefore, the impact level on wetlands would not change: **negligible** to **minor**.

Under Alternative H, an alternative method of dredge and fill activity would occur around the SBMT, which would not materially change the analysis of any IPF compared to the Proposed Action, and any potential indirect effects on wetlands in the vicinity would be temporary. Therefore, the overall impact level on wetlands would not change: **negligible** to **minor**.