Sunrise Wind Farm and Sunrise Wind Export Cable – Development and Operation

Biological Assessment

December 15, 2022

For the U.S. Fish and Wildlife Service

U.S. Department of the Interior
Bureau of Ocean Energy Management
Office of Renewable Energy Programs

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Abbreviations and Acronyms

ac	acre(s)
AC	alternating current
ACJV	Atlantic Coast Joint Venture
ADLS	Aircraft Detection Lighting System
AIS	automatic identification systems
BA	Biological Assessment
BBMP	Bird and Bat Monitoring Plan
BMP	best management practice
BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
CPS	cable protection system
EM&CP	Environmental Management and Construction Plan
EPA	United States Environmental Protection Agency
ERP	Emergency Response Plan
ESA	Endangered Species Act
ESP	electrical service platform
FAA	Federal Aviation Administration
FDR	Facility Design Report
FIR	Fabrication and Installation Report
ft	foot(feet)
ft/s	foot(feet) per second
ha	hectare(s)
GPS	global positioning system
HDD	horizontal directional drilling
HRG	high-resolution geophysical
IAC	Inter-Array Cables
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
ICW	Intracoastal Waterway
IPaC	Information, Planning, and Conservation System

IPF	impact-producing factor
ISCMP	Invasive Species Control and Management Plan
IVM	Integrated Vegetation Management
kHz	kilohertz
km	kilometer(s)
kV	kilovolt(s)
LIPA	Long Island Power Authority
m	meter(s)
m/s	meter(s) per second
m^2	square meter(s)
MA	Massachusetts
MEC	munitions and explosives of concern
mi	mile(s)
MSL	mean sea level
MW	megawatt(s)
NEPA	National Environmental Policy Act
NM	nautical mile(s)
NMFS	National Marine Fisheries Service
NNIS	Non-Native Invasive Species
NOAA	National Oceanic and Atmospheric Administration
NOI	notice of intent
NPCC	Northeast Power Coordinating Council, Inc.
NYCRR	New York Codes, Rules and Regulations
NYNHP	Natural Heritage Program
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
O&M	operations and maintenance
OCS	outer continental shelf
OCS–DC	Offshore Converter Station
OCSLA	Outer Continental Shelf Lands Act
OnCS–DC	Onshore Converter Station
OSRP	Oil Spill Response Plan
OSS	Offshore Substation
PATON	private aid to navigation
PDE	project design envelope
RI	Rhode Island
ROW	right-of-way

RPM	revolution(s) per minute
RSZ	rotor swept zone
RTE	rare, threatened, and endangered
SAP	Site Assessment Plan
SBP	subbottom profiler
SCADA	supervisory control and data acquisition
SOV	service operating vessel
SPCC	Spill Prevention, Control, and Countermeasure
SRWEC	Sunrise Wind Export Cable
SRWF	Sunrise Wind Farm
Sunrise Wind	Sunrise Wind LLC
SWPPP	Stormwater Pollution Prevention Plan
TJB	transition joint bay
US	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
UXO	unexploded ordnance
WEA	Wind Energy Area
WNS	white-nose syndrome
WTG	Wind Turbine Generator

1.0 INTRODUCTION

The Energy Policy Act of 2005, Public Law No. 109-58, added Section 8(p)(1)(C) to the Outer Continental Shelf Lands Act (OCSLA), which grants the Secretary of the Interior the authority to issue leases, easements, or rights-of-way on the Outer Continental Shelf (OCS) for the purpose of renewable energy development (43 United States [US] Code [USC] § 1337[p][1][C]). The Secretary delegated this authority to the former Minerals Management Service, now the Bureau of Ocean Energy Management (BOEM). On April 22, 2009, BOEM (formerly the Bureau of Ocean Energy Management, Regulation, and Enforcement) promulgated final regulations implementing this authority at 30 Code of Federal Regulations (CFR) Part 585.

Sunrise Wind LLC (Sunrise Wind; Applicant) is a 50/50 joint venture between Ørsted North America, Inc. and Eversource Investment LLC. Sunrise Wind submitted the first draft of the Construction and Operations Plan (COP) to BOEM on September 1, 2020. After addressing several rounds of comments from BOEM, Sunrise Wind resubmitted the COP August 23, 2021 (Sunrise Wind 2021a). BOEM deemed the COP sufficient and initiated this National Environmental Policy Act (NEPA) analysis on August 31, 2021, with the issuance of the notice of intent (NOI) (BOEM 2021). Sunrise Wind submitted a second updated COP for the Project in October 2021 (Sunrise Wind 2021b) and a third updated COP in April 2022 (Sunrise Wind 2022b), and a fourth updated COP in August 2022 (Sunrise Wind 2022e). Consistent with the requirements of 30 CFR §§ 585.620 to 585.638, COP submittal occurs after BOEM grants a lease for the Proposed Action and the Applicant completes all studies and surveys defined in their Site Assessment Plan (SAP). BOEM's renewable energy development process is described in the following section.

The Sunrise Wind Offshore Wind Farm Project includes up to 94 wind turbine generators (WTGs) in 102 potential positions, an offshore converter station (OCS–DC), an inter-array cable (IAC), an onshore converter station (OnCS-DC), an offshore transmission cable making landfall on Long Island, New York, and an onshore interconnection cable to the Long Island Power Authority (LIPA) Holbrook Substation. The Project will generate up to approximately 1,034 megawatts (MW) of renewable energy.

This Biological Assessment (BA) has been prepared pursuant to Section 7 of the Endangered Species Act (ESA) to evaluate potential effects of the Sunrise Wind Offshore Wind Farm Project (Project, or Proposed Action) described herein on ESA-listed species and critical habitat under the jurisdiction of the United States Fish and Wildlife Service (USFWS) (50 CFR § 402.14). This BA provides a comprehensive description of the Proposed Action, defines the Action Area, describes species and critical habitat potentially impacted by the Proposed Action, and provides an analysis and determination of how the Proposed Action may affect listed species and/or their habitats. The activities being considered include all proposed federal actions associated with the construction, operations, and decommissioning of the proposed Project including approving the COP for the Sunrise Wind offshore wind energy facility on the OCS offshore of Massachusetts, Rhode Island, and New York. Effects on ESA-listed species and critical habitat under the oversight of the National Marine Fisheries Service (NMFS) are analyzed under a separate BA document for consultation.

1.1 RENEWABLE ENERGY PROCESS

Under BOEM's renewable energy regulations, the issuance of leases and subsequent approval of wind energy development on the OCS is a phased decision-making process. BOEM's wind energy program occurs in four distinct phases, defined below. Phases 1 through 3 have already been completed for the Sunrise Wind Farm (SRWF) and Sunrise Wind Export Cable (SRWEC); the Proposed Action addressed in this consultation represents phase 4 for the development:

1. Planning and Analysis (complete). The first phase of the renewable energy process is to identify suitable areas to be considered for wind energy leases through collaborative, consultative, and analytical processes using the state's task forces; public information meetings; and input from the states, Native American tribes, and other stakeholders.
2. Lease Issuance (complete). The second phase is the issuance of a commercial wind energy lease. The competitive lease process is set forth at 30 CFR §§ 585.210 to 585.225, and the noncompetitive process is set forth at 30 CFR §§ 585.230 to 585.232. A commercial lease gives

the lessee the exclusive right to subsequently seek BOEM approval for the development of the leasehold. The lease does not grant the lessee the right to construct any facilities; rather, the lease grants the right to use the leased area to develop its plans, which must be approved by BOEM before the lessee can move on to the next phase of the process (30 CFR §§ 585.600 and 585.601).

3. Approval of a SAP (complete). The third phase of the renewable energy development process is the submission of a SAP, which contains the lessee's detailed proposal for the construction of a meteorological tower and/or the installation of meteorological buoys on the leasehold (30 CFR §§ 585.605 to 585.618). The lessee's SAP must be approved by BOEM before it conducts these "site assessment" activities on the leasehold. BOEM may approve, approve with modification, or disapprove a lessee's SAP (30 CFR § 585.613). As a condition of SAP approval, meteorological towers will be required to have visibility sensors to collect data on climatic conditions above and beyond wind speed, direction, and other associated metrics generally collected at meteorological towers. These data will assist BOEM, NMFS, and USFWS with evaluating the impacts of future offshore wind facilities on threatened and endangered birds, migratory birds, and bats.
4. Approval of a COP (Proposed Action). The fourth and final phase of the process is the submission of a COP; a detailed plan for the construction and operation of a wind energy farm on the lease (30 CFR §§ 585.620 to 585.638). BOEM approval of a COP is a precondition to the construction of any wind energy facility on the OCS (30 CFR § 585.628). As with a SAP, BOEM may approve, approve with modification, or disapprove a lessee's COP (30 CFR § 585.628). This phase is the focus of the Proposed Action including the SRWF and SRWEC.

The regulations also require that a lessee provide the results of surveys with its SAP or COP, including a shallow hazards survey (30 CFR § 585.626 [a][1]), geological survey (30 CFR § 585.616[a][2]), geotechnical survey (30 CFR § 585.626[a][4]), and an archaeological resource survey (30 CFR § 585.626[a][5]). BOEM refers to these surveys as "site characterization" activities. Although BOEM does not issue permits or approvals for these site characterization activities, it will not consider approving a lessee's SAP or COP if the required survey information is not included.

The Proposed Action addresses phase 4 of the renewable energy process. The Applicant has completed site characterization activities and has developed a COP in accordance with BOEM regulations. BOEM is consulting on the proposed approval of the COP for the SRWF and SRWEC as well as other permits and approvals from other agencies that are associated with the approval of the COP. BOEM is the lead federal agency for purposes of Section 7 consultation; the other action agencies include the Bureau of Safety and Environmental Enforcement (BSEE), the US Army Corps of Engineers (USACE), the Environmental Protection Agency (EPA), the US Coast Guard (USCG), and the NMFS Office of Protected Resources. This BA considers effects of the Proposed Action on ESA-listed birds, bats, and plants that occur in the Action Area.

BOEM completed an environmental assessment and BA on the issuance of leases for wind resource data collection on the OCS within the Rhode Island (RI) and Massachusetts (MA) Wind Energy Areas (WEAs) and the MA WEA in 2013 and on associated site characterization and site assessment activities that could occur on those leases, including the Lease Area. The RI-MA WEA comprises 13 whole and 29 partial lease blocks (see the Lease Area on **Figure 1**). On April 10, 2013, NMFS issued a programmatic biological opinion for commercial wind lease issuance and site assessment activities on the Atlantic OCS in Massachusetts, Rhode Island, New York, and New Jersey WEAs.

1.2 Design Envelope

Before a lessee may build an offshore wind energy facility on their commercial wind lease, they must submit a COP for review and approval by BOEM (see 30 CFR § 585.620[C]). Pursuant to 30 CFR § 585.626, the COP must include a description of all planned facilities, including onshore and support facilities, as well as anticipated easement needs for the Proposed Action. It must also describe all activities related to Proposed Action construction, commercial operations, maintenance, decommissioning, and site clearance procedures. There are benefits to allowing lessees to describe a reasonable range of designs in a COP because of the complexity, the unpredictability of the environment in which it will be constructed, and the rapid pace of technological development within the industry. In the renewable energy industry, a permit application or plan that describes a reasonable range of designs is referred to as a project design envelope (PDE) approach.

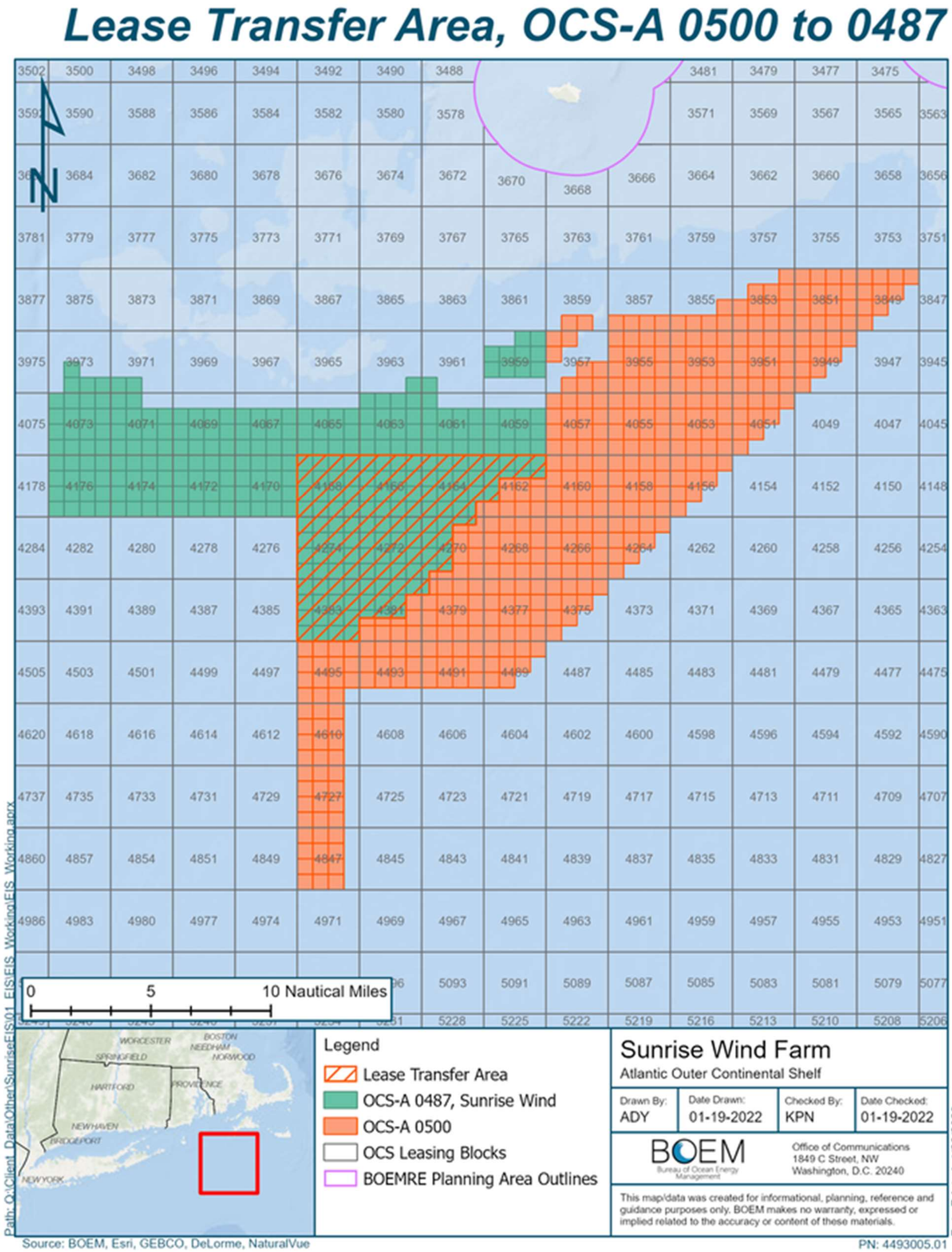

Figure 1. Sunrise Wind Lease Area OCS-A 0487 and OCS-A 0500 Transfer.

BOEM gives offshore renewable energy lessees the option to use a PDE approach when submitting a COP to evaluate a design envelope approach for the environmental review of COPs (USDOE and USDOI 2016). A PDE approach is a permitting approach that allows a proponent the option to submit a reasonable range of design parameters within its permit application, allows a permitting agency to then analyze the maximum impacts that could occur from the range of design parameters, and may result in the approval of a Proposed Action that is constructed within that range. As the PDE relates to NEPA, the PDE covers the range of alternatives being considered in the environmental impact statement in preparation for this Proposed Action. Therefore, this BA and associated outcomes of the ESA consultation will cover the menu of potential alternatives that may be authorized by BOEM in the Record of Decision and approval of the COP.

1.3 Regulatory Background and Consultation History

Under ESA Section 7 consultation regulations, the Action Area refers to the area affected by the Proposed Action (50 CFR § 402.02) and also includes all consequences to listed species or critical habitat that are caused by the Proposed Action, including actions that would occur outside the immediate area involved in the action (see 50 CFR § 402.17). The immediate Project Area includes the 11.25-by-20-nautical-mile (NM; 20.84-by-37.04-kilometer [km]) wind farm footprint within the Lease Area and all IAC routes and transmission cable right-of-way (ROW) from the offshore substation (OSS) to shore. In addition to the immediate Project footprint, the operations and maintenance (O&M) facility, potential port modifications, and vessel transits are considered as part of the Action Area. Additionally, the size of the Action Area includes noise, electromagnetic field, water quality, benthic, vessel and survey operations, and other impacts associated with the Proposed Action that have the potential for consequences that may affect listed species or critical habitat.

1.4 Action Agencies and Regulatory Authorities

The Energy Policy Act of 2005 (Public Law 109-58) added OCSLA. The new section authorized the Secretary of Interior to issue leases, easements, and rights-of-way in the OCS for renewable energy development, including wind energy. The Secretary delegated this authority to the former Minerals Management Service, and later to BOEM. Final regulations implementing this authority (30 CFR Part 585) were promulgated on April 22, 2009. These regulations prescribe BOEM's responsibility for determining whether to approve, approve with modifications, or disapprove Sunrise Wind's COP.

BSEE's mission is to enforce safety, environmental, and conservation compliance with any associated legal and regulatory requirements during Project construction and future operations. BSEE will be in charge of the review of facility design and fabrication and installation reports, oversee inspections/ enforcement actions as appropriate, oversee closeout verification efforts, oversee facility removal inspections/ monitoring, and oversee bottom clearance confirmation.

USACE regulates work that is authorized or permitted through Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act, which would include the construction of up to 15 offshore WTGs, scour protection around the base of the WTGs, one OSS, an IAC connecting the WTGs to the OSS, and one offshore export cables. The cable route(s) would originate from the OSS and would connect to the electric grid at East Hampton, New York. BOEM was a cooperating agency with the USACE on a 2013 informal USFWS consultation for the Deepwater Wind Block Island Wind Facility and Block Island Transmission System. The wind facility consists of five 6-MW wind turbines within 3 miles (mi; 4.8 km) of Block Island, Rhode Island. On July 31, 2013, USFWS concurred that this proposed action was not likely to adversely affect the American burying beetle (*Nicrophorus americanus*), piping plover (*Charadrius melodus*), roseate tern (*Sterna dougallii*), or rufa red knot (*Calidris canutus rufa*), concluding that the effects of the proposed action on those species would be insignificant and/or discountable.

The "OCS Air Regulations," found at 40 CFR Part 55, establish the applicable air pollution control requirements, including provisions related to permitting, monitoring, reporting, fees, compliance, and enforcement, for facilities subject to Section 328 of the Clean Air Act; the EPA issues OCS air permits. Sunrise Wind has submitted to EPA Region 1 an application requesting a Clean Air Act permit under Section 328 of the Clean Air Act for the construction and operation of an offshore windfarm, including export cables, on the OCS with the potential to generate up to 180 MW of electricity (the windfarm).

The EPA may also issue a National Pollutant Discharge Elimination System General Permit for construction activities under the Clean Water Act. The EPA uses general permits issued under Section 402 of the Clean Water Act (33 USC § 1342 et seq.) to authorize routine discharges by multiple dischargers. Coverage for discharges under a general permit is granted to applicants after they submit a NOI to discharge. Once the NOI is submitted and any review period specified under the construction general permit has closed, the Applicant is authorized to discharge under the terms of the general permit.

The USCG administers the permits for private aids to navigation (PATON) located on structures positioned in or near navigable waters of the United States. PATONs and federal aids to navigation (ATONS), including radar transponders, lights, sound signals, buoys, and lighthouses, are located throughout the Project Area. USCG approval of additional PATONs during construction of the WTGs, OSS, and along the offshore export cable corridor may be required. These aids serve as a visual reference to support safe maritime navigation. Sunrise Wind would establish marine coordination to control vessel movements throughout the wind farm as required. Federal regulations governing PATON are found within 33 CFR Part 66 and address the basic requirements and responsibilities.

BOEM was involved in consultation with USFWS regarding the construction, O&M, and decommissioning of offshore wind turbines for the Cape Wind Energy Project in federal waters of Nantucket Sound, Massachusetts. The consultation was initiated on the finding that the Cape Wind Energy Project would be “likely to adversely affect” piping plovers and roseate terns, and that an incidental take statement was provided to address mortality of these species due to the potential for rotor swept collisions. The USFWS determined in the Cape Wind Energy Project Biological Opinion dated November 21, 2008, that effects due to monopile collisions, habitat loss and disturbance, prey species attraction, barriers and displacement, increased predation, lighting, oil spills, pre- and post- construction activities, routine maintenance activities, and decommissioning activities were insignificant and discountable.

On March 24, 2011, BOEM requested informal ESA Section 7 consultation with the USFWS for lease issuance and site assessment activities off New Jersey, Delaware, Maryland, and Virginia. On June 20, 2011, the USFWS concurred with BOEM’s determinations that the risk to the roseate tern, piping plover, Bermuda petrel (*Pterodroma cahow*), and (then-candidate) rufa red knot from site characterization and site assessment activities (construction, operations, maintenance, and decommission of buoys and meteorological towers) associated with lease issuance was “small and insignificant” and, therefore, not likely to adversely affect the three ESA-listed species and one candidate species occurring in the Action Area.

BOEM completed ESA Section 7 consultation on the *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Rhode Island and Massachusetts Biological Assessment* in 2012 (BOEM 2012). The RI-MA WEA consists of 13 whole and 29 partial lease blocks (see the Lease Area on **Figure 1**). This consultation addressed activities associated with the site assessment process, including geological and geophysical surveys (sonar and sediment work), wind resource assessments (meteorological towers and buoys), biological assessments, and cultural/archeological assessments. On November 1, 2012, USFWS concurred with BOEM’s determination that the proposed action is not likely to adversely affect the roseate tern or piping plover or jeopardize the continued existence of the then-candidate rufa red knot (USFWS 2012). USFWS concluded that the likelihood of these species occurring in the Action Area was discountable, while acknowledging that the extent to which these species occur 8 or more miles offshore was not well known at that time. USFWS also concluded that the greatest potential threat posed to avian species from site assessment activities was the risk of a catastrophic oil spill resulting from vessel collision with meteorological towers. USFWS concluded that the risk of such an event was low given the number of proposed structures, the implementation of recommended visibility sensors, and USCG requirements to ensure these structures are clearly marked and outside of established navigational corridors. To date, no meteorological towers have been placed on the OCS.

1.5 ACTION AREA

The Proposed Action's Action Area includes upland and coastal nearshore habitats on eastern Long Island and adjacent New York State (NYS) waters, and ocean habitats in the RI-MA WEAs on the OCS offshore of New York, Rhode Island, and Massachusetts. The SRWF and SRWEC area and cable routes are shown on **Figures 2** and **3**. Although most activities would occur on the lease and along the proposed cable routes, vessels would travel locally between ports and the SRWF. The Proposed Action would use existing port facilities located in New York, Rhode Island, Connecticut, Massachusetts, Maryland, New Jersey, and/or Virginia for offshore construction, staging and fabrication, crew transfer, and logistics support. Modifications of these ports specifically for the Project are not anticipated. Final port selection has not been determined at this time; Table 3.3.10-1 and Figure 3.3.10-1 in the COP (Sunrise Wind 2022e) provide a summary and depiction of potential ports that could be used to support construction of the Project.

Although specific ports have not been identified where equipment and components may originate, vessel transits from ports in the Mid-Atlantic region may occur as a result of the Project. The following port towns may be used for fabrication, assembly, deployment, or decommissioning activities for the SRWF: Albany, Brooklyn, Coeymans, Port Jefferson Village, Montauk, and/or New York City, New York; North Kingstown, Narragansett, and/or Providence, Rhode Island; New Bedford, Massachusetts; New London, Connecticut; Paulsboro, New Jersey; Sparrows Point, Maryland; and/or Norfolk, Virginia. In addition, the following port towns may be used as a base for crew transfers, cargo logistics, or storage: Port Jefferson Village and/or Montauk, New York, and/or North Kingstown and/or Narragansett, Rhode Island. The Action Area would include any vessel routes between these port locations and the SRWF and cable route areas. All proposed vessel routes are within nearshore waters of the Mid-Atlantic (Figures 1 and 2, Section 4.1.5, Sunrise Wind 2021c). Whether ports in these states would be used or not would not be known until additional details are available when contracts are in place. The number of ports under consideration does not increase the number of vessel trips that are likely to occur but may affect the location of the transits and the length of the transits.

On July 31, 2013, the BOEM conducted a competitive auction and awarded Lease OCS-A 0487, consisting of about 67,250 acres (ac; 27,215 hectares [ha]), to Deepwater Wind New England, LLC. On August 3, 2020, Deepwater Wind New England, LLC assigned Lease OCS-A 0487 to Sunrise Wind. On September 3, 2020, Bay State Wind, LLC assigned 100 percent of its record title interest in a portion of lease OCS-A 0500, which BOEM designated OCS-A 0530, to Sunrise Wind. On March 15, 2021, BOEM completed the consolidation of Lease OCS-A 0530 into Lease OCS-A 0487 through an amendment to Lease OCS-A 0487 (see **Figure 1**). The resulting Lease Area is 109,952 ac (44,496 ha). The effective date of Lease OCS-A 0487 remains October 1, 2013. The Lease Area is approximately 26.5 NM (30.5 mi [48.1 km]) east of Montauk, New York, and approximately 14.5 NM (16.7 mi [26.8 km]) from Block Island, Rhode Island (**Figure 2**).

The Proposed Action addressed in this BA covers the construction, O&M, and decommissioning of the SRWF and SRWEC. The two major construction and operations components, the SRWF and the SRWEC, are described in this section. Decommissioning and site clearance surveys are anticipated at the end of the Project life. There would be a maximum of 95 monopiles driven for SRWF. This would include up to 94 monopiles for the WTGs with a nameplate capacity of 11 MW per turbine and one monopile for an OSS (see WTG design specifications in **Table 1**). In addition to pile driving, submarine cables would be installed between the WTGs (IAC) and to shore (export cable) (**Figure 2**). The SRWF would be located within federal waters on the OCS, specifically in the Lease Area (**Figure 3**) approximately 16.4 NM (18.9 mi [30.4 km]) south of Martha's Vineyard, Massachusetts.

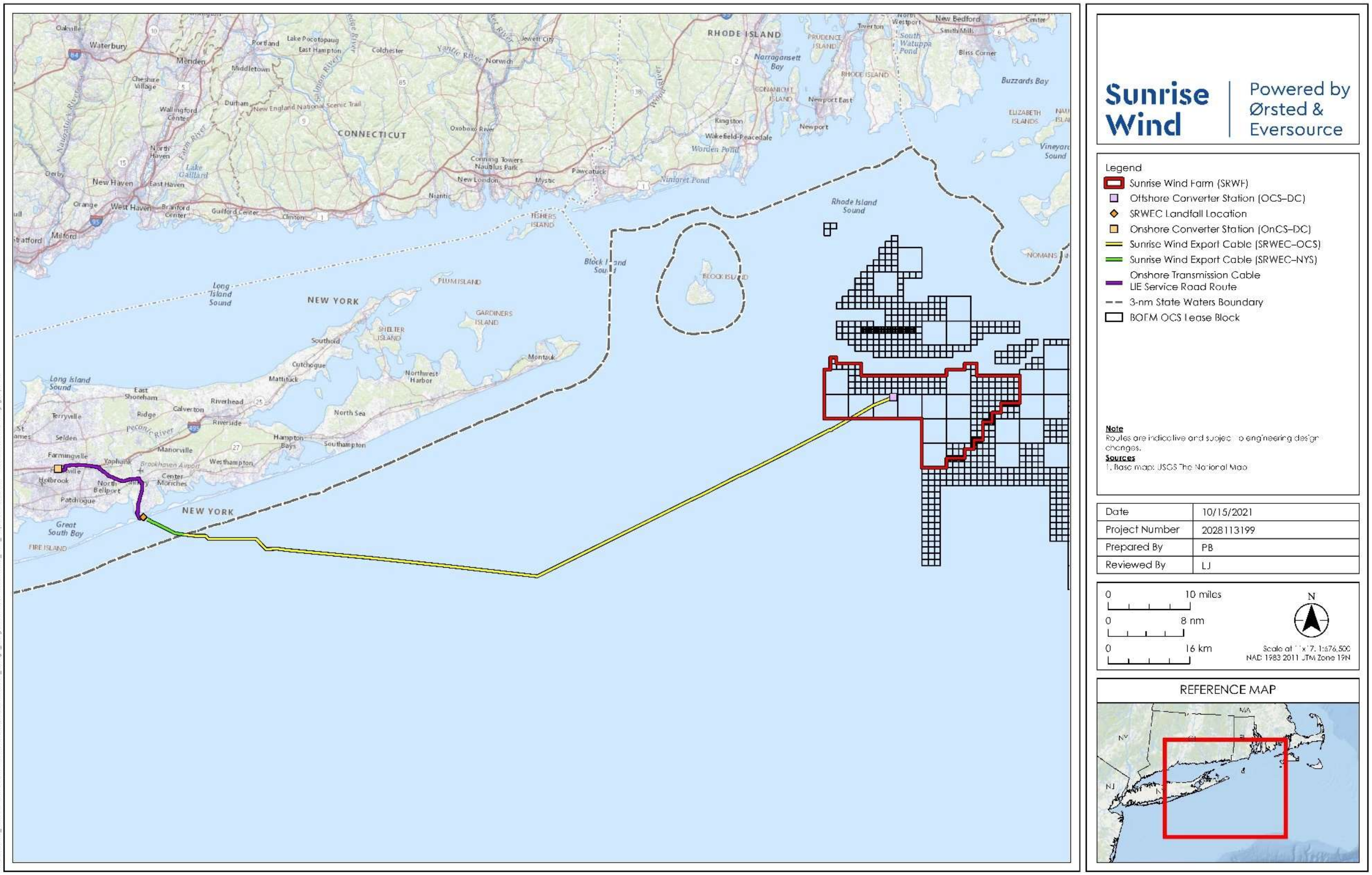

Figure 2. Sunrise Wind Project Area.

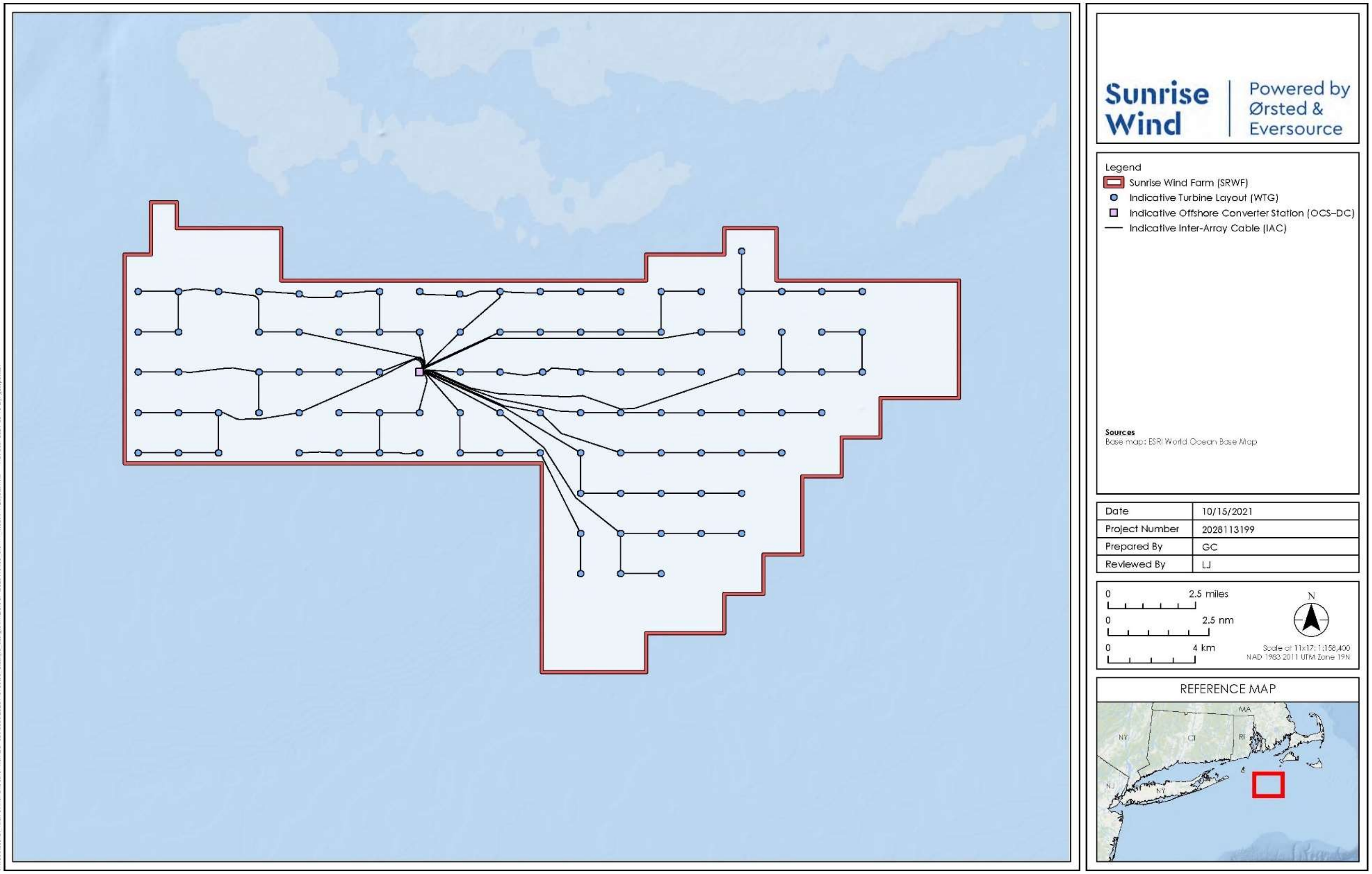

Figure 3. Sunrise Wind Farm Area.

Table 1. Wind Turbine Generator Design Specifications.

WTG Component/Parameter	Selected Turbine (11 MW)
Turbine Height (from MSL)	787 ft (240 m)
Hub Height (from MSL)	459 ft (140 m)
Air Gap (from MSL) to the Bottom of the Blade Tip	131.2 ft (40 m)
Base Height (foundation height – top of transition piece) (from MSL)	89 ft (27 m)
Base (tower) Width (at the bottom)	23 ft (7 m)
Base (tower) Width (at the top)	16 ft (5 m)
Nacelle Dimensions (length x width x height)	69 ft x 33 ft x 36 ft (21 m x 10 m x 11 m)
Blade Length	318 ft (97 m)
Maximum Blade Width	19 ft (5.8 m)
Rotor Diameter	656 ft (200 m)
Operation Cut-in Wind Speed	7 to 11 mph (3 to 5 m/s)
Operation Cut-out Wind Speed	56 to 63 mph (25 to 28 m/s)

Notes:
ft = feet(foot); m = meter(s); m/s = meter(s) per second; mph = mile(s) per hour; MSL = mean sea level; MW = megawatt(s)

The SRWEC is an alternating current (AC) electric cable that would connect the SRWF to the existing mainland electric grid in the Town of Brookhaven, New York (see **Figure 2**). The SRWEC includes both offshore and onshore segments. Offshore, the SRWEC would be located in federal waters (SRWEC-OCS) and NYS territorial waters (SRWEC-NYS) and would be buried to a target depth of 3 to 7 feet (ft; 1 to 2 meters [m]) below the seabed. Onshore, the terrestrial underground segment of the export cable (SRWEC-Onshore) would be located in the Town of Brookhaven, New York. The SRWEC-NYS would be connected to the SRWEC-Onshore via the sea-to-shore transition where the offshore and onshore cables would be spliced together. The SRWEC would also include a new interconnection facility where the SRWEC would interconnect with the LIPA electric transmission and distribution system at the existing Holbrook Substation also located in the Town of Brookhaven, New York.

The Applicant has elected to use a PDE approach for describing the Proposed Action, consistent with BOEM's *Draft Guidance Regarding the Use of a Project Design Envelope in a Construction and Operations Plan* (BOEM 2018) (see **Section 1.3**).

2.1 CONSTRUCTION

The following sections describe the proposed Project infrastructure and provide details on design and construction methodologies, organized in accordance with the standard construction sequence of an offshore wind farm as outlined in the following Project schedule with construction of the onshore components beginning first in 2023 and concluding with WTG construction by year-end 2025:

- Onshore Facilities (OnCS–DC, Onshore Interconnection Cable, and Onshore Transmission Cable): approximately 2 years (Q3 2023 to Q3 2025)

- SRWEC: approximately 8 months (including 3 months of route clearance, and 5 months of installation; Q2 and Q4 2024 and Q1 2025)
- Offshore Foundations (WTG and OCS–DC): approximately 4 to 5 months (Q3 to Q4 2024)
- IAC: approximately 7 months (including 3 months route clearance and 4 months installation and termination; Q1 to Q2 2024 and Q2 to Q3 2025)
- WTGs: approximately 10 months (Q4 2024 to Q2 2025 and Q4 2025)
- OCS–DC: approximately 12 months (Q4 2024 to Q4 2025)

2.1.1 Offshore Sunrise Wind Farm

Proposed SRWF components to be constructed include WTGs and an offshore converter station (OCS–DC) and their foundations, scour protection for all foundations, and an IAC that connects the WTGs to the OCS–DC. The proposed offshore Project elements are located within federal waters. COP Section 3.3.1.2 provides a detailed description of proposed construction and installation methods (Sunrise Wind 2022e).

As part of the PDE, Sunrise Wind would erect up to 94 WTGs (within 102 potential positions) and one OCS–DC within the SRWF (see **Figure 3**) using 11-MW WTGs for up to a 1,034-MW project. The OCS–DC serves as the interconnection point between the WTGs and the SRWEC. Based on the PDE, Sunrise Wind would mount the WTGs upon monopile foundations and the OCS–DC on a piled jacket foundation. A monopile is a long steel tube driven up to 164 ft (50 m) into the seabed. A piled jacket foundation is a latticed steel frame with supporting hollow steel pin piles driven 295 ft (90 m) into the seabed. The WTGs would be sited in a uniform east-west/north-south grid with 1.15-by-1.15-mi (1-by-1-NM [1.85-by-1.85-km]) spacing (see **Figure 3**). The water depths where the WTGs would be located range from 135 to 184 ft (41 to 56 m) mean sea level (MSL) based on National Oceanic and Atmospheric Administration (NOAA) Coastal Relief Model data (127 to 181 ft [39 to 55 m] mean lower low water based on site-specific geophysical surveys). The maximum area of the seafloor footprint per foundation, inclusive of scour protection and cable protection system (CPS) stabilization, is 1.06 ac (4,290 square meters [m^2]) for WTG monopile foundations and 2.64 ac (10,684 m^2) for the OCS–DC foundation structure.

Using 11-MW WTGs will substantially reduce collision risk of birds compared to using more and smaller turbines for a 1,034-MW project. This was demonstrated in a modeling study by Johnston et al. (2014) where the collision risk of 25 marine species (including three tern species) was explored for a series of 30-MW wind facilities with different sized and number of turbines. When turbines increased in size from 2 MW to 3 MW (from 15 turbines to 10 turbines), the proportion of the population at risk of collision declined by 29 percent; likewise, when turbine size increased from 3 MW to 5 MW (from 10 turbines to 6 turbines), the risk dropped another 29 percent (Johnston et al. 2014).

The IAC will carry the electrical current produced by the WTGs to the OCS–DC. The IAC will consist of three bundled copper or aluminum conductor cores surrounded by layers of cross-linked polyethylene or ethylene propylene rubber insulation and various protective armoring and sheathing to protect the cable from external damage and keep it watertight. A fiber optic cable will also be included in the interstitial space between the three conductors and will be used to transmit data from each of the WTGs to the supervisory control and data acquisition (SCADA) system. The length of the entire network of IAC will be up to 180 mi (290 km). **Figure 3** presents the indicative IAC layout for the Project. The IAC will be installed within a 90-ft (30-m)-wide corridor. Burial of the IAC will typically target a depth of 3 to 7 ft (1 to 2 m). The target burial depth for the IAC will be determined based on an assessment of seafloor conditions, seafloor mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment. Seafloor preparation (specifically boulder clearance and sand wave leveling) would be required; boulder clearance trials may also be implemented prior to wide-scale seafloor preparation activities. Sunrise Wind assumes up to 10 percent of the total IAC network would require boulder clearance and up to 5 percent of the total IAC network would require sand wave leveling prior to installation of the cables. Boulder clearance would involve the use of a boulder grab or towed plow to relocate boulders along the IAC routes.

Scour protection for the WTGs will have a radial extension of approximately five times the monopile radius and a height of approximately 6.5 ft (2 m) from original seabed level around selected monopile foundations. Additional CPS stabilization may be used where the IAC are pulled into the foundation, which would require additional rock cover on top of the scour protection. This additional rock cover would have a height of approximately 6.5 ft (2 m), for a total of up to 13.1 ft (4 m) height from the original seabed level, inclusive of the scour protection and CPS stabilization. Scour protection for the OCS–DC, if required, will cover the entire piled jacket footprint, extending an additional 33 to 66 ft (10 to 20 m) beyond the base of the structure and reaching a height of approximately 6.5 ft (2 m) from original seabed level. Additional CPS stabilization may be used where the IAC and SRWEC are pulled into the foundation, which would require additional rock cover on top of the scour protection. This additional rock cover would have a height of approximately 6.5 ft (2 m) for a total of up to 13.1 ft (4 m) height from the original seabed level, inclusive of the scour protection and CPS stabilization.

2.1.2 Offshore Sunrise Wind Export Cable

The SRWEC will consist of one cable bundle comprised of two cables and be spliced together with the Onshore Transmission Cable at the co-located transition joint bay (TJB) and link boxes located at the landfall location at Smith Point County Park, in the Town of Brookhaven, New York. A fiber optic cable will be bundled together with the two main conductors, which assists in cable fault detection, control and monitoring, and communication. The SRWEC would have portions in federal waters (SRWEC-OCS), state waters (SRWEC-NYS), and onshore (SRWEC-Onshore). In addition, a segment of the SRWEC (up to 1,339 ft [408 m]) will be located onshore (i.e., above the mean high-water line) and underground, up to the TJB. The export cable would have a transmission capacity of up to 320 kilovolts (kV). The PDE lengths for the SRWEC-OCS and SRWEC-NYS segments total 99.4 and 5.2 mi (159.6 and 8.4 km), respectively, for a potential total length of 104.6 mi. The SRWEC would be installed within a survey corridor ranging in width from 1,312 to 2,625 ft (400 to 800 m), depending on water depth. The total width of the disturbance corridor for installation of the SRWEC would be up to 98 ft (30 m) (if the cable bundle would separate prior to the horizontal directional drilling (HDD) exit pits, the disturbance corridor would be up to 98 ft [30 m] per individual cable), inclusive of any required sand wave leveling and boulder clearance. Dynamic Positioning vessels would generally be used for cable burial activities. If anchoring (or a pull ahead anchor) is necessary during cable installation, it would occur within the survey corridor. See Section 3.3.10 of the COP for additional information on vessel anchoring (Sunrise Wind 2022e).

The marine segments would be buried to a target depth of 3 to 7 ft (1 to 2 m) using the same trenching methods and construction vessels described above for the IAC. The target burial depth for the SRWEC will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment. The Cable Burial Risk Assessment would be prepared for the Facility Design Report (FDR) to be reviewed by the Certified Verification Agent and submitted to BOEM prior to construction. The Cable Burial Feasibility Assessment, which provides an assessment of cable burial based on review of site-specific survey data, is provided with the Marine Site Investigation Report as Appendix G4, under confidential cover. Where burial cannot occur, sufficient burial depth cannot be achieved, or protection is required due to cables crossing other existing cables, additional cable protection methods may be used (cable protection is discussed further below). The location of the SRWEC and associated cable protection would be provided to NOAA's Office of Coast Survey after installation is completed so that they may be marked on nautical charts. Burial depths at specific locations would be formalized in the FDR/Fabrication and Installation Report (FIR).

Installation of the proposed SRWEC consists of a sequence of events, including pre-lay cable surveys, seafloor preparation, offshore cable installation, beginning with cable pull into the landfall, joint construction, cable installation surveys, cable protection, and connection to the OCS–DC, as summarized in Table 3.3.3-4 of the COP (Sunrise Wind 2022e). Additional details for seafloor preparation, cable installation methodologies and cable protection strategies are described in the COP, including information on unexploded ordnance (UXO)/munitions and explosives of concern (MEC) risk mitigation, boulder removal, sand wave leveling, and pre-lay grapnel run.

Based on the identified range of installation methods and requirements, Sunrise Wind has established a design envelope for installation of the proposed SRWEC that reflects the maximum seafloor disturbance associated with construction (see Table 3.3.3-5 of the COP; Sunrise Wind 2022e). Temporary seafloor disturbance during installation includes the construction disturbance corridor where seafloor preparation would occur prior to cable installation, as well as the installation of the cable. Vessel anchoring occurring within the surveyed corridor during cable installation would also result in temporary seafloor disturbance. Permanent seafloor disturbance includes areas where additional cable protection may be required post-installation.

2.1.3 Onshore Sunrise Wind Export Cable

The onshore termination of the SRWEC would be spliced together with the Onshore Transmission Cable at the co-located TJB and link boxes located at the landfall location at Smith Point County Park, in the Town of Brookhaven, New York. The onshore portion of the SRWEC (up to 1,339 ft [408 m]) would be buried underground (i.e., above the mean high-water line) up to the TJB and the remaining, offshore portion would traverse both federal and NYS waters (see Figure 1.1-1 of the COP; Sunrise Wind 2022e).

The SRWEC would be comprised of one distinct cable bundle and would transfer the electricity from the OCS–DC to the TJB located within the Landfall Work Area at Smith Point County Park. The SRWEC would be joined with the Onshore Transmission Cable at the TJB.

The SRWEC would consist of one cable bundle comprised of two cables. Each cable within the single bundle would consist of one copper or aluminum conductor core surrounded by layers of cross-linked polyethylene insulation and various protective armoring and sheathing to protect the cable from external damage and keep it watertight. A fiber optic cable would be bundled together with the two main conductors. The maximum design scenario for the proposed SRWEC is provided in Table 3.3.3-1 of the COP, and Section 3.3.3.2 in the COP (Sunrise Wind 2022e) provides a detailed description of SRWEC design.

2.1.4 Onshore Converter Station

Power from the Project would be delivered to the electric grid via an OnCS–DC, which would be constructed in the Town of Brookhaven, Long Island, New York at the Union Avenue Site. The OnCS–DC would support the Project's interconnection to the existing electrical grid by transforming the Project voltage to 138 kV AC. Interconnection to the electric grid would occur at the existing Holbrook Substation also located in the Town of Brookhaven, New York.

The union Avenue Site is approximately 7-ac (2.8-ha) area is located on two parcels to be improved jointly as a common development. The entire station footprint area would be graveled and surrounded by a 7-ft (2.1-m)-high fence topped with a 1-ft (0.3-m) tall, barbed wire extension for a total height of 8 ft (2.4 m). Access would be provided through a minimum of one drive-through gate and one walk-through gate. Vegetative screening of the site would be provided as needed subject to New York permitting requirements. General yard lighting would be provided within the site for assessment of equipment. In general, yard lighting would be minimal at night and subject to state and local requirements unless there is work in progress on site or lights are required for safety and security purposes.

The proposed Union Avenue Site is depicted in Figure 3.3.1-1 of the COP (Sunrise Wind 2022e). Equipment and structures for the OnCS–DC would be supported on foundations expected to be of concrete and would be of a design suitable for existing soil conditions. The majority of the site equipment would require shallow foundations, 4 to 5 ft (1.2 to 1.5 m) in depth based on the expected equipment size. Larger structures may require drilled shaft equipment foundations of 12 to 30 ft (4 to 9 m) in depth. The final foundation design and equipment layout may vary based on site-specific geotechnical evaluations and subsequent engineering design.

Construction of the proposed OnCS–DC would involve surveys and protection of sensitive areas, clearing and grading, foundation and equipment installation, site restoration, and commissioning, as described in Table 3.3.1-3 of the COP (Sunrise Wind 2022e). Sunrise Wind may utilize temporary laydown yards to support the staging of necessary equipment and materials for development of the OnCS–DC. Locations selected for the use of temporary laydown yards would be approved by the applicable permitting agencies prior to utilization. These areas would be generally confined to locations containing open land or previously disturbed commercial/industrial sites with existing roadway access, such that no or minimal site improvements would be required. Sunrise Wind would use mechanical clearing methods for the construction of the Project and does not intend to use any pesticides/herbicides during construction and installation. Following the completion of the proposed Project, locations used for temporary laydown yards would be restored to pre-existing conditions in accordance with landowner requests and permit requirements.

The maximum areas of land disturbance associated with the construction of the OnCS–DC are provided in Table 3.3.1-4 of the COP (Sunrise Wind 2022e). Site grading may be between 7 to 10 ft (2.1 to 3.0 m) deep in areas that require excavation but would be further refined as geotechnical work is completed. The anticipated construction timeframe for the OnCS–DC is provided in the construction schedule in Section 3.2.2 of the COP (Sunrise Wind 2022e).

2.1.5 Onshore Interconnection and Transmission Cables

The Onshore Interconnection Cable would carry the power from the new OnCS–DC location to the existing grid at the Holbrook Substation. The Onshore Interconnection Cable would begin at a set of termination structures located at the OnCS–DC and would be routed entirely underground along Union Avenue to an existing utility-owned or controlled property for connection to the Holbrook Substation (Figure 3.3.1-1 of the COP; Sunrise Wind 2022e).

The Onshore Transmission Cable would carry the power from the TJB to the new OnCS–DC location. The proposed Onshore Transmission Cable route has been sited within the existing disturbed ROW to the extent practicable. The SRWEC and Onshore Transmission Cable would be spliced together at co-located TJB and link boxes located at Smith Point County Park on Fire Island in the Town of Brookhaven, New York. The Onshore Transmission Cable would then follow the Long Island Expressway Service Road Route to the OnCS–DC at the Union Avenue Site.

Construction of the Onshore Transmission Cable and Onshore Interconnection Cable would involve site preparation, trench excavation, duct bank and vault installation, cable installation, cable jointing, and final testing and restoration with additional steps associated with HDD and other trenchless crossing methods. The typical underground transmission cable construction sequence is provided in Table 3.3.2-3 of the COP (Sunrise Wind 2022e). Temporary laydown yards would be required to support the staging of necessary equipment and materials for the installation of the Onshore Transmission Cable and Onshore Interconnection Cable. Locations selected for the use of temporary laydown yards may require additional assessments prior to use and would be approved by the applicable permitting agencies prior to utilization. These areas would be generally confined to locations containing open land or previously disturbed commercial/industrial sites with existing roadway access, such that no or minimal site improvements are required. Following the completion of the proposed Project, locations used for temporary laydown yards would be restored to pre-existing conditions in accordance with landowner requests and permit requirements.

Installation of the Onshore Transmission Cable would generally require excavation of a trench within a temporary disturbance corridor. The Onshore Transmission Cable would be installed within a concrete or thermal equivalent duct bank buried to a depth consistent with local utility standards. From the OnCS–DC, the Onshore Interconnection Cable would be installed underground within a duct bank to the Holbrook Substation. A typical configuration of an underground onshore transmission circuit is shown on Figure 3.3.2-4 of the COP (Sunrise Wind 2022e). A typical configuration of the installation of an underground onshore transmission circuit within a road ROW is shown on Figure 3.3.2-5 of the COP (Sunrise Wind 2022e). A typical configuration of an underground onshore interconnection circuit is shown in Figure 3.3.2-6 of the COP (Sunrise Wind 2022e).

Due to the length of the proposed Onshore Transmission Cable, sections of cable would need to be spliced together with joints for each circuit. Splicing would occur along the entirety of the route approximately every 1,800 to 2,200 ft (549 to 671 m). At each splice location, a splice vault/pit would be required. Once a detailed below grade utility survey is completed, more refined distances between splice vaults/pits would be determined based upon site specifics. In these locations, the temporary disturbance area required would be larger than for the duct bank installation. The splice vaults would be buried to a depth consistent with local utility standards. The entire temporary disturbance corridor would be restored to pre-construction conditions following installation of the proposed Onshore Transmission Cable. The maximum design scenario for the construction of the Onshore Transmission and Onshore Interconnection Cable is provided in Table 3.3.2-4 of the COP (Sunrise Wind 2022e).

Installation of the proposed Onshore Transmission Cable would result in the crossing of multiple waterways, major roadways, and rail roads, which would require additional temporary disturbance areas to support the setup of equipment necessary to perform each crossing. The maximum design scenario, identifying the associated crossing method, overall crossing distance, approximate area of temporary and/or permanent impact, along with a description of the workspace locations that would be impacted to facilitate the various major crossings are provided in Table 3.3.2-5 of the COP (Sunrise Wind 2022e).

2.2 OPERATIONS AND MAINTENANCE

Per the Lease, the operations term of the proposed Project is 25 years but could be extended to 30 or 35 years. The operations term would commence on the date of COP approval. It is anticipated that Sunrise Wind would request to extend the operations term in accordance with applicable regulations in 30 CFR § 585.235.

The O&M Plan for both the Project's onshore and offshore infrastructure would be finalized as a component of the FDR/FIR review process; however, a preliminary O&M plan for the onshore facilities, offshore transmission facilities (e.g., the SRWEC, IAC, and the OCS–DC electrical components) and WTGs is provided in the following sections. As noted previously, various existing ports are under consideration to support offshore construction, assembly and fabrication, crew transfer and logistics (including for O&M activities) (see Section 3.5.5 and Table 3.3.10-3 in the COP; Sunrise Wind 2022e).

To support O&M, the Project would be controlled 24/7 via a remote surveillance system (i.e., SCADA).

2.2.1 Offshore Sunrise Wind Farm

WTGs would be continuously remotely monitored via the SCADA systems from shore. Preventative maintenance activities would be planned for periods of low wind and good weather (typically corresponding to the spring and summer seasons). The WTGs would remain operational between work periods of the maintenance crews. Certain O&M activities (e.g., non-routine maintenance that requires exposing and reburying the IAC) may require presence of either a jack-up vessel or anchored barge vessel. These activities would result in a short-term disturbance of the seafloor similar to or less than what is anticipated.

The WTGs would also be designed to minimize the effects of potential icing conditions in the SRWF. The SCADA monitoring system and turbine control management system would be designed to detect the buildup of ice and/or snow on the WTG and shut down operations, as necessary. The WTGs would be type certified according to IEC standards. The WTGs would comply with EC machinery directive (CE marked). Sunrise Wind would seek compliance with BOEM and BSEE regulations that directly govern operations and in-service inspections for offshore wind facilities in the United States.

Each of the WTGs would require various oils, fuels, and lubricants to support the operation of the WTGs (see Table 3.3.6-2 of the COP; Sunrise Wind 2022e). The spill containment strategy for each WTG would be comprised of preventive, detective, and containment measures. These measures include 100 percent leakage-free joints to prevent leaks at the connectors, high pressure and oil level sensors that can detect both water and oil leakage, and appropriate integrated retention reservoirs capable of containing 110 percent of the volume of potential leakages at each WTG.

Each WTG would have its own control system to carry out functions like yaw control and ramp down in high wind speeds. Each turbine would also connect to a central SCADA system for control of the wind farm remotely. This would allow functions such as remote turbine shutdown if faults occur. The Project would be able to shut down a WTG within 2 minutes of initiating a shutdown signal. The SCADA system would communicate with the wind farm via fiber optic cable(s), microwave, or satellite links. Individual WTGs can also be controlled manually from within the nacelle or tower base to control and/or lock out the WTG during commissioning or maintenance activities. In case of a power outage or during commissioning, the turbine would be powered by a permanent battery back-up power solution with integrated energy harvest from the rotor or by a diesel generator located temporarily on each WTG.

The WTGs would also be protected both externally and internally by a lightning protection system. The external lightning protection system is comprised of lightning receptors located within both the nacelle and blade tips, which are designed to handle direct lightning strikes and would conduct the lightning's peak current through a conductive cabling system that leads through the tower into the WTG grounding/earthing system. To avoid and/or minimize internal damage from the secondary effects of lightning (e.g., power surges), the internal electrical systems would be protected by equipotential bonding, overvoltage protection, and electromagnetic coordination.

WTGs would be accessed either from a vessel via a boat landing or alternative means of safe access (e.g., Get Up Safe). The WTGs would be lit and marked in accordance with Federal Aviation Administration (FAA), BOEM, and USCG requirements for aviation and navigation obstruction lighting, respectively. The Proposed Action includes the use of red flashing aviation obstruction lights on WTGs and electrical service platforms (ESPs) in accordance with FAA and BOEM requirements. The lights would consist of two L-864 medium-intensity red lights mounted on the nacelle and up to three L-810 low-intensity red lights mounted on the midsection of the WTG tower, and all lights will have a synchronous flash rate of 30 flashes per minute. The lights would be equipped with back-up battery power to maintain operation should a power outage occur on a WTG. Additional operational safety systems on each WTG would include fire suppression, first aid, and survival equipment. Per the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) guidance document referenced in the COP, navigation lighting will have the following characteristics: c

The OCS–DC would require various oils, fuels, and lubricants to support its operation. The spill containment strategy for the OCS–DC would be comprised of preventive, detective, and containment measures. The OCS–DC would be designed with a minimum of 110 percent of secondary containment of all identified oils, grease, and lubricants. OCS–DC gas insulated switchgears containing SF6 would be equipped with gas density monitoring devices to detect SF6 gas leakages should they occur. Any chemicals used in the auxiliary systems would be brought onto and taken off the platform during O&M and are not anticipated to be stored on the platform.

2.2.2 Offshore Transmission Facilities

Sunrise Wind would employ a proprietary state-of-the-art asset management system to inspect offshore transmission assets including the OCS–DC (electrical components), SRWEC, and IAC. This system provides a data-driven assessment of the asset condition and allows for prediction and assessment of whether inspections and/or maintenance activities should be accelerated or postponed. This approach would allow the Project to maximize O&M efficiencies.

The SRWEC and IAC would typically have no maintenance requirements unless a fault or failure was to occur. To evaluate integrity of the assets, Sunrise Wind intends to conduct a bathymetry survey along the entirety of the cable routes immediately following installation (scope of installation contractor), and at 1 year after commissioning, 2 to 3 years after commissioning, and 5 to 8 years after commissioning. Survey frequency thereafter would depend on the findings of the initial surveys (i.e., site seabed dynamics and soil conditions). A survey may also be conducted after a major storm event (i.e., greater than 10-year event). Surveys of the cables may be conducted in coordination with scour surveys at the foundations.

Should the periodic bathymetry surveys completed during the operational lifetime of the Project indicate that the cables no longer meet an acceptable burial depth (as determined by the Cable Burial Risk Assessment), the following actions may be taken:

- Alert the necessary regulatory authorities, as appropriate.
- Undertake an updated Cable Burial Risk Assessment to establish whether cable is at risk from external threats (i.e., anchors, fishing, dredging).
- Survey monitoring campaign for the specific zone around the shallow buried cable.
- Assess the risk to cable integrity.

Based on the outcome of these assessments, several options may be undertaken, as feasible, permitted and practical, such as remedial burial, addition of secondary protection (rock protection, rock bags or mattresses), and increased frequency of bathymetric surveys to assess reburial.

It is possible submarine cables may need to be repaired or replaced due to fault or failure. Also, it is expected that a maximum of 10 percent of the cable protection placed during installation may require replacement/remediation over the lifetime of the Project. These maintenance activities are considered non-routine. If cable repair/replacement or remedial cable protection are required, the Project would complete any necessary surveys of the seafloor in areas where O&M activities would occur and obtain necessary approvals. These activities would result in a short-term disturbance of the seafloor similar to or less than what is anticipated during construction.

2.2.3 Onshore Activities and Facilities

Sunrise Wind would monitor the OnCS–DC remotely on a continuous basis. The equipment in the OnCS–DC would be configured with a condition monitoring system that would sound an alarm upon detecting equipment faults, unintended shutdowns, or other issues. In addition, the OnCS–DC would be inspected for anomalies with the equipment operation in accordance with manufacturers' recommendations. Sunrise Wind would put in place an established and documented program for the maintenance of all equipment critical to reliable operation. Maintenance programs would conform to the equipment manufacturer's recommendations.

Sunrise would implement a reliability maintenance program which would include preventative maintenance on the OnCS-DC, Onshore Transmission Cable, and Onshore Interconnection Cable, and planned outages would be conducted in accordance with the North American Electric Reliability Corporation/Northeast Power Coordinating Council, Inc. (NPCC) Standard-TOP-003-1, and protective system maintenance would be performed in accordance with the NPCC PRC 005-2 standard.

Vegetation surrounding the Onshore Transmission Cable and Onshore Interconnection Cable would be managed to ensure safe operation and access. A 60-ft wide Project Easement for Operation ROW center on the cables would be required. An Integrated Vegetation Management (IVM) program would be developed to address vegetation removal and control. The plan would include manual cutting, mowing, and the prescriptive use of federally approved and state-registered herbicides to eliminate targeted species within the ROW. Specific details on the IVM program would be provided within the Project Environmental Management and Construction Plan (anticipated early 2023).

2.3 DECOMMISSIONING

Pursuant to 30 CFR Part 585 and other BOEM requirements, Sunrise Wind would be required to remove or decommission all installations and clear the seabed of all obstructions created by the Project. In accordance with applicable regulations and a BOEM-approved conceptual decommissioning plan, Sunrise

Wind would have up to 2 years to decommission the Project after the 25-year lease ends, unless the lease is extended, which would return the area to pre-construction conditions, as feasible.

Sunrise Wind would need to obtain separate and subsequent approval from BOEM to retire any portion of the Project in place. Sunrise Wind would submit a conceptual decommissioning application prior to any conceptual decommissioning activities. BOEM would conduct a NEPA review at that time, which could result in the preparation of a NEPA document. If the COP is approved or approved with modifications, Sunrise Wind would have to submit a bond that would be held by the US government to cover the cost of conceptually decommissioning the entire facility.

Conceptual decommissioning may not occur for all Project components; however, for the purposes of this BA, all analyses assume that conceptual decommissioning would occur as described in this section.

2.3.1 Offshore Activities and Facilities

WTGs and foundations (along with their associated transition pieces) now have an expected operating life of at least 25 years and substantially longer with prudent inspection and maintenance practices. This timeframe is applicable to offshore wind facilities worldwide, including for SRWF. At the end of the proposed Project's operational life, it would be decommissioned in accordance with a detailed Project decommissioning plan that would be developed in compliance with applicable laws, regulations, and best management practices (BMPs) at that time. All facilities would need to be removed to a depth of 15 ft (4.6 m) below the mudline, unless otherwise authorized by BOEM (30 CFR § 585.910[a]). Care would be taken to handle waste in a hierarchy that prefers reuse or recycling and leaves waste disposal as the last option. Absent permission from BOEM, Sunrise Wind would complete decommissioning within 2 years of termination of the Lease.

Sunrise Wind would develop a final decommissioning and removal plan for the facility that complies with all relevant permitting requirements. This plan would account for changing circumstances during the operational phase of the Project and would reflect new discoveries particularly in the areas of marine environment, technological change, and any relevant amended legislation.

2.3.2 Onshore Activities and Facilities

Depending on the needs of the host town, Sunrise Wind may leave onshore facilities in place for future use. Cable removal, if required, would probably proceed using truck-mounted winches and handling equipment. There are no plans to disrupt streets or onshore public utility ROWs by excavating or deconstructing buried facilities.

2.4 VESSEL AND AIRCRAFT TYPES

Construction of the Project will require the support of onshore construction equipment (see Table 3.3.10-2 of the COP; Sunrise Wind 2022e), as well as various vessels, helicopters, and unmanned systems (see Table 3.3.10-3 of the COP; Sunrise Wind 2022e). For each vessel type, the route plan for the vessel operation area will be developed to meet industry guidelines and best practices in accordance with International Chamber of Shipping guidance. The Project will install operational automatic identification systems (AIS) on all vessels associated with the construction of the Project. AIS will be used to monitor the number of vessels and traffic patterns for analysis and compliance with vessel speed requirements. All vessels will operate in accordance with applicable rules and regulations for maritime operation within US and federal waters. Similarly, all aviation operations, including flying routes and altitude, will be aligned with relevant stakeholders (e.g., the FAA). Additionally, the Project will adhere to current vessel speed restrictions as appropriate at the time of Project activities and in accordance with BOEM and NMFS requirements.

Project vessels will employ a variety of anchoring systems, which include a range of size, weight, mooring systems, and penetration depths. Anchors associated with cable laying vessels will have a maximum penetration depth of 15 ft (4.6 m). Jack-up will include up to four spudcans with a maximum penetration depth of 52 ft (15.8 m). Jack-up will occur within the 722-ft (220-m) radius cleared around foundation locations during seafloor preparation activities.

Sunrise Wind expects to use a variety of vessels to support O&M, including service operating vessels (SOVs) with deployable work boats (SOV support craft), crew transfer vessels, jack-up vessels, and cable laying vessels. A hoist-equipped helicopter and unmanned aircraft systems may also be used to support O&M. Table 3.5.5-1 in the COP provides a summary of O&M support vessels that are currently being considered to support Project O&M (Sunrise Wind 2022e). The type and number of vessels and helicopters will vary over the operational lifetime of the Project. For each vessel type, the route plan for the vessel operation area will be developed to meet industry guidelines and best practices in accordance with the International Chamber of Shipping guidelines.

During O&M, helicopters may be used to provide supplemental means of access when vessel access is not practical or desirable. Flights may be restricted to daylight operations when visibility is good. Helicopters and unmanned aircraft systems may be used to support O&M:

- **Helicopter Hoist Operations**. An integrated helicopter hoist platform located on the roof of each WTG nacelle will provide access for O&M. SOVs and the OCS–DC may also be fitted with helicopter hoist platforms. The purpose of this effort is primarily for transport/transfer of technical personnel and equipment on to/from the WTGs via hoist to the nacelle but can also be conducted for transport/transfer of personnel and equipment to offshore installations that do not have a helideck. This is the means of access in the O&M phase and is typically used to perform minor repairs and restarts. Hoist operations can be combined with transport helicopter operation (e.g., landing on a vessel with a helideck and hoisting technicians or goods afterwards to a WTG).
- **Transport/Transfer Operations**. Transport helicopter operations are flights from an onshore airport/heliport to an offshore installation or vessel with a helideck and back. Transfer helicopter operations are flights within the SRWF, from an offshore installation or vessel with a helideck to another, and back.
- **Unmanned Aircraft Systems**. Unmanned aircraft systems may be used for inspection of blades, structures, seabed inspections, and cargo delivery between the assets in the wind farm.

2.5 SURVEYS

A number of operations will be completed prior to the foundation installation process, including

- geophysical surveys to identify seafloor debris and potential UXO/MEC;
- geotechnical surveys to identify the geological, archaeological, and cultural resource conditions; and
- UXO/MEC clearance surveys to identify and confirm UXO/MEC targets for removal/disposal.

High-resolution geophysical (HRG) surveys are required throughout construction. Survey activities would include multibeam echosounders, side-scan sonars, shallow penetration subbottom profilers (SBPs), medium penetration SBPs, and marine magnetometers within the SRWF and SRWEC route. Additional geotechnical surveys may occur for further sediment testing at specific WTG locations. The geotechnical surveys would include in situ testing, boring, and sampling at foundation locations. Although Sunrise Wind has completed all biological surveys required with submission of the COP, Sunrise Wind has committed to working with BOEM and USFWS to conduct additional biological surveys during construction and/or monitoring periods during post-construction.

Cable installation surveys will be required, including pre- and post-installation surveys, to determine the cable lay-down position and the cable burial depth. Surveys are carried out using a combination of multibeam echo sounder or side-scan sonar to confirm the mean seafloor and a cable detection system to confirm the target cable burial depth.

During O&M, geophysical surveys of the seafloor would occur as part of routine maintenance of offshore cables and foundations using multibeam echosounders, side-scan sonars, and marine magnetometers. Surveys will monitor bathymetry, cable burial depth, cable protection, and scour. For the SRWEC, IAC, and foundations, seafloor surveys would occur at 1 year after commissioning, 2 to 3 years after commissioning, and 5 to 8 years after commissioning, with frequency thereafter depending upon the findings of the initial surveys. The underwater and in-air noise generated from equipment and vessels during these seafloor surveys would be similar to that occurring during site assessment of the Project Area; however, some of the equipment with higher sound pressure levels, such as the SBP, are not anticipated to be used to support the O&M seafloor surveys.

The survey equipment to be employed during construction and O&M will be equivalent to the equipment utilized during the HRG survey campaigns associated with Lease Area OCS-A 0500 conducted in 2016, 2017, 2018, 2019, and 2020 and with Lease Area OCS-A 0487 conducted in 2019 and 2020 (CSA 2020).

2.6 Mitigation Measures that are Part of the Proposed Action

This section should include both BOEM-proposed mitigation measures, as well as mitigation included in the COP by the lessee, as well as any mitigation measures proposed by other federal agencies (e.g., conditions of the USACE permit). Mitigation measures will be finalized during consultation.

This section outlines the environmental protection measures included in the Proposed Action to avoid and minimize potential impacts to ESA-listed species under jurisdiction of the USFWS. Sunrise Wind's mitigation measures for specific resources are listed in the sections below and are from the COP (Sunrise Wind 2022e). Additional conditions, including mitigation, monitoring, or reporting measures, may be included in any BOEM-issued lease or other authorization, including those resulting from the ESA Section 7 consultation process.

2.6.1 Coastal and Terrestrial Habitat

There are presently no mitigation measures proposed specifically for potential impacts to the listed plant species sandplain gerardia or seabeach amaranth. The measures listed here may benefit these plant species.

- The SRWEC Landfall will be installed via HDD to avoid impacts to the nearshore zones and coastal resources. The Onshore Transmission Cable will also be installed via HDD under the Intracoastal Waterway (ICW) to avoid impacts to coastal resources; HDD and trenchless methods will also be used elsewhere onshore, where appropriate, to minimize impacts to resource areas. Onshore Facilities are primarily sited within previously disturbed and developed areas (e.g., roadways, ROWs, developed industrial/commercial areas) to the extent feasible, to minimize impacts to undisturbed coastal and terrestrial habitat.
- A Stormwater Pollution Prevention Plan (SWPPP), including erosion and sedimentation control BMPs and revegetation measures, will be implemented to minimize potential water quality impacts from construction and O&M of the Onshore Facilities.
- Accidental spill or release of oils or other hazardous materials will be managed offshore through an Emergency Response Plan (ERP)/Oil Spill Response Plan (OSRP) and onshore through a Spill Prevention, Control, and Countermeasure (SPCC) Plan.
- Where HDD is utilized, an Inadvertent Return Plan will be prepared and implemented to minimize the potential risks associated with the release of drilling fluids.
- Time-of-year restrictions for certain work activities (e.g., HDD conduit stringing and tree removal) will be employed to the extent feasible to avoid or minimize direct impacts to terrestrial habitat and rare, threatened, and endangered (RTE) species during construction of the Landfall and Onshore Facilities. If work is anticipated to occur outside of these time-of-year restriction periods, Sunrise Wind will work with state and federal agencies to develop construction monitoring and impact minimization plans or mitigation plans, as appropriate.

- Where appropriate, temporary erosion controls such as swales and erosion control socks will be installed and will be maintained until the site is restored and stabilized.
- An Invasive Species Control and Management Plan (ISCMP) will be implemented to manage the spread of invasive plant species that could negatively affect native plants and coastal habitat (AKRF 2022). This plan includes BMPs that will be used to minimize the colonization and spread of Prohibited and Regulated Non-Native Invasive Species (NNIS) that may be introduced or spread as a result of the construction, operation, or maintenance of the onshore components of the Project. Specific procedures and education measures will be implemented to inform workers of NNIS and to ensure, to the extent practicable, that equipment and personnel arrive at and depart from the Project Corridor clean and free of all NNIS material, seeds, and parts (AKRF 2022).
- Sunrise Wind will comply with applicable international (IMO MARPOL), federal (USCG), and state regulations and standards for treatment and disposal of solid and liquid wastes generated during all phases of the Project.

2.6.2 Avian Species

- Sunrise Wind is committed to an indicative layout scenario with WTGs and the OCS–DC sited in a uniform east-west/north-south grid with 1.15-by-1.15-mi (1-by-1-NM [1.85-by-1.85-km]) spacing that aligns with other proposed adjacent offshore wind projects in the RI-MA WEA and MA WEA. This wide spacing of WTGs may reduce risk of barrier effects and/or displacement and may allow avian species to avoid individual WTGs and minimize risk of potential collision. The WTGs will have an air gap from MSL to minimum blade swept height of 131.2 ft (40 m); birds crossing the area within this height range would not be at risk of collision with spinning blades.
- The distance of the SRWF offshore (greater than 15 mi [13 NM (24.1 km)]) avoids coastal areas, which are known to concentrate birds, particularly shorebirds and sea ducks.
- Sunrise Wind will take measures to reduce perching opportunities at operating turbines, if appropriate based on further consultations with state and federal agencies.
- Sunrise Wind will document any dead (or injured) birds found incidentally on vessels and structures during construction, O&M, and decommissioning and provide an annual report to BOEM and USFWS.
- Construction and operational lighting will be limited to the minimum necessary to ensure safety and compliance with applicable regulations. Limiting lighting to that which is required for safety and compliance with applicable regulations is expected to minimize impacts on avian species.
- Sunrise Wind will use Aircraft Detection Lighting System (ADLS) or related means (e.g., dimming or shielding) to limit visual impact, pursuant to approval by the FAA and BOEM, commercial and technical feasibility at the time of FDR/FIR approval, and dialogue with stakeholders. In addition to limiting visual impact, reducing lighting will also reduce the potential for impacts to avian species.
- Accidental spill or release of oils or other hazardous materials will be managed offshore through an ERP/OSRP and onshore through an SPCC Plan.
- Time-of-year restrictions for certain work activities such as HDD conduit stringing will be employed to the extent feasible to avoid or minimize direct impacts to RTE avian species during construction of the Landfall. Time-of-year restrictions for tree removal at the Onshore Facilities to avoid impacts to northern long-eared bats would also benefit breeding birds. If work is anticipated to occur outside of these time-of- year restriction periods, Sunrise Wind will work with state and federal agencies to develop construction monitoring and impact minimization plans or mitigation plans, as appropriate.
- Onshore Facilities are primarily sited within previously disturbed and developed areas (e.g., roadways, ROWs, developed industrial/commercial areas) to the extent feasible, thereby minimizing impacts to undisturbed avian habitat.
- An ISCMP will be implemented to manage the spread of invasive plant species that could negatively impact native plants and avian habitat.

- The Onshore Transmission Cable and Onshore Interconnection Cable will not include any overhead utility poles, thus minimizing potential impacts to birds associated with collision with overhead lines.
- Sunrise Wind is developing an avian post-construction monitoring plan for the Project that will summarize the approach to monitoring; describe overarching monitoring goals and objectives; identify the key avian species, priority questions, and data gaps unique to the region and Project Area that will be addressed through monitoring; and describe methods and time frames for data collection, analysis, and reporting. Post-construction monitoring will assess impacts of the Project with the purpose of filling select information gaps and supporting validation of the Sunrise Wind Avian Risk Assessment. Focus may be placed on improving knowledge of ESA-listed species occurrence and movements offshore, avian collision risk, species/species-group displacement, or similar topics. Where practicable, monitoring conducted by Sunrise Wind will build on and align with post-construction monitoring conducted by the other Ørsted/Eversource offshore wind projects in the Northeast region. Sunrise Wind will engage with federal and state agencies and environmental groups (eNGOs) to identify appropriate monitoring options and technologies, and to facilitate acceptance of the final plan.

2.6.3 Insect Species

BOEM’s proposed mitigation measures for monarch butterflies will be finalized during consultation.

- A Vegetation Management and Restoration Plan will be implemented. As part of this plan, Sunrise Wind commits to reseed wetland adjacent areas with a seed mix of native plants specified in the approved Post Phase 1 Environmental Management and Construction Plan (EM&CP); replace removed trees or shrubs with equivalent type trees or shrubs, subject to the provisions of 6 New York Codes, Rules and Regulations (NYCRR) Part 575, *Prohibited and Regulated Invasive Species*; allow temporary construction areas to naturally revegetate or return to its original land use; and replant or reseed any existing vegetated areas of parkland and beach/dunes that are disturbed during construction with an appropriate restoration seed mix. These practices will continue to provide suitable open and early successional habitat that contains potential opportunities for nectar foraging for adult monarch butterflies and recruitment of milkweed for potential larval development.

2.6.4 Bat Species

- Sunrise Wind is committed to an indicative layout scenario with WTGs and the OCS–DC sited in a uniform east-west/north-south grid with 1.15-by-1.15-mi (1-by-1-NM [1.85-by-1.85-km]) spacing that aligns with other proposed adjacent offshore wind projects in the RI-MA WEA and MA WEA. This wide spacing of WTGs may reduce risk of barrier effects and/or displacement and may allow bats to avoid individual WTGs and minimize risk of potential collision. The WTGs will have an air gap from MSL to minimum blade swept height of 131.2 ft (40 m); bats crossing the area within this height range would not be at risk of collision with spinning blades.
- The distance of the SRWF offshore (greater than 15 mi [13 NM (24.1 km)]) avoids coastal and nearshore areas where bats typically occur.
- Construction and operational lighting will be limited to the minimum necessary to ensure safety and compliance with applicable regulations. Limiting lighting to that which is required for safety and compliance with applicable regulations is expected to minimize impacts on bats.
- Sunrise Wind will use ADLS or related means (e.g., dimming or shielding) to limit visual impact, pursuant to approval by the FAA and BOEM, commercial and technical feasibility at the time of FDR/FIR approval, and dialogue with stakeholders. In addition to limiting visual impact, reducing lighting will also reduce the potential for impacts to bats.
- Onshore Facilities are primarily sited within previously disturbed and developed areas (e.g., roadways, ROWs, developed industrial/commercial areas) to the extent feasible, thereby minimizing impacts to undisturbed bat habitat.

- An ISCMP will be implemented to manage the spread of invasive plant species that could negatively impact native plants and bat habitat.
- Sunrise Wind will document any dead (or injured) bats found incidentally on vessels and structures during construction, O&M, and decommissioning and provide an annual report to BOEM and USFWS.
- Time-of-year restrictions for certain work activities such as tree removal will be employed to the extent feasible to avoid or minimize direct impacts to northern long-eared bats during construction of the Onshore Facilities. If work is anticipated to occur outside of this period, Sunrise Wind will work with state and federal agencies to develop construction monitoring and impact minimization plans or mitigation plans, as appropriate.
- The Onshore Transmission Cable and Onshore Interconnection Cable will not include any overhead utility poles, thus minimizing potential impacts to bats associated with collision with overhead lines.
- A Northern Long-eared Bat Avoidance Plan is being prepared as part of the Project's EM&CP to be submitted to NYS Public Service Commission in November 2022. This Plan describes practices to avoid impacts to northern long-eared bat but will also benefit other species including the tri-colored bat. In addition, the Vegetation Management and Restoration Plan states that Sunrise Wind will replace removed trees or shrubs with equivalent type trees or shrubs, subject to the provisions of 6 NYCRR Part 575; allow temporary construction areas to naturally revegetate or return to its original land use; and replant or reseed any existing vegetated areas of parkland that are disturbed during construction. Although roosting habitat is not considered a limiting resource for bat species in the vicinity of the Project, these practices will minimize loss of potential roosting habitat for these and other bat species.

BOEM considered additional avoidance and minimization measures that could further reduce potential effects of the Proposed Action on ESA-listed animals and plants during the development of this BA. These potential measures are listed in **Table 2.** Some or all of these measures may be required as a result of ESA Section 7 consultation with the USFWS. Any measures imposed through consultations will be included in the Final BA. The additional measures presented in **Table 2** may not all be within BOEM's statutory and regulatory authority to require; however, other jurisdictional governmental agencies may potentially require them. BOEM may choose to incorporate one or more additional measures in the record of decision on the Final EIS and adopt those measures as conditions of COP approval.

Table 2. Additional Measures Proposed to Avoid and Minimize Potential Effects of the Proposed Action

No.	Description
1.a.	To minimize attracting birds to operating turbines, Sunrise Wind must install bird perching-deterrent devices on WTGs and OSSs. The location of bird-deterrent devices must be proposed by Sunrise Wind based on best management practices applicable to the appropriate operation and safe installation of the devices. The Lessee must confirm the locations of bird-deterrent devices with a monitoring plan to track the efficacy of the deterrents as part of the as-built documentation it must submit with the FDR.
1.b.	Sunrise Wind must use an FAA-approved vendor for the ADLS, which will activate the FAA hazard lighting only when an aircraft is in the vicinity of the wind facility to reduce visual impacts at night. Sunrise Wind must confirm the use of an FAA-approved vendor for ADLS on WTGs and OSSs in the FDR.
1.c.	Sunrise Wind must light each WTG and OSS in a manner that is visible by mariners in a 360-degree arc around the WTG and OSS. To minimize the potential of attracting migratory birds, the top of each light shall be shielded to minimize upward illumination (Conditional on U.S. Coast Guard approval).
2	BOEM will require that Sunrise Wind develops and implements a BBMP based on the "Sunrise Wind Farm Project: Post-construction Avian and Bat Monitoring Framework" (**Appendix C**) in

No.	Description
	coordination with USFWS and other relevant regulatory agencies. Annual monitoring reports will be used to determine the need for adjustments to monitoring approaches, consideration of new monitoring technologies, and/or additional periods of monitoring. Prior to commencing offshore construction activities, Sunrise Wind must submit the BBMP for BOEM and USFWS review. BOEM and USFWS will review the BBMP and provide any comments on the plan within 30 calendar days of its submittal. Sunrise Wind must resolve all comments on the BBMP to BOEM and USFWS's satisfaction before implementing the plan. a. Monitoring. Sunrise Wind must conduct monitoring as outlined in "Sunrise Wind Farm Project: Post-construction Avian and Bat Monitoring Framework" (**Appendix C**), which will include: (1) installation of acoustic monitoring devices for bats for two years; (2) installation of Motus receivers within the wind farm; (3) refurbishing up to two onshore Motus receiver stations; (4) providing funding for up to 150 Motus tags per year for up to 3 consecutive years; and (5) conducted a one-two year cross project radar study to measure migrant flux rates and flight heights, and marine bird avoidance. b. Annual Monitoring Reports. Sunrise Wind must submit to BOEM (at renewable_reporting@boem.gov), USFWS, and BSEE (at OSWSubmittals@bsee.gov) a comprehensive report after each full year of monitoring (pre- and post-construction) within 6 months of completion of the last avian survey. The report must include all data, analyses, and summaries regarding ESA-listed and non-ESA-listed birds and bats. BOEM, USFWS, and BSEE will use the annual monitoring reports to assess the need for reasonable revisions (based on subject matter expert analysis) to the BBMP. BOEM, BSEE, and USFWS reserve the right to require reasonable revisions to the BBMP and may require new technologies as they become available for use in offshore environments. c. Post-Construction Quarterly Progress Reports. Sunrise Wind must submit quarterly progress reports during the implementation of the BBMP to BOEM (at renewable_reporting@boem.gov) and the USFWS by the 15th day of the month following the end of each quarter during the first full year that the Project is operational. The progress reports must include a summary of all work performed, an explanation of overall progress, and any technical problems encountered. d. Monitoring Plan Revisions. Within 15 calendar days of submitting the annual monitoring report, Sunrise Wind must meet with BOEM and USFWS to discuss the following: the monitoring results; the potential need for revisions to the BBMP, including technical refinements or additional monitoring; and the potential need for any additional efforts to reduce impacts. If BOEM or USFWS determines after this discussion that revisions to the BBMP are necessary, BOEM may require Sunrise Wind to modify the BBMP. If the reported monitoring results deviate substantially from the impact analysis included in the Final BA, Sunrise Wind must transmit to BOEM recommendations for new mitigation measures and/or monitoring methods. e. Operational Reporting (Operations). Sunrise Wind must submit to BOEM (at renewable_reporting@boem.gov) and BSEE (at OSWSubmittals@bsee.gov) an annual report summarizing monthly operational data calculated from 10-minute supervisory control and data acquisition data for all turbines together in tabular format: the proportion of time the turbines were operational (spinning at >x revolutions per minute) each month, the average rotor speed (monthly revolutions per minute) of spinning turbines plus 1 standard deviation, and the average pitch angle of blades (degrees relative to rotor plane) plus 1 standard deviation. BOEM and BSEE will use this information as inputs for avian collision risk models to assess whether the results deviate substantially from the impact analysis included in the Final BA. f. Raw Data. The Lessee must store the raw data from all avian and bat surveys and monitoring activities according to accepted archiving practices. Such data must remain accessible to BOEM, BSEE, and USFWS, upon request for the duration of the Lease. The Lessee must work with BOEM to ensure the data are publicly available. The USFWS may

No.	Description
	specify third-party data repositories that must be used, such as the Motus Wildlife Tracking System or MoveBank, and such parties and associated data standards may change over the duration of the monitoring plan.
3	Sunrise Wind must provide an annual report to BOEM and USFWS documenting any dead (or injured) birds or bats found on vessels and structures during construction, operations, and decommissioning. The report must contain the following information: the name of species, date found, location, a picture to confirm species identity (if possible), and any other relevant information. Carcasses with federal or research bands must be reported to the United States Geological Survey Bird Band Laboratory, available at https://www.pwrc.usgs.gov/bbl/. Any occurrence of a dead ESA-listed bird or bat must be reported to BOEM, BSEE, and USFWS as soon as practicable (taking into account crew and vessel safety), but no later than 24 hours after the sighting, and, if practicable, the dead specimen will be carefully collected and preserved in the best possible state.

Notes:
ADLS = Aircraft Detection Lighting System; BA = Biological Assessment; BBMP = Bird and Bat Monitoring Plan; BOEM = Bureau of Ocean Energy Management; BSEE = Bureau of Safety and Environmental Enforcement; ESA = Endangered Species Act; FAA = Federal Aviation Administration; FDR = Facility Design Report; OSS = Offshore Substation; USFWS = U.S. Fish and Wildlife Service; WTG = Wind Turbine Generator

3.0 ENVIRONMENTAL BASELINE

3.1 DESCRIPTION OF ENDANGERED SPECIES ACT LISTED SPECIES IN THE ACTION AREA

The USFWS Long Island Ecological Services Field Office was contacted through the Information, Planning, and Conservation System (IPaC) regarding the potential presence of proposed and final designated critical habitat and threatened, endangered, proposed, or candidate species under the jurisdiction of the USFWS within the area of the Project (**Appendix A**) (Consultation Code: 05E1LI00-2020-SLI-0367/Event Code: 05E1LI00-2020-E-00839). One mammal, three bird, and two plant species were identified as protected species that may occur within the boundary of the Action Area and/or may be affected by the Proposed Action. These species are listed in the 27 March 2020 letter from the USFWS (**Appendix A**). The IPaC site has been visited several times during the preparation of the Sunrise Wind Farm EIS and most recently during the preparation of this BA (June 17, 2022): no changes in the status of these species since March 11, 2020, were indicated. The USFWS later requested the inclusion of another protected bird species and an additional two mammal, one bird, and one insect species that may be protected in the future. All of these species are included in **Table 3**.

The Action Area does not include any designated critical habitat (**Appendix A**). Critical habitat has not been designated for these species. Proposed critical habitat for the rufa red knot includes areas of southern Long Island outside of the Project Area (USFWS 2021a).

A letter from the New York State Department of Environmental Conservation (NYSDEC) Natural Heritage Program (NYNHP), dated March 27, 2020, reporting known occurrences of RTE plant species in the vicinity of the Sunrise Wind Onshore Facilities is also included in **Appendix A**. Subsequent field surveys of potential habitat for RTE species in the Action Area were completed in June and October of 2020. Field surveys for RTE plants evaluated the potential for suitable habitat within the Action Area, but surveys to specifically determine the potential presence/probable absence of species were not conducted. Potential habitat identified during field surveys (Sunrise Wind 2020) is listed in **Table 3** for each plant species.

Table 3. Endangered Species Act listed species under United States Fish and Wildlife Service jurisdiction expected to occur in the Action Area.

Species	ESA Status[1]	Expected to Occur in SRWF?	Expected to Occur in SRWEC OCS?	Expected to Occur in SRWEC NYS?	Expected to Occur in Onshore Facilities?
Piping plover (*Charadrius melodus*)	T	Yes	Yes	Yes	Yes
Roseate tern (*Sterna dougallii*)	E	Yes	Yes	Yes	Yes
Rufa red knot (*Calidris canutus rufa*)	E	Yes	Yes	Yes	Yes
Saltmarsh sparrow (*Ammospiza caudacuta*)	NL	No	No	No	Yes Suitable habitat: high marsh regions with only weather or twice monthly lunar flooding
Eastern black rail (*Laterallus jamaicensis ssp. jamaicensis*)	T	No	No	No	No Suitable habitat: high marsh regions with only weather or twice monthly lunar flooding
Northern long-eared bat (*Myotis septentrionalis*)	E[2]	No	No	No	Yes
Little brown bat (*Myotis l. lucifugus*)	NL	No	No	No	Yes
Tricolored bat (*Perimyotis subflavus*)	NL	No	No	No	Yes
Monarch butterfly (*Danaus plexippus*)	NL	No	No	No	Yes Suitable habitat: swamp milkweed in saltmarsh areas and common milkweed in the sandy, hilly portions of the Action Area
Sandplain gerardia (*Agalinis acuta* [synonymized under *Agalinis decemloba*])	E	No	No	No	Yes Suitable habitat: Open sandy grasslands of southern New England and Long Island; associated with the "coastal prairie" habitat type
Seabeach amaranth (*Amaranthus pumilus*)	T	No	No	No	Yes Suitable habitat: Beaches and overwash flats at accreting ends of barrier islands and lower foredunes; upper strands of noneroding beaches; otherwise bare sand

Notes:

[1] ESA Status: E = Endangered; T = Threatened; NL = Not Listed

[2] Change in status from threatened to endangered is effective on January 30, 2023 (USFWS 2022a).

3.1.1 Bird Species Included in the Analysis

Three ESA-listed bird species use coastal habitats for breeding in the region and also may occur offshore during migration: piping plover, roseate tern, and rufa red knot. Eastern black rails have a historic presence in the onshore portions of the Action Area, and they are ESA-listed as threatened (Atlantic Coast Joint Venture 2019b). While the saltmarsh sparrow (*Ammodramus caudacutus*) is not currently listed under the ESA, they could be listed in the future and have been observed in the onshore portions of the Action Area (Roberts et al. 2019). The status, general distribution, habitat associations, feeding information, and occurrence in the Action Area are described in the following sections.

The black-capped petrel (*Pterodroma hasitata*) has been proposed for listing and could potentially occur in the region; however, this species is generally associated with waters deeper than the nearshore waters utilized by the three currently listed species (USFWS 2018). Therefore, this species is not expected to occur in the Action Area and is not discussed further in this BA.

3.1.1.1 Roseate Tern

Status

Roseate terns that occur in the Action Area are from the northwestern Atlantic population which is listed under the ESA as endangered (USFWS 1987). Since 2010, the number of breeding pairs of roseate terns in the United States and Canada has increased 45 percent from 3,013 to 4,374 in 2019 (USFWS 2020c). Erosion and invasive plant species continue to be the primary threats to breeding colony habitat (USFWS 2020c). The roseate tern is one among 61 species (out of 177 species on the Atlantic OCS) that ranked high in its relative vulnerability to collision with wind turbines (Robinson Willmott et al. 2013). This high ranking is partially driven by the amount of time the species spends foraging on the ocean, and if time on the ocean was restricted to migration the population would be ranked medium. This species also ranked high for relative sensitivity to the impacts of displacement (Robinson Willmott et al. 2013).

Distribution and Habitat

The northwestern Atlantic population breeds in colonies on coastal islands of the northeastern Atlantic coast and Atlantic Canada (Long Island, New York to Nova Scotia) and winters in South America (USFWS 2010; Gochfeld and Burger 2020). Currently, 90 percent of this population breeds on only three islands: Great Gull Island in New York and Bird and Ram Islands in Buzzards Bay, Massachusetts (USFWS 2020c). Although roseate terns historically occurred in Rhode Island, there are currently no breeding colonies in the state (Paton et al. 2010). Juveniles fledge from late July to mid-August and the adults and subadults then occupy post-breeding staging areas through mid-September before migrating southward (Burger et al. 2011). The coastal region of southeastern Cape Cod, Massachusetts, in Buzzard's Bay near Chatham and Monomoy Island, is the most important post-breeding staging area for this species, supporting nearly the entire northwestern Atlantic population (Burger et al. 2011).

Occurrence in the Action Area

Roseate terns migrate through the Project Area region on their way to coastal breeding sites in New England and Atlantic Canada and breed on small islands as far south as Long Island (NYSDEC 2022). Ninety percent of the roseate tern population breeds in the Cape Cod-Long Island area on rocky coastal islands, outer beaches, or saltmarsh islands with protective vegetation to conceal (Veit and Petersen 1993; USFWS 2001). On Long Island, most breeding pairs nest on Great Gull Island (NYSDEC 2014a; NYSERDA 2017a; Jennings 2018), which is located off the eastern end of the North Fork of Long Island. Results of the 2018 Long Island colonial seabird surveys found over 2,000 roseate tern breeding pairs on Great Gull Island (Jennings 2018), approximately 48 mi (77 km) east-northeast of Smith Point Park. Roseate terns have historically nested along the barrier beach at FINS NYSERDA and potentially in the vicinity of the cable landfall location at Smith Point County Park (Peters 2008; NPS 2018), and they may forage over shallow waters or loaf in the area. Fire Island Inlet, approximately 25 mi (40 km) west-southwest of Smith Point County Park, has also provided important foraging habitat (Peters 2008).

Roseate terns may be found offshore, but occurrence frequency and number of roseate terns would be expected to be low due to the more nearshore distribution of this species (Paton et al. 2010; Veit et al. 2016; Bay State Wind 2019). Tagging data recorded across telemetry stations between southern Virginia and Cape Cod, Massachusetts, showed that roseate terns used offshore migratory routes with a peak during mid-July and August (Loring et al. 2019). Although they primarily flew below the rotor swept zone (RSZ) (<82 ft [<25 m]), an estimated 6.4 percent of roseate tern flights in offshore waters occurred within the RSZ (Loring et al. 2019); however, the air gap for the Sunrise Wind WTGs is much greater at 131 ft (40 m), therefore very few, if any, roseate terns would be flying within the RSZ.

Feeding

Foraging roseate terns off Massachusetts are associated with high sand lance abundance (Goyert 2014). Roseate terns dive <1.6 ft (<0.5 m) into the water to forage primarily on the inshore sand lance in shallow, warmer waters near shoals, inlets, and rip currents close to (Rock et al. 2007). Nesting adults typically forage within 4 mi (7 km) of their colony sites (Rock et al. 2007) but may occasionally travel as far as 19 mi (30 km) if necessary (Burger et al. 2011). Roseate tern foraging flights are slow and range from 10 to 39 ft (3 to 12 m) above the ocean surface. During the breeding season, most terns from colonies on Great Gull Island and Buzzards Bay forage relatively close to their colonies, but some do travel along the coast to other nearshore foraging sites (Loring et al. 2019). The roseate tern may be susceptible to habitat disturbances and reductions in prey availability due to reliance on a specific habitat type and narrow range of prey species (Rock et al. 2007).

3.1.1.2 Piping Plover

Status

This small, migratory shorebird is divided into three distinct breeding populations: the threatened Atlantic Coast population, the endangered Great Lakes population, and the threatened Northern Great Plains population (USFWS 1985). The Atlantic Coast breeding population occurs in the Action Area and ranges from North Carolina to Newfoundland (USFWS 1985). The estimated number of Atlantic Coast breeding pairs has increased steadily from 790 pairs in 1986 to 2,289 pairs in 2021 (USFWS 2021). Primary threats are habitat disturbance and destruction and disturbance of nesting adults and chicks (USFWS 1985; USFWS 2020a). The piping plover is among 72 species (out of 177 species on the Atlantic OCS) that ranked medium in its relative vulnerability to collision with wind turbines (Robinson Willmott et al. 2013). This species ranked low for relative sensitivity to the impacts of displacement (Robinson Willmott et al. 2013).

Distribution and Habitat

The piping plover breeds along the Atlantic coast, the Great Lakes, and the Great Plains regions of the United States and winters in coastal habitats of the southeastern United States, coastal Gulf of Mexico, and the Caribbean (USFWS 1996; Elliott-Smith and Haig 2004; USFWS 2020a). Critical habitat has not been designated for the Atlantic Coast breeding population; however, critical habitat units for the wintering population have been designated along the Atlantic and Gulf coasts from North Carolina to Texas (USFWS 2001; USFWS 2008a; USFWS 2009).

The breeding range of the Atlantic coast population includes the Atlantic coast of North America from Canada to North Carolina (USFWS 1985). Piping plovers arrive on the Atlantic Coast breeding grounds and initiate courtship in late March or early April. Clutch initiation may occur as early as mid-April and as late as mid-June. The incubation period ranges from 27 to 30 days, and chicks fledge at an age of 25 to 35 days. Along the Atlantic Coast, most chicks fledge by the end of July although flightless chicks may be present through late August (USFWS 1996). Southward migration to the wintering grounds occurs during late July, August, and September. The wintering ranges of the three breeding populations overlap and include coastal areas from North Carolina to Texas, as well as northern Mexico and the Caribbean (USFWS 1996).

The migration pathways of piping plovers are not well understood (USFWS 2020a). Tagging data recorded across telemetry stations in the Mid-Atlantic show that piping plovers use offshore migratory routes (Loring et al. 2019).

Atlantic Coast nest sites are located above the high tide line on coastal beaches, sandflats at the end of sand spits, gently sloping foredunes, blowout areas behind primary dunes, and washover areas between dunes. Suitable dredge material deposits may also be used as nest sites. Nests consist of shallow scraped depressions in substrates ranging from fine-grained sand to mixed sand and pebbles, shells, or cobble. Nests are typically located in areas with little or no vegetation, although nests are occasionally located beneath American beachgrass or other vegetation (USFWS 1996).

Occurrence in the Action Area

Piping plovers nest on sandy beaches near the Project Area and pass through the region during spring and fall migrations. They are present in the region from March to September and nest on beaches on Long Island from April through August (NYSDEC 2017a). Results of the 2018 Long Island colonial waterbird surveys found 82 active piping plover breeding sites and 404 breeding pairs along the coast and barrier islands (Jennings 2018). Fire Island at Smith Point County Park had 25 breeding pairs of piping plover in 2018 (Jennings 2018). Piping plover nests have been documented within the Great South Bay area (NYSERDA 2017b). Although offshore flights of piping plovers are infrequent, telemetry data indicate that the potential exists for this species to infrequently fly over the SRWF (COP, Appendix P; Sunrise Wind 2022d). Tagging data recorded across telemetry stations between southern Virginia and Cape Cod, Massachusetts showed that piping plovers used offshore migratory routes after departing from their Massachusetts and Rhode Island breeding grounds with a peak migratory departure in early August (Loring et al. 2019). Although they primarily flew above the RSZ (>820 ft [>250 m]), an estimated 21.3 percent of piping plover flights in offshore waters occurred within the RSZ (Loring et al. 2019).

Feeding

Piping plovers forage in the intertidal zone. Foraging habitat includes intertidal portions of ocean beaches, washover areas, mudflats, sandflats, as well as shorelines of coastal ponds, lagoons, and saltmarshes where they feed on beetles, crustaceans, fly larvae, marine worms, and mollusks (USFWS 1996).

3.1.1.3 Rufa Red Knot

Status

The rufa red knot is listed as threatened under the ESA (USFWS 2014b). The overall abundance of rufa red knots is diminished relative to the 1980s but currently stable (USFWS 2021b). There are three distinct nonbreeding regions: the southeastern United States and Caribbean, the northeast coast of Brazil, and the Patagonian coasts of Chile and Argentina. The Southeast United States/Caribbean population is about 15,500 birds including about 5,100 in the Caribbean (Lyons et al. 2018). Primary threats to this species include loss of breeding and nonbreeding habitat (including sea level rise, coastal engineering, coastal development, and arctic ecosystem change); likely effects related to disruption of natural predator cycles on the breeding grounds; reduced prey availability throughout the nonbreeding range; and increasing frequency and severity of asynchronies (mismatches) in the timing of the birds' annual migratory cycle relative to favorable food and weather conditions (USFWS 2014b). The rufa red knot is one of 72 species (out of 177 species on the Atlantic OCS) that ranked medium in its relative vulnerability to collision with wind turbines (Robinson Willmott et al. 2013). This species ranked low for relative sensitivity to the impacts of displacement (Robinson Willmott et al. 2013).

Distribution and Habitat

This species, including the rufa subspecies, of shorebird undertakes long distance migratory flights (up to 5,000 mi [8,000 km]) (Baker et al. 2013) between breeding grounds in the Arctic and wintering grounds in the southeastern United States, Caribbean, northern Brazil, and Argentina (Tierra del Fuego) (Niles et al.

2012; Baker et al. 2013). In the southeastern United States, red knots overwinter primarily in Florida and Georgia (Niles et al. 2008); however, red knots are known to winter as far north as Virginia (Niles et al. 2012). Major stopover sites during the southbound migration include Massachusetts, Connecticut, and Rhode Island. During the northbound migration, stopover sites along the US Atlantic coast include the primary stopover in Delaware Bay although some red knots stop farther south between Virginia and Florida (Niles et al. 2008; Gillings et al. 2009).

Critical habitat for the rufa red knot has been proposed and encompasses 649,066 ac (2,626.7 km^2) from Massachusetts to Texas. The portion of proposed critical habitat near the Project Area is on southern Long Island and includes 1,001 ac (4.05 km^2) in Moriches Inlet, Sussex County; 1,821 ac (7.37 km^2) in Jones Inlet, Nassau County; and 5,458 ac (22.09 km^2) in Jamaica Bay, Queens County (USFWS 2021a).

Preferred wintering and migration habitats include muddy or sandy coastal areas, particularly the mouths of bays and estuaries, tidal inlets and tidal flats. Wintering habitat in the southeastern US also includes peat banks, saltmarshes, brackish lagoons, and mangroves (Niles et al. 2008). In this region, red knots forage along sandy beaches, in tidal mudflats, along peat banks, and along barrier islands (Niles et al. 2008).

<u>Occurrence in the Action Area</u>

The red knot may be present along the United States East Coast, including New York, Rhode Island, and Massachusetts, during spring and fall migratory periods (NYSERDA 2017a; Loring et al. 2018a). The rufa subspecies' primary stopover during spring migration is Delaware Bay (Niles et al. 2009). Only a small portion of the rufa population uses the US Atlantic Coast during the southward migration (Loring et al. 2018a). Tagging data recorded across telemetry stations between southern Virginia and Cape Cod, Massachusetts showed that only 8 percent of tagged rufa red knots passed through one or more of the WEAs during fall migration (Loring et al. 2018a). Red knots tagged in Massachusetts flew across WEAs mostly during November, while those tagged in New Jersey departed in late August and flew directly offshore to WEAs or departed in November and flew a more coastal route along the WEAs in Delaware, Maryland, and Virginia (Loring et al. 2018a). Most of the flights across WEAs were within the RSZ (66 to 656 ft [20 to 200 m]), but these data should be viewed with caution due to the large error around the estimated flight heights (Loring et al. 2018a). Although offshore flights of rufa red knots are infrequent, telemetry data indicate that the potential exists for this species to infrequently fly over the SRWF (COP, Appendix P; Sunrise Wind 2022d). In summary, while rufa red knot exposure to the SRWF is limited overall, these findings indicate that individuals could migrate through the SRWF in small numbers during spring and fall.

<u>Feeding</u>

Preferred prey in non-breeding habitats includes horseshoe crab eggs, snails, clams, and crustaceans (Tsipoura and Burger 1999; Niles et al. 2008; Cohen et al. 2010). In the southeastern United States, red knots forage along sandy beaches, in tidal mudflats, along peat banks, and along barrier islands (Niles et al. 2008). Red knots may stopover to forage in salt meadows and mudflats of the South Shore of Long Island (NYSDEC 2014b) and may stopover to forage in intertidal areas and roost on beach habitats near the landfall/ICW work area at Smith Point.

3.1.1.4 Saltmarsh Sparrows

<u>Status</u>

Saltmarsh sparrows are not currently listed under the ESA; however, their low and declining population sizes, limited habitat, vulnerability to anthropogenic threats, and reduced breeding success make them a candidate for future listing (Roberts et al. 2019). Endemic to the United States' Atlantic Coast, their population was estimated at 60,000 individuals in 2011 and 2012, and their population is likely to be reduced to 5,000 individuals by 2040 without effective mitigation and conservation (Atlantic Coast Joint Venture 2019a). Nest loss due to flooding is a major driving force behind their population decline, and it is exacerbated by the higher rates of sea level rise experienced along the east coast of the United States

(Atlantic Coast Joint Venture 2019a). They also face broader stressors, such as predation and pollution, as well as habitat degradation due to alterations from anthropogenic activities, such as construction and the placement of roads, ditches, and coastal walls (Hartley and Weldon 2020).

Once grouped with Nelson sparrows under the species “sharp-tailed sparrows”, saltmarsh sparrows are distinguished as a unique species with two populations: the North-Atlantic saltmarsh sparrow and the Mid-Atlantic saltmarsh sparrow (Watts and Smith 2015); however, there is some hybridization between saltmarsh and Nelson sparrows (Watts and Smith 2015). The North-Atlantic saltmarsh population is the one that occurs in the Action Area (Watts and Smith 2015).

Distribution and Habitat

Saltmarsh sparrows have a breeding range from Virginia to Maine, non-breeding habitat that spans from Florida to North Carolina, and a year-round presence from Virginia to Massachusetts (Hartley and Weldon 2020). The North-Atlantic saltmarsh sparrow population has a breeding range from New Jersey to Maine during the months of May-September (Watts and Smith 2015; Atlantic Coast Joint Venture 2022).

As obligate users of saltmarshes, saltmarsh sparrows depend on this habitat for all life stages including breeding, nesting, foraging, and wintering; however, most existing data are focused on their breeding habitat, and much is unknown about their wintering range and distribution (Watts and Smith 2015).Nesting in “high marsh”, which is the portion of a tidal saltmarsh with the highest elevation, saltmarsh sparrows use low marsh for foraging (Hartley and Weldon 2020). In addition to the twice daily flooding of low marsh, high marsh floods with coastal storm flooding (Atlantic Coast Joint Venture 2019a). Saltmarsh sparrows build nests in saltmarsh grasses above the mean water level, and they rely on unmodified habitat without altered tidal flow (e.g., ditching or roads) (Atlantic Coast Joint Venture 2022). High marshes frequently have grass, such as salt hay cordgrass, spike grass, salt meadow rush, and black needlerush, although rising water levels and altered tidal flows are affecting the distribution of saltmarsh grasses with increasing numbers of low marsh species encroaching on high marsh habitat (Hartley and Weldon 2020). Saltmarsh sparrows have primarily been observed in marshes ranging from 0.9 to 1.97 ac (Hartley and Weldon 2020).

With approximately 5,000 breeding individuals, New York has the fourth highest breeding population of saltmarsh sparrows with most centered around the marsh habitat on Long Island (Hartley and Weldon 2020). Their breeding habitat extends across the coastal areas of the Long Island Peninsula with the largest in the Southwest Long Island Marshes, and they have an observed presence in the Eastern Fire Island Marshes (Atlantic Coast Joint Venture 2022). New York has a total of 27,673 ac of saltmarsh habitat, with a majority occurring around the densely population Long Island, but that number is decreasing with increasing sea levels (Atlantic Coast Joint Venture 2019a).

Occurrence in the Action Area

Saltmarsh sparrows have an observed presence in the landfall region at Smith Point County Park and the surrounding Eastern Fire Island Marshes but breeding areas in this region are unconfirmed (Atlantic Coast Joint Venture 2022). The western region of Long Island is listed and protected as the Fire Island National Seashore while the central and eastern parts of Long Island form the Smith Point County Park and Great Gun Park. While the Eastern Fire Island Marshes have 903 ac, the western wilderness area is rapidly shrinking from rising sea-levels, and marshes within Smith Point County Park are heavily ditched and unmaintained (Atlantic Coast Joint Venture 2022). This has resulted marsh habitat that has a mix of environmental concerns such as pooling in areas with plugged drainage and extensive sandy areas needing revegetation after sand deposition from dredging and storms such as Hurricane Sandy (Atlantic Coast Joint Venture 2022).

Feeding

While they nest in high marshes, saltmarsh sparrows use low marsh regions for foraging (Hartley and Weldon 2020). During their summer breeding season, they feed exclusively on invertebrates, and their diet makes them an indicator of mercury accumulation in the local environment (Lane et al. 2020).

3.1.1.5 Eastern Black Rails

Status

Black rails are an American species of marsh bird with two populations: the California and eastern black rails. The eastern black rail population historically ranged from the Great Plains to the U.S. Atlantic coast and the Gulf of Mexico and is currently listed as threatened under the ESA (Atlantic Coast Joint Venture 2019b). This species is listed as endangered by the State of New York (Watts 2020). Eastern black rails do not have designated critical habitat (USFWS 2020b). The eastern black rail population is declining, and they are currently observed in a much smaller area than their historic range (Atlantic Coast Joint Venture 2019b). This species has multiple threats including flooding, rising sea levels encroaching on high marsh habitat, and anthropogenic activities, such as wetland reclamation, hay mowing, and ditching, that impact habitat integrity (USFWS 2019). The tidal marshes where they are found most frequently are particularly vulnerable to rising sea levels with water levels rising at a disproportionately high rate which increases the risk of nest loss due to flooding (Atlantic Coast Joint Venture 2019b). While eastern black rails will renest quickly upon a nest loss, shifts in water levels can lead to them abandoning their nesting area (Atlantic Coast Joint Venture 2019b).

Relatively little is known about the life history or population dynamics of the eastern black rail (USFWS 2019). Since the 1990s, their population has declined by 90 percent and is estimated at between 710 and 1630 individuals while continuing to decline at a rate of 9 percent annually (Watts 2016). The eastern black rail is among 72 species (out of 177 species on the Atlantic Ocean OCS) that ranked medium in its relative vulnerability to collision with wind turbines (Robinson Willmott et al. 2013). While they ranked high for population sensitivity, eastern black rails ranked low for displacement (Robinson Willmott et al. 2013).

Distribution and Habitat

Eastern black rails have a historic breeding range that includes the Northeast Atlantic coast, but their distribution has undergone a steady contraction. Despite their documented presence in the Northeast, they have not been observed breeding north of Ocean County, New Jersey, since 2010 (Watts 2016). While the populations north of Virginia are migratory, those in the Southeast are annual residents (Atlantic Coast Joint Venture 2019b). Obligate marsh birds, eastern black rails are residents of the region of marshes known as high marsh which is characterized by low water levels that are stable and range from continuously damp soil to 1 inch (3 centimeters) of water (Atlantic Coast Joint Venture 2019b). High marsh habitat only floods twice monthly with the lunar cycle and infrequently as a result of storms (Atlantic Coast Joint Venture 2019b).

With a nesting period of March to August, eastern black rails lay an average clutch of seven eggs for an incubation period of 19 days with both sexes incubating (USFWS 2019). Once hatched, eastern black rails fledge after one and a half months and are capable of flight at that point (USFWS 2019). There is little information about the juvenile stage, but it is believed that they disperse from the nest (USFWS 2019). They reach adulthood in the spring after their hatch year. Eastern black rail adults go through a summer molting period from July to October when they are flightless (Atlantic Coast Joint Venture 2019b). Eastern black rails are not known for flying or flushing during their nesting season, preferring instead to run under the vegetation and build nests on or near the ground (Atlantic Coast Joint Venture 2019b; USFWS 2019).

Unlike other marsh bird species, their habitat preference is not fully determined by the salinity levels of the marsh; eastern black rails can be found in both fresh and saltwater marshes (Atlantic Coast Joint Venture 2019b). Eastern black rails prefer habitat based on vegetation density and water levels although they have been observed at highest numbers in saltmarshes (Atlantic Coast Joint Venture 2019b). Eastern black rails require dense vegetation with space under the canopy for the adult birds and their fledgling chicks to walk or run through (USFWS 2019; Watts 2020). They also depend on having areas of higher elevation and dense vegetation without water coverage that they can flee to on foot during flooding events (USFWS 2019). This feature is particularly important when the chicks are still unable to fly or when the adults have entered their flightless period.

Occurrence in the Action Area

Eastern black rails have a documented and confirmed breeding presence on the Long Island Peninsula in in Suffolk County which overlaps with the onshore portions of the Action Area; however, they have not been observed in the region since 2009 (Watts 2016). More broadly, there is not a record of them breeding north of New Jersey after 2010 (Watts 2016). When they were observed in the area, they showed a preference for nesting on the inshore regions of the marshes on the Long Island Peninsula (Watts 2016). Observations of eastern black rails in Suffolk County were limited to the nesting period between March and October (Watts 2016).

Feeding

Eastern black rails have a seasonally varied diet. In the nesting periods when they are less likely or unable to fly, they eat both aquatic and terrestrial invertebrates, and they tend to forage within walking distance of their nests (USFWS 2019). During the wintering portions of their migration, they are more likely to forage on seeds (USFWS 2019).

3.1.2 Bat Species Included in the Analysis

The endangered northern long-eared bat is the only ESA-listed bat species expected to occur in the Project Area. The status, general distribution, habitat associations, occurrence in the Action Area, and feeding and hearing information for this species are described in the following sections.

The little brown bat (*Myotis lucifugus*) and tri-colored bat (*Perimyotis subflavus*) are both currently under review for listing under the ESA. While present in New York, the ESA-listed Indiana bat (*Myotis sodalist*; endangered) is not known to occur in Long Island's Nassau or Suffolk Counties (USFWS 2021b) and to date has not been located during regional offshore vessel-based acoustic bat surveys (Pelletier et al. 2013; Stantec 2018a; Sunrise Wind 2022e). Therefore, this species is not expected to occur in the Action Area and is not discussed further in this BA.

3.1.2.1 Tricolored Bat

Status

The status of tricolored bats is currently under review with a listing determination coming in the near future. There are three populations of tricolored bats: northern, eastern, and southern (NYSDEC 2017b). The eastern tricolored bat population inhabits the Northeast Atlantic coast (NYSDEC 2017b). All populations are declining rapidly due to a fungal pathogen known as white-nose syndrome (WNS) which is causing precipitous declines in bat species and localized extirpations of hibernation sites (NYSDEC 2017b). They face additional threats from habitat loss which affects their foraging, roosting, and commuting as well as anthropogenic habitat disturbances such as forest removal and collision with onshore wind turbines (USFWS 2022). In comparison to other bat species, tricolored bats have historically been rare in New York with exact population abundances unknown (NYSDEC 2017b). Tricolored bats do not currently have designated critical habitat, and while other states have listed them as endangered, they are not listed in New York (NYSDEC 2017b).

Distribution and Habitat

Tricolored bats have a range that encompasses the eastern half of the United States as well as Canada. When not hibernating between March and July, tricolored bats will primarily roost in leaf clusters of both live and recently dead deciduous hardwood trees, and in more northern states, they often roost in lichen (USFWS 2021a). They also use artificial roosts like barns, roof eaves, and concrete structures like bridges (USFWS 2021a). While males roost singularly, females show a high degree of site fidelity and form all-female maternity colonies while pregnant (USFWS 2021a). Summer roosts are primarily selected based on proximity to the abundant foraging resources such as insects and water (USFWS 2021a). When foraging, they prefer to be over waterways and moving in line with forest edges (USFWS 2021a). The young are typically born in May, and they lactate until July when they become fledglings (USFWS 2021a).

Tricolored bats depart their summer roosts for the swarming and mating period from August to October (USFWS 2021a). Their hibernation period is longer than other bat species and lasts from November to March, but their hibernating numbers do not peak until December (USFWS 2021a). They show site fidelity to their hibernating roosts between years and tend to roost in small clusters, in pairs, or in isolation (USFWS 2021a). They have always been considered rare in New York, but since the development of WNS, their historic roosts in New York have declined between 78 and 100 percent (NYSDEC 2017b).

Occurrence in the Action Area

There is evidence of a limited presence of tricolored bats in the onshore portions of the Action Area which includes suitable habitat for their spring and summer roosting (Jackson and Schwager 2012). Prior to the appearance of WNS, tricolored bats were still considered in NYS, and their numbers have steadily declined (NYSDEC 2017b). They have previously been detected in offshore environments; however, there is little data on their offshore presence compared to other species (Peterson and Pelletier 2016). In an acoustic study conducted during their lactation period of May-July within Suffolk County (where the onshore portions of the Action Area are set to occur), tricolored bat calls made up 0.28 percent of the total detected calls (Jackson and Schwager 2012).

Feeding

Tricolored bats are opportunistic feeders, and their diet typically includes caddisflies, moths, small beetles, wasps, true bugs, and flies (USFWS 2021a). When foraging, they typically travel as far as 3 to 4 mi (5 to 6 km) from their roosting areas (Poissant 2009).

Hearing

In North America, insectivorous bats have a general hearing range of 10 to 100 kilohertz (kHz), depending on the species and specific behavior, with the most sensitive frequency band between 20 and 50 kHz and are generally unable to hear frequencies below 500 hertz (DoN 2018). While hearing is echolocating bats' primary sense for foraging and avoiding obstacles, they also use a combination of auditory and visual cues, magneto-reception, and spatial memory for long-distance navigation. When there are no reflective surfaces for echolocation, it is possible that bats flying over the ocean use visual cues and, therefore, are unlikely to fly over the ocean when visibility is low (True et al. 2021).

3.1.2.2 Little Brown Bat

Status

The little brown bat (*Myotis lucifugus*) is a small species of migratory bat with a historic range that encompasses the majority of North America. Not currently listed under the ESA, their status is under review and a species status assessment has been conducted by USFWS; however, the results have not yet been released (Kath 2022). No critical habitat has been designated for this species (Kunz and Reichard 2010). There are five subspecies of the little brown bat with *Myotis lucifugus lucifugus* being the subspecies that occurs in the Action Area (Kunz and Reichard 2010). The primary driving cause behind the population decline is WNS which has caused a mass decline of bat species in North America since its appearance in 2006 (Kunz and Reichard 2010). Little brown bats seek out winter roosting sites known as hibernacula where they congregate and enter a state of torpor (Kunz and Reichard 2010). A side effect of WNS is the disruption of torpor which causes bats to rouse more frequently and waste necessary lipid stores (Cheng et al. 2019). This has resulted in broad scale declines and local extirpations; however, some northeastern populations at WNS-affected roosts have appeared to stabilize (Cheng et al. 2019). There is some evidence that higher fat stores increase the viability of surviving WNS outbreaks (Cheng et al. 2019). Aside from WNS, factors in little brown bat populations include wind energy mortality, effect from climate change, and habitat loss (Kunz and Reichard 2010). Aside from mortality counts at WNS-affected hibernacula, there is a lack of population abundance estimates; however, their core population was estimated 6.5 million individuals within their core range prior to WNS (Kunz and Reichard 2010; Russell et al. 2014).

Distribution and Habitat

Like other cave roosting bats, the distribution of little brown bats is determined by the availability of suitable caves or mines for hibernation (Kunz and Reichard 2010). Prior to WNS, this encompassed the majority of the United States and Canada, with the core range of the species being concentrated in the northeastern portions of their range (Kunz and Reichard 2010). Prior to hibernation, they undergo a fattening season in preparation for entering torpor. This overlaps with their swarming and mating season which is between August and early October (Kunz and Reichard 2010). When choosing a hibernacula, the primary considerations are locations with stable temperatures and high humidity (Kunz and Reichard 2010). They hibernate from November to April (WDNR 2013b).

Between April and May, they emerge from their hibernacula, moving to spring roosts that include barns, attics, tree cavities, or other locations that remain dark throughout the day. Females, in particular, show a high degree of site fidelity between each year and return to the roost of their birth (Kunz and Reichard 2010). Little brown bats have a maternity period between June and August when the females rear their offspring (WDNR 2013b). Female little brown bats nurse at night which impacts their availability to forage at night (Henry et al. 2002). Females typically forage closer to their roosts during this maternity period, and because their lipid stores are not enough to sustain milk production, they are forced to forage each night (Henry et al. 2002). The young are weaned between 22 and 26 days and become fledglings at that point (Kunz and Reichard 2010). Juveniles tend to prefer foraging in clearings or along open forest roads while adults show a preference for more tightly spaced foraging locations (Kunz and Reichard 2010).

Occurrence in the Action Area

Little brown bats have been recorded in the onshore portions of the Action Area and have the potential to occur in the offshore portions of the Project Area. There is evidence of a year-round presence on the Long Island Peninsula with both spring roosts and hibernacula (Russell et al. 2014). Additionally, little brown bats have been acoustically detected on Fire Island between March and December, with a peak from March-September (Gorman et al. 2021). In addition to a history of being observed making offshore flights, little brown bats tagged on Martha's Vineyard were detected offshore (Dowling et al. 2017; NYSERDA 2017a). They are capable of extended flights, making seasonal migrations between 32 and 344 mi (51 and 554 km) between their spring roosts and hibernacula (Dowling et al. 2017).

Feeding

Little brown bats are insectivorous with a diet that primarily consists of flies, moths, beetles, caddisflies, mayflies, and lacewings (Kunz and Reichard 2010). During their nightly foraging, they have been observed eating more than half their body weight in foraged insects (Kunz and Reichard 2010). While male and pregnant female little brown bats can have a foraging range up to 74 ac (30 ha), that range substantively decreases during lactation (Kunz and Reichard 2010).

Hearing

In North America, insectivorous bats have a general hearing range of 10 to 100 kHz, depending on the species and specific behavior, with the most sensitive frequency band between 20 and 50 kHz and are generally unable to hear frequencies below 500 hertz (DoN 2018). While hearing is echolocating bats' primary sense for foraging and avoiding obstacles, they also use a combination of auditory and visual cues, magneto-reception, and spatial memory for long-distance navigation. When there are no reflective surfaces for echolocation, it is possible that bats flying over the ocean use visual cues and, therefore, are unlikely to fly over the ocean when visibility is low (True et al. 2021).

3.1.2.3 Northern Long-Eared Bat

Status

The northern long-eared bat is listed as endangered under the ESA (USFWS 2022a) Critical habitat has not been designated for the northern long-eared bat. The primary factor influencing the viability of this species is WNS. Other factors also include wind energy mortality, effects from climate change, and habitat loss (USFWS 2022b). Abundance estimates, including both winter and summer data, indicate that this species has and will continue to decline substantially under current stressors, particularly the effects of WNS (USFWS 2022a; USFWS 2022b).

Distribution and Habitat

This non-migratory cave-hibernating bat typically overwinters in caves or mines and spends the remainder of the year in forested habitats. It is broadly distributed throughout much of the eastern and north-central United States and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia. Occurrence along the eastern coast of the US ranges from South Carolina to Maine (USFWS 2022b). In general, these bats migrate to hibernacula in August or September, enter hibernation in October and November, and emerge from the hibernacula in March or April, although hibernation timing and duration can vary considerably by region (USFWS 2015). Non-migratory cave-hibernating bat activity is greater onshore and at coastal locations when compared to offshore (Smith and McWilliams 2016; NPS 2018; Stantec 2018a; Sunrise Wind 2022e).

Occurrence in the Action Area

The northern long-eared bat has the potential to occur in the corridor for the Onshore Facilities during summer (NYSDEC 2022; USFWS 2022b). They are expected to be rare in the offshore portions of the Action Area, particularly during the maternity period (June to mid-July) (Dowling et al. 2017).

Within the WNS-affected zone, northern long-eared bats are persisting in some coastal areas, including Long Island, New York (USFWS 2022b). Summer occurrence is confirmed in all coastal counties of the island (NYSDEC 2022); however, an acoustic survey conducted between 9-15 August 2022 failed to detect the presence of northern long-eared bats within the onshore portions of the Action Area (Stantec 2022).

There are also records of this species on the coastal islands of Rhode Island and Massachusetts (Dowling et al. 2017) indicating that some individuals traveled over open water to the islands. Dowling et al. (2017) detected these bats on Martha’s Vineyard in October and November. Survey data suggest that northern long-eared bats may overwinter in small hibernacula on the island; however, it is possible that they may also migrate to mainland hibernacula from these islands in August and September, though none of the five northern long-eared bats tracked during this study were detected making offshore movements (Dowling et al. 2017).

During the offshore construction of the Block Island Wind Farm, bats were monitored with acoustic detectors on boats; no northern long-eared bats were detected among the 1,546 passes of bats (Stantec 2018c). During post-construction monitoring from August 2017 to January 2018, none were detected out of the 1,086 passes recorded by bat acoustic detectors mounted on two turbines (Stantec 2018c). At the South Fork Wind Farm, there was a single northern long-eared bat call detected in the offshore project area during the 2017 Enterprise vessel-based survey; the detection was recorded 21.1 mi (18.2 nm, 33.8 km) offshore from the closest point of land (Stantec 2018b). None of the other recent vessel-based acoustic surveys in the vicinity of the SRWF (which covered late-summer and fall dispersal periods) documented northern long-eared bat. Therefore, occurrences of northern long-eared bat in the SRWF are expected to be very rare.

Feeding

The northern long-eared bat is insectivorous foraging on moths, flies, and beetles. This species uses echolocation to locate and capture prey, often using gleaning to catch insects resting on leaves or twigs, in addition to catching insects that are flying. Edge habitat (transition zone between two types of vegetation) is important for northern long-eared bats as they migrate and forage. When bats migrate from wintering caves to summer habitat or commute from roosts to feeding grounds, they take longer routes that follow edge habitat to protect them from wind and predators instead of flying the shortest distance. Edge habitats also allow bats more feeding opportunities because food is more abundant in this transition zone (WDNR 2013a).

Hearing

In North America, insectivorous bats have a general hearing range of 10 to 100 kHz, depending on the species and specific behavior, with the most sensitive frequency band between 20 and 50 kHz and are generally unable to hear frequencies below 500 hertz (DoN 2018). While hearing is echolocating bats' primary sense for foraging and avoiding obstacles, they also use a combination of auditory and visual cues, magneto-reception, and spatial memory for long-distance navigation. When there are no reflective surfaces for echolocation, it is possible that bats flying over the ocean use visual cues and, therefore, are unlikely to fly over the ocean when visibility is low (True et al. 2021).

3.1.3 Insect Species Included in the Analysis

3.1.3.1 Monarch Butterfly

Status

The monarch butterfly is a migratory species of butterfly that occurs across the United States with some global and non-migratory populations in Europe and Hawaii (USFWS 2020). This species is not currently listed under the ESA but is a candidate for future listing. There are two migratory populations in North America, the western and eastern monarch populations which are divided by the Rocky Mountains, and there is an additional non-migratory population in Florida (USFWS 2020). The eastern North American monarch population occurs in the Action Area (USFWS 2020). Despite the broad distribution of monarchs, the eastern North American monarch population is the most substantive and is believed to be the overarching population from which the other populations stemmed (USFWS 2020). Wintering censuses of this population have been estimated at 77,141,600 as a 5-year average; however, they have suffered a decline for the last 26 years with a population reduction of 90 percent (USFWS 2020). This decline has multiple causes including disease, parasitism, climate change, and exposure to insecticides; however, the primary cause is attributed to the large-scale loss of available milkweed due to human development activities such as agriculture (USFWS 2020). They are vulnerable to extreme temperature conditions which are projected to occur more frequently with ongoing climate shifts (USFWS 2020).

Distribution and Habitat

The range of the eastern North American monarch population covers east of the Rocky Mountain Range to the Atlantic Coast, south into Mexico, and into the southernmost regions of Canada (in line with the availability of milkweed) during the spring and summer (USFWS 2020). Beginning their migration in October, they move south to central Mexico where they remain until they return north in February (USFWS 2020). They feed during their winter migration, but once they have arrived (between October and December), they live off their lipid reserves and do not feed again until February (Jepsen et al. 2015). While wintering in Mexico, they are not breeding, but during the rest of the year, they will breed and produce three to five generations with varied lifespans (USFWS 2020). In comparison to their migratory counterpart's lifespan of 6 to 9 months, non-migratory generations of monarch butterflies live 2 to 5 weeks (USFWS 2020).

While monarch butterflies can and do forage on a variety of flowers and blooms, they are obligate users of milkweed for feeding and reproduction (USFWS 2020). They feed and lay their eggs on the host plant where the larvae develop over 9 to 18 days (USFWS 2020). The larvae pupate into a chrysalis for 6 to 14 days before emerging as an adult butterfly (USFWS 2020).

Occurrence in the Action Area

The onshore portion of the Action Area falls within the eastern North American monarch's summer breeding range as well as their fall migration route (NPS 2015). They are reliant on the milkweed variant, including the two that are common on Fire Island: swamp milkweed and common milkweed (NPS 2015). The common milkweed grows in the hilly and sandy regions of Fire Island while swamp milkweed occurs in the wetlands (NPS 2015). Their presence is seasonal, restricted by their migration patterns (NPS 2015). They begin their spring migration in Mexico between February-March and begin their south migration in September-October (USFWS 2020).

Feeding

Monarch butterflies depend on having access to a diverse range of flowering plants that provide them with nectar as a food source to sustain them through migrations and breeding (USFWS 2020). They are pollinators, transferring pollen across flowers in pursuit of nectar. Their obligate relationship with milkweed extends beyond laying eggs; the developing larvae use it as a food source before constructing their chrysalis (Jepsen et al. 2015). While feeding on milkweed, the larvae sequester toxins found in the leaves to use as a defense against predators; their bright coloration is a warning that they are toxic (USFWS 2020).

3.1.4 Plant Species Included in the Analysis

Two federally listed plant species potentially occur within the Action Area: the endangered sandplain gerardia and the threatened seabeach amaranth. Suitable habitat for both species within the Action Area is limited to the landfall/ICW work area at Smith Point County Park on Fire Island (**Figure 4**) and this analysis is limited to the same area. The status and species description, distribution in the project vicinity, and likelihood of occurrence in the Action Area are presented in the following sections.

3.1.4.1 Sandplain Gerardia

Status

Sandplain gerardia was listed as federally endangered on September 7, 1988 (USFWS 1988) due primarily to direct loss and degradation of suitable habitat, caused by increased development, vegetation succession, and changing historical disturbance regimes such as increased fire suppression (USFWS 1989). Historically, sandplain gerardia was found from Nantucket, Massachusetts to Folly Beach, South Carolina, but was extirpated from nearly three-fourths of its earlier range by 1987 (Weakley et al. 1996). The plant has a very restricted distribution due to its dependence on the periodic disturbance of its specialized and limited habitat. It grows in native grassland sites along coastal Cape Cod, Massachusetts; Long Island, New York; Rhode Island; and Maryland (USFWS 2019). Sandplain gerardia is presently the only federally listed endangered species in the State of New York (GOSR 2020). Significant remnant populations remain only at Sayville, the Hempstead Plains, and Montauk on Long Island (USACE 2016).

The USFWS (2019) is recommending delisting of sandplain gerardia because it no longer meets the definition of a species. In a study using genetic and morphological analyses, (Pettengill and Neel 2011) conclude that sandplain gerardia (*Agalinis acuta*) should be synonymized under sandplain agalinis (*A. decemloba*) and conclude that *A. decemloba* "is deserving of protection under the Endangered Species Act". The USFWS will adopt the taxonomy presented in Volume 17 of Flora of North America. The taxonomy adopted by Flora of North America (Freeman et al. 2019) has adopted the view presented by (Pettengill and Neel 2011) that does not treat sandplain gerardia as distinct from sandplain agalinis.

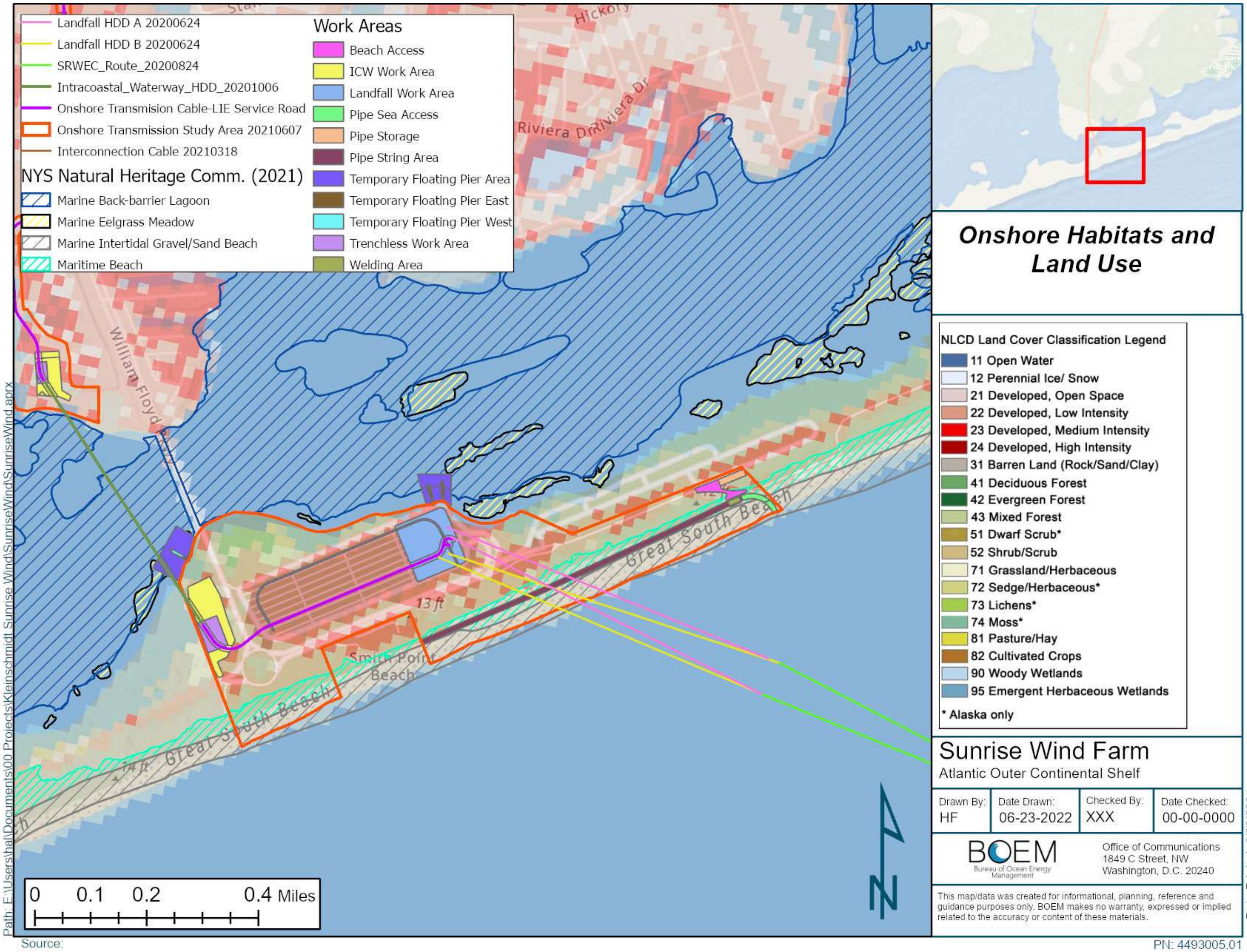

Figure 4. Onshore habitats within and near the Action Area at Smith Point County Park on Fire Island.

Distribution and Habitat

Sandplain gerardia is a small annual plant in a family of mostly parasitic plants (family Orobanchaceae, formerly Scrophulariaceae). The plant has small, delicate pink flowers and is most successful in disturbed prairie grassland habitat that is sandy and open and dominated by native bunchgrasses (Jordan 2003). Management of this species requires prescribed fires which may be essential for germination (USACE 2016) and shrub cutting and mowing that remove species that would out-compete sandplain gerardia (Jordan 2003). A stable population of sandplain gerardia is measured by a 5-year running geometric (rather than arithmetic) average population size with a minimum of 100 individuals because the species has such wide year-to-year size fluctuations (USFWS 1989).

Surveys for sandplain gerardia are typically conducted in late summer or early fall when the plant is visible. The annual nature of the plant, its characteristic small and disjunct populations, its microhabitat requirements, and its presence under fluctuating weather conditions account for dramatic changes in numbers from year to year (USFWS 2019). Since 1988, there has been a range-wide increase in the number of plants from 1,218 plants at 10 sites (2010) to 41,382 plants at 13 sites (2017) for the entire range of sandplain gerardia due to recovery efforts. In New York, the numbers of sandplain gerardia plants ranged from 4,380 in 2013 to 20,158 in 2016 and 15,572 in 2017 (USFWS 2019).

Occurrence in the Action Area

Nine natural populations of sandplain gerardia are known on Long Island and have been monitored since 1984. Two of these populations are in the town of Brookhaven and in or near the village of Bellport, just west and south of the proposed corridor. Sandplain gerardia at the Bellport Avenue site totaled 11 individuals in 2001; at the Bellport Railroad, there were zero individuals reported in 2001 (Jordan 2003). None of these populations are within the Action Area. Significant remnant populations are reported only at Sayville, the Hempstead Plains, and Montauk (USFWS 2019).

During field visits in June and October 2020, scientists evaluated the general natural community types (Edinger et al. 2014) in the Action Area with respect to potential suitability for RTE species. Any incidental observations of RTE species encountered during field visits were documented. Sandplain gerardia was not observed during these 2020 habitat surveys, and no records of this species in the Action Area are available. Potentially suitable habitat for sandplain gerardia is present outside the landfall/ICW work area component of the Action Area within Smith Point County Park in small, sandy, open or grassy areas among more heavily vegetated shrub communities along the north side of the parking area (Sunrise Wind 2020); however, this potential habitat is outside the proposed landfall/ICW work area.

3.1.4.2 Seabeach Amaranth

Status

The seabeach amaranth (family Amaranthaceae) was listed as a threatened species on April 7, 1993 (USFWS 1993). The listing was based on the elimination of seabeach amaranth from two-thirds of its historic range and continuing threats to the 55 populations that remained at the time (USFWS 1993). Extirpation of the plant in many places has been attributed to hardened shorelines, erosion, tidal inundation, and possibly herbivory. Soft shoreline stabilization activities, such as beach nourishment, dune creation, and beach grass plantings, are also threats to the seabeach amaranth.

Distribution and Habitat

Historically, seabeach amaranth occurred in nine states from Massachusetts to South Carolina. It was eliminated from seven of these states in the 1980s. The species is still considered extirpated in Massachusetts and Rhode Island, but since 1990, the naturally occurring range for seabeach amaranth has increased and currently extends from Long Island to South Carolina (Jolls et al. 2004).

Populations of seabeach amaranth are extremely variable (Weakley et al. 1996) and can fluctuate by several orders of magnitude from year to year due to the effects of weather-related impacts on mortality and reproduction. Range-wide surveys of seabeach amaranth at known historical sites documented 39 populations totaling 11,740 plants in 1987 (Weakley et al. 1996). A survey in 1990 revealed 56 populations with a total of 11,432 plants in the Carolinas and Long Island, New York (Hancock and Hosier 2003), which is a range-wide reduction of 74 percent since 1988.

Seabeach amaranth is endemic to the Atlantic coastal plain (USFWS 1993) and native to barrier island beaches and rapidly eroding or accreting shorelines in New York, inclusive of Long Island. It is a low-growing plant with fleshy pink or reddish stems and small rounded leaves. It flowers from mid-summer to late fall, is typically visible between May and November, and produces seeds from July or August until the plant dies. As the growing season progresses, the plant acts to stabilize sand, forming a mound of sand (USFWS 1993). The species' primary habitat is on barrier beaches, on overwash fans at ends of islands where new material may be deposited, and on lower foredunes of non-eroding beaches. The seeds, which float, are presumably deposited by tidal action. Smaller, temporary populations may be established in blowouts in foredunes (Weakley et al. 1996).

Seabeach amaranth is eliminated from existing habitats by competition from established species and erosion and colonizes newly formed habitats by dispersal and (probably) long-lived seed banks (Weakley et al. 1996). Existing habitat often erodes away but new habitat is created by island overwash and breaching. Seeds are dispersed by a variety of mechanisms involving transport via wind and water.

Sand trapped by seabeach amaranth may also initiate dune formation and create suitable habitat for other plants, such as sea oats and beach grass. Numerous shorebirds, including the least tern (*Sterna antillarum*), Wilson's plover (*Charadrius wilsonia*), black skimmer (*Rhynchops niger*), and Caspian tern (*Sterna caspia*) as well as the endangered/threatened piping plover and endangered roseate tern (*Sterna dougallii dougallii*), nest in seabeach amaranth stands (Randall 2002).

Occurrence in the Action Area

The NYNHP reported that almost 99 percent of the seabeach amaranth plants, range-wide, were found in Long Island in 2000 (USACE 2016). The Action Area is within the present range of seabeach amaranth and includes maritime beach, the habitat that supports seabeach amaranth. Maritime beach is present along 32 mi (51.5 km) of the Atlantic side of Fire Island, inclusive of Smith Point County Park where the landfall/ICW work area for the transmission cable is planned.

Seabeach amaranth has been observed in annual coastal habitat surveys conducted in immediate proximity to the Action Area and has been observed on maritime beach habitat at Smith Point County Park (NYSDOS 2008). In 2013, Smith Point had one of the two largest concentrations of seabeach amaranth on Fire Island (second was Democrat Point) (USFWS 2014a). The number of observed amaranth plants across all of Fire Island, inclusive of Smith Point County Park, averaged 564 plants from 2000-2013 with a maximum of 2,089 plants observed in 2003 and a minimum of 28 plants observed in 2013 (USACE 2016).

Recreation use of the Smith Point County Park is very high during the summer months; as many as 1,200 beach vehicles in one day have been reported in the area, with an estimated average of 400-800 per day during summer weekends (NYSDOS 2008). Consequently, beach disturbance by pedestrian and off-road vehicle traffic is common, thereby limiting the likelihood of seabeach amaranth occurrences along this portion of the beach.

3.2 CLIMATE CHANGE CONSIDERATIONS

Climate change refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, which occur over several decades or longer (BOEM 2019). The impacts of these changes have wide ranging implications for the natural and human environment and can vary greatly around along the Atlantic coast. Council on Environmental Quality (CEQ) guidance describes how federal agencies should consider the effects of greenhouse gas emissions and climate change in their NEPA reviews. CEQ recommends that:

- Agencies consider both the potential effects of a proposed action on climate change, as indicated by estimated greenhouse gas emissions, and the implications of climate change for the environmental effects of the proposed action.
- The extent of the analyses should be proportional to the projected greenhouse gas emissions and climate impacts.
- Analyses employ appropriate quantitative or qualitative analytical methods to ensure useful information is available to inform the public and the decision-making process in distinguishing between alternatives and mitigation.

BOEM addresses climate change in the description of the affected environment. The current and expected future state of the environment without the Proposed Action represents the reasonably foreseeable affected environment that should be described based on available climate change information, including observations, interpretative assessments, predictive modeling, scenarios, traditional ecological knowledge, and other empirical evidence. The descriptions of the affected environment for each resource in Chapter 3 provide the basis for comparing the current and future state of the environment should the Proposed Action or any of its reasonable alternatives proceed.

BOEM's impact analysis acknowledges the potential net benefit renewable energy development actions could have on climate change. For example, as renewable energy expends, it has the potential to reduce and/or replace traditional electricity sources, such as coal-fired power plants, which emit greenhouse gases.

Climate change can increase the vulnerability of a resource, ecosystem, or human community, which could then be more susceptible to climate change effects and other effects, and result in a Proposed Action's effects being more environmentally damaging. BOEM considers these factors in the cumulative analysis. This is especially important for proposed actions that are long-term or located in areas that are considered vulnerable to specific effects of climate change, such as ecological change.

Climate change can also affect the operating environment in such ways as to change the requirements for the proposed activities. For example, one potential effect of climate change may be increased intensity of hurricanes along the Atlantic coast and proposed WTGs would need to be designed to withstand these greater wind strengths.

Climate change affects coastal habitats due to factors such as sea level rise, increases in the number of storms, and subsequent erosion and habitat loss. Climate change factors also accounted for the loss of approximately 3.4 million ac (13,682 km^2) of forested coastal wetlands across the north Atlantic coastal plain between 1996-2016 (White et al. 2022). A climate change assessment of Fire Island National Seashore (Ricci et al. 2020) predicted vulnerability of coastal habitats and fauna to climate change and found saltmarshes, maritime forests, freshwater ecosystems, and coastal herpetofauna to be the most vulnerable to loss, with little capacity to adapt to climate change. Coastal habitats are considered highly vulnerable to the impacts of climate change, including non-climate stressors such as coastal development (Farr et al. 2021).

Climate Change Impacts for Birds

Impacts associated with climate change, such as increased storm severity and frequency, ocean acidification, increased disease frequency, habitat conversion, increased erosion, and sediment deposition, and leaching of legacy contaminants (e.g., metals, persistent organic compounds, biocides) and emerging contaminants (e.g., pharmaceuticals, personal care products, transformation products and micro- and nanopolymers) could result in minor, long-term impacts to birds (Mitchell et al. 2020). These impacts could lead to changes in food webs, oceanic habitats, marine productivity, and prey abundance and distribution which could indirectly impact birds. Climate change impacts could also directly impact birds via changes in physiology, breeding failures, changes in nesting and foraging habitat abundance and distribution, and alterations to migration patterns and timing (Grémillet and Boulinier 2009; Sydeman et al. 2012; Mitchell et al. 2020; Orgeret et al. 2022). A climate change model of Fire Island National Seashore (Zeigler et al. 2022) predicted that even though piping plover habitat moderately declined with shoreline change, dynamic beach response, flatter topography, and increased likelihood of overwash suggest storms could support suitable conditions for nesting piping plovers. Coastal species that rely on early successional beach environments could flourish on Fire Island if natural overwash processes are allowed.

Climate Change Impacts for Bats

Global climate change is an ongoing risk to bats although the associated impact mechanisms are complex, not fully understood, and difficult to predict with certainty. Possible impacts to bats include increased storm severity and frequency; increased disease frequency; and altered habitat, ecology, and migration patterns (Sherwin et al. 2013). Over time, climate change and coastal development would alter existing habitats, rendering some areas unsuitable for certain species and more suitable for others.

Climate Change Impacts for Insects

Insects such as monarch butterflies are vulnerable to heightened temperatures or unseasonable shifts in temperature during their migration (USFWS 2020). Monarch butterflies face increased mortality or habitat loss from droughts, storms, or extreme temperatures (USFWS 2020). Additionally, shifts in availability or distribution of milkweed due to shifts in climate will affect the ability of monarch butterflies to breed within their historic range (USFWS 2020).

Climate Change Impacts for Plants

Rising sea levels associated with climate change and the subsequent landward migration of barrier islands and compression of coastal habitats between developed lands and rising sea will continue to alter the amount and types of coastal habitat available to plant species. Although a climate change assessment of Fire Island National Seashore (Ricci et al. 2020) predicted vulnerability of coastal habitats and fauna to climate change, a recent climate change model of Fire Island National Seashore (Zeigler et al. 2022) predicted that even though piping plover habitat moderately declined with shoreline change, dynamic beach response, flatter topography, and increased likelihood of overwash suggest storms could support suitable conditions for nesting piping plovers.

The seabeach amaranth is considered more vulnerable to non-climate stressors, such as coastal development and invasive species, rather than climate change (Ricci et al. 2020) due to its adaptations to erosion and habitat loss. Climate change factors such as sea level rise, increases in the number of storms, and subsequent erosion and habitat loss will affect the distribution of seabeach amaranth because of this species' habitat position close to the water's edge. Seabeach amaranth, as a pioneer species, can re-seed and become re-established relatively quickly in a location vacated by less-tolerant species. Because eroding beaches and other disturbed areas will persist as the climate changes, the seabeach amaranth is expected to be impacted much less than species intolerant of the high wave and wind energy environments. A study of four barrier island plants in North Carolina found seabeach amaranth likely to be most negatively affected by climate change factors to its habitat, which includes accreting ends of barrier island without hardened structures which are likely to become less common except in areas that are preserved or properly managed as dynamic landscapes (Hancock 2010). Sandplain gerardia occurs in dry, sandy, poor-nutrient soils in areas such as serpentine barrens, where few other species can become established. The ability to survive stressful environmental conditions suggests that, like seabeach amaranth, sandplain gerardia will continue to be more affected by loss of habitat due to continued development and fire suppression than it will be affected by climate change. Because the species has been re-classified as sandplain agalinis, its distribution has expanded to 12 states, including Tennessee and Kentucky, and it is even less likely to be impacted by many climate change-related factors.

Summary of Climate Change Risks for Endangered Species Act–Listed Species Considered in the Biological Assessment

The Proposed Project would not make these species any more vulnerable to climate change factors than they presently are.

4.0 EFFECTS OF ACTION ORGANIZED BY SPECIES

In this section, we examine the activities associated with the Proposed Action and determine what the consequences of the Proposed Action are to listed species or critical habitat. A consequence is caused by the Proposed Action if it would not occur but for the Proposed Action and it is reasonably certain to occur. In analyzing effects, we evaluate whether a source of impacts is "likely to adversely affect" listed species/critical habitat or "not likely to adversely affect" listed species/critical habitat. A "not likely to adversely affect" determination is appropriate when an effect is expected to be discountable, insignificant, or completely beneficial.

As discussed in the USFWS-NMFS Joint Section 7 Consultation Handbook (USFWS and NMFS 1998), "[b]eneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur. "Take" means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct" (ESA § 3[19]). "Take" is not anticipated if an effect is beneficial, discountable, or insignificant. Effects of the action are all consequences to listed species or critical habitat that are caused by the Proposed Action, including the consequences of other activities that are caused by the Proposed Action. A consequence is caused by the Proposed Action if it would not occur but for the Proposed Action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR § 402.02).

The effects of the issuance of federal permits/authorizations, such as the USACE and USEPA permits, are considered effects of the action as they are consequences of another activity that is caused by the Proposed Action (e.g., the proposed construction of the Sunrise Wind project causes the need for an Incidental Take Authorization); however, they are also federal actions that trigger consultation in their own right. This project will require permits from other federal agencies aside from BOEM, and we have analyzed the effects of those actions along with the effects of BOEM's Proposed Action.

4.1 DESCRIPTION OF IMPACT-PRODUCING FACTORS

Based on the analysis of the methods described in this section, potential direct and indirect effects from the proposed Project were determined, as defined below:

- Direct effects are effects on a listed species or its designated critical habitat that are caused by or would occur during construction and/or operation or decommissioning of the proposed Project
- Indirect effects are effects on a listed species or its designated critical habitat caused by or resulting from the proposed Project that would occur at a later time but are still reasonably certain to occur.

Based on an analysis of potential direct and indirect effects, a determination for each species and designated critical habitat is provided (**Tables 4** through 6). One of the following three determinations, as defined by the ESA, has been applied for listed species and critical habitat that have potential to be affected by the Project:

- *No effect* – the determination that the proposed Project would have no impacts, positive or negative, on species or designated critical habitat. Generally, this means that the species or critical habitat would not be exposed to the proposed Project and its environmental consequences.
- *May affect, not likely to adversely affect* – the determination that all the effects of the proposed Project would be discountable, insignificant, or completely beneficial to the species and/or its designated critical habitat. Discountable effects are those that are extremely unlikely to occur. Insignificant effects relate to the size of the impact and would not reach the scale where take of a listed species occurs. Beneficial effects are contemporaneous positive effects without any adverse effects on the species. Based on best judgment, a person would not (1) be able to meaningfully measure, detect, or evaluate insignificant effects, or (2) expect discountable effects to occur.

- *May affect, likely to adversely affect* – the determination that the proposed Project may result in any adverse effect on a species or its designated critical habitat. In the event that the proposed Project would have beneficial effects on listed species or critical habitat, but is also likely to cause some adverse effects, then the proposed Project may affect, and is likely to adversely affect, the listed species.

Table 4. Impact-producing factors, issues, indicators, and effects determinations for the Endangered Species Act listed bird species that may be affected by the Proposed Action.

Contributing IPFs[1]	Issue	Impact Indicator	Effect Determination[2]
• Land disturbance • Seafloor disturbance • Sediment suspension and deposition • Noise • Traffic • Lighting • WTG Collision Risk	Land-based, airborne construction noise duration and extent of exclusion from preferred habitats and normal behaviors	Qualitative analysis of displacement on foraging, roosting, and flying birds	All Species – NLAA
	Habitat loss/ displacement	Area of suitable natural nesting, foraging, and roosting habitat converted to developed land	All Species – NLAA
	Pile driving noise	Qualitative analysis of displacement/disturbance on migration and foraging	All Species – NLAA
	Displacement effects of sediment suspension and deposition from pile driving and export cable laying and maintenance	Qualitative analysis on relative impact on prey availability and alteration of habitat supporting prey resources for foraging birds	All Species – NLAA
	Potential toxicity to diving and foraging birds from discharges	Qualitative analysis of potential discharges (fuel, lubricants, chemicals, and cooling water)	All Species – NLAA
	Potential debris entanglement/ingestion	Qualitative analysis of potential effects of trash and debris	All Species – NLAA
	Lighting	Qualitative assessment of potentially increased risk of collision, alterations to prey availability	All Species – NLAA
	Potential collision risk by and/or displacement at/by structures	Qualitative analysis of potential collision risk mortality and displacement	All Species – NLAA

Notes: IPF = impact-producing factor;

[1] All listed IPFs may not necessarily contribute to each individual issue.

[2] NLAA = may affect, not likely to adversely affect

Table 5. Impact-producing factors, issues, indicators, and effects determinations for the Endangered Species Act listed bat species that may be affected by the Proposed Action.

Contributing IPFs[1]	Issue	Impact Indicator	Effect Determination[2]
• Land disturbance • Noise • Traffic • Lighting	Loss of habitat	Acreage loss compared to suitable acreage available in the region for bats	NLAA
	Noise duration and extent of exclusion from preferred habitats and normal behaviors	Qualitative estimate of displacement impact	NLAA
	Potential collision risk and displacement	Qualitative risk assessment of collision mortality risk for vessels and onshore traffic	NLAA
	Potential for concentration of insect prey base	Qualitative estimate of prey availability and analysis of collision mortality associated with lighted structures	NLAA

Notes: IPF = impact-producing factor;

[1] All listed IPFs may not necessarily contribute to each individual issue.

[2] NLAA = may affect, not likely to adversely affect

Table 6. Impact-producing factors, issues, indicators, and effects determinations for the Endangered Species Act listed plant species that may be affected by the Proposed Action.

Contributing IPFs[1]	Issue	Impact Indicator	Effect Determination[2]
• Cable emplacement/ maintenance • Land disturbance (trenching, HDD, construction) • Traffic (onshore and vessels) • Cable emplacement/ maintenance • Land disturbance • Traffic	Habitat loss, individual plant mortality/habitat modification	Acres of impacted or modified habitat and/or numbers of individual (plants) killed	Sandplain gerardia – NE Seabeach amaranth – NLAA
	Disturbance/ displacement of individuals and/or habitat, loss of seedbank	Estimated time to expected recovery/return to habitat; duration and/or extent of activity (accidental release, discharge, cable installation, light, noise) and/or volume (traffic).	Sandplain gerardia – NE Seabeach amaranth – NLAA
	Collision/injury (crushing, burial)	Qualitative estimate of collision risk	Sandplain gerardia – NE Seabeach amaranth – NLAA

Notes: IPF = impact-producing factor;

[1] All listed IPFs may not necessarily contribute to each individual issue.

[2] NE = no effect; NLAA = may affect, not likely to adversely affect

4.2 Roseate Tern, Piping Plover, Rufa Red Knot, Eastern Black Rail, and Saltmarsh Sparrow

4.2.1 Direct Effects

Direct effects include onshore construction, drilling and cable laying, pile driving and construction, lighting, collision with structures, decommissioning, and discharge of waste and accidental fuel leaks.

4.2.1.1 Substation Construction

The proposed Project's substation site is in a highly disturbed residential area and does not provide potentially suitable habitat for nesting or foraging roseate terns, piping plovers, rufa red knots, eastern black rails, or saltmarsh sparrows. The site is located on the eastern portion of a previously developed site within the Independence Park commercial/industrial area in the Town of Barnstable. Construction of the substation site would require the removal of approximately 6.1 ac (2.5 ha) of forested habitat. None of these birds use urban forests for nesting, foraging, or roosting. Therefore, substation construction is expected to have **no effect** on roseate terns, piping plovers, rufa red knots, eastern black rails, or saltmarsh sparrows.

4.2.1.2 Onshore Export Cable Installation

Roseate terns, piping plovers, and rufa red knots do not nest at the proposed landfall site and onshore export cable installation is unlikely to disturb coastal habitat due to the use of HDD methods to make the offshore to onshore transition. Coastal habitats associated with the Landfall/ICW Work Area on Fire Island include foreshore, backshore, dune, and interdunal areas (Stantec 2020). The Landfall Work Area occupies a portion of the parking lot at Smith Point County Park on Fire Island, an approximately 425-ac (172-ha) public beach and recreation area. The work spaces at the Landfall/ICW Work Area at Smith Point County Park and Smith Point Marina will be located within paved areas of the parking lots or open land used for recreational activities. The use of HDD for installation will minimize impacts to onshore habitats.

Vegetation clearing and grading required for the Landfall/ICW Work Area at Smith Point is not expected to alter beach habitat utilized by shorebirds and other species including terns, because most activity will occur within an existing parking lot or open land utilized by the park for recreational purposes. There will be no direct impacts to intertidal and beach areas during installation of the Landfall HDD and ICW HDD; however, this activity may include stringing the conduit out on the beach, which could temporarily alter/partially cover the existing habitat; HDD conduit stringing is anticipated to occur for two to three weeks per duct between October and March, outside of the nesting period for shorebirds. If work is anticipated to occur outside of these time-of-year restriction periods, Sunrise Wind will work with state and federal agencies to develop construction monitoring and impact minimization plans or mitigation plans, as appropriate.

Eastern black rails have a documented historical presence in the onshore portion of the Action Area; however, none have been observed in the region since 2009, with no breeding pairs recorded north of New Jersey since 2010 (Watts 2016). The Action Area contains potential habitat for the eastern black rail adjacent to the Landfall Work Area and the ICW Work Areas (see Figure 3 in Sunrise Wind 2022a). These work areas are already cleared and developed. During construction, BMPs will be used to ensure that disturbed sediments will be contained within the work area and will not be allowed to enter adjacent saltmarsh habitat. Because HDD will be used to traverse the areas where the saltmarsh habitat occurs and no work occurs in these areas, there will be no impacts to saltmarsh habitat that could potentially be suitable for eastern black rail. Because eastern black rails have not been seen in the region in which the project will occur for more than a decade and the project will not impact potential habitat for this species, the potential for effects to this species or their habitat is extremely unlikely to occur.

Saltmarsh sparrows have been observed in the landfall region at Smith Point County Park and the surrounding Eastern Fire Island Marshes (Atlantic Coast Joint Venture 2022) which are adjacent to the Landfall Work Area and the ICW Work Areas (see Figure 3 in Sunrise Wind 2022e). Saltmarsh sparrows breed only in tidal saltmarshes along the Atlantic coast. Tidal saltmarshes provide both terrestrial and marine habitats of two main categories: low marsh and high marsh. Low marsh is dominated by smooth cordgrass and is tolerant to daily tidal flooding and increased salinity. High marsh is flooded irregularly during the highest monthly moon tides or extreme weather events and vegetation types include salt hay, seashore saltgrass, black rush, and big-leaved marsh elder. Saltmarsh sparrows mainly nest in high marsh areas in which they build a nest cup interwoven into high marsh grasses, but they will occasionally nest in low marsh vegetation. The greatest threat to the species is loss of habitat from coastal development, severe storms, and sea level rise.

The Atlantic Coast Joint Venture (ACJV) identifies state-by-state population and habitat goals to preserve, restore, or enhance high-quality breeding habitat for the saltmarsh sparrow. These goals have been updated by ACJV for the state of New York as recent as April 14, 2022, in their document Saltmarsh Restoration Priorities for the Salt Marsh Sparrow – New York (Atlantic Coast Joint Venture 2022). Saltmarsh priority habitats were reviewed in relation to the Project footprint, and three priority habitats were identified in the vicinity of the Project, but no priority habitats occur within the Project footprint. These include Eastern Fire Island Marshes, Mastic Shirley Marshes which includes Smith Point, and Wertheim National Wildlife Refuge. The Project's Onshore Transmission Cable will largely be limited to existing paved road ROWs and/or cleared and maintained transportation and utility corridors. Where the Onshore Transmission Cable meets the Landfall Work Area at the Smith Point County Park parking lot, the Project is located greater than 3,000 ft from priority habitat identified by ACJV as the eastern Fire Island Marshes. At the ICW HDD Work Area at Smith Point Marina, priority habitat is located over 200 ft west and across the manmade channel. The Onshore Transmission Cable along William Floyd Parkway is approximately 2,500 ft east of mapped priority habitat associated with the Wertheim National Wildlife Refuge at its closest point. All Project components are sited such that they avoid potential saltmarsh habitat, including mapped priority habitat by ACJV, and therefore impacts to saltmarsh sparrow are unlikely.

Increased noise from construction activities at the ICW and Landfall Work Areas could disturb saltmarsh sparrows; however, the range of noise disturbance is not expected to extend into priority habitat areas. During construction, BMPs will be used to ensure that disturbed sediments will be contained within the work area and will not be allowed to enter adjacent saltmarsh habitat.

Any disturbances associated with construction will be for a short duration and limited to daytime hours. The Onshore Transmission Route/Interconnection Cable is generally located within the paved portion of existing roadway or utility-owned or controlled property and previously disturbed and developed areas to the extent practicable to minimize impacts to natural locations. The duct bank for the Onshore Transmission Cable will be installed via open trench excavation for the majority of the Cable. Terrestrial land cover types adjacent to the Onshore Transmission Cable mainly consists of developed residential or industrial land uses, with the exception of forested wetlands and waterways at the Carmans River crossing (Stantec 2020). The Project will utilize trenchless crossing installation to avoid sensitive environmental resources or other physical obstructions (i.e., railroads) at certain crossing locations. The use of trenchless crossings for installation of portions of the Onshore Transmission Cable/Interconnection Cable, such as in the vicinity of the Carmans River, will minimize impacts to terrestrial habitats. This will avoid impacts potentially suitable habitat for foraging roseate terns, piping plovers, and rufa red knots. Therefore, direct effects to roseate terns, piping plovers, or rufa red knots, if any, associated with the installation of the onshore export cable would be expected to be **insignificant** and **discountable** and **not likely to adversely affect** these species.

4.2.1.3 Offshore Export Cable Installation

Seafloor disturbance resulting from the installation of the offshore export cables would not affect piping plovers, rufa red knots, eastern black rails, or saltmarsh sparrows, as these species are strictly terrestrial or wetland foragers and do not use aquatic habitats for foraging. While disturbance to individual foraging roseate tern may occur as a result of offshore export cable installation in appropriate habitat, the disturbance is not expected to be different from typical construction equipment (barges and/or dredges) and cable installation will not be expected to adversely affect roseate terns (USFWS 2008b). Jet-plowing activities that occur from July to mid-September have the potential to result in short-term disturbance of individual staging roseate terns (USFWS 2008b) due to increased sedimentation; however, as described in the COP, Appendix H (Sunrise Wind 2022f), TSS concentrations are predicted to return to ambient levels (<10 mg/L) within 0.4 hours following installation Impacts on benthic habitats and increased turbidity during cable-laying activities have the potential to impact sand lance, an important prey resource for roseate terns (USFWS 2008b). Given the nature of the construction techniques (i.e., jet plow), adverse impacts such as increased turbidity will be short-term in duration and localized in nature and will not directly affect terns because the activity is underwater. Water quality effects and disturbance resulting from the installation and decommissioning of offshore export cables are not expected due to the short-term duration of disturbance and water column sedimentation from submarine cable construction activities (USFWS 2008b). It is estimated that water turbidity conditions will return to normal within a few hours of cable installation (USFWS 2008b). As such, adverse effects on roseate terns, if any, resulting from installation of the offshore export cables would be i**nsignificant** and **discountable** and **not likely to adversely affect** roseate tern, and would have **no effect** on piping plovers and rufa red knots.

4.2.1.4 Construction and Pile Driving

The construction of the Proposed Action would result in increased noise levels, primarily from pile-driving activities. The type and intensity of the sound and the distance it travels can vary greatly and are dependent on multiple factors, including but not limited to atmospheric conditions, the type and size of the pile, the type of substrate, the depth of the water, and the type and size of the impact hammer. If present in the area, migrating roseate terns, piping plovers, rufa red knots, eastern black rails, and saltmarsh sparrows may be exposed to increased noise levels due to construction activities. Species responses may range from escape behavior to mild annoyance (BOEM 2014; BOEM 2016); however, the potential noise impacts would be short-term, lasting only for the duration of the pile-driving activity (3 hours per pile). In addition, these species are highly mobile and would be able to avoid the construction area; the noise from pile driving is not anticipated to impact the migratory movements or behaviors of these species through the area. Therefore, pile-driving-related construction noise may affect these bird species, but the effect would be **insignificant** and **not likely to adversely affect** roseate tern, piping plover, or rufa red knot**.**

4.2.1.5 Lighting Effects

Under poor visibility conditions (fog and rain), some migrating birds may become disoriented and circle lighted communication towers instead of continuing on their migratory path, greatly increasing their risk of collision (Hüppop et al. 2006). Tower lighting would have the greatest impact on bird species during evening hours when nocturnal migration occurs; 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). The Proposed Action includes the use of red flashing aviation obstruction lights on WTGs and ESPs in accordance with FAA and BOEM requirements (Sunrise Wind 2022e). The lights would consist of two L-864 medium-intensity red lights mounted on the nacelle and up to three L-810 low-intensity red lights mounted on the midsection of the WTG tower, and all lights will have a synchronous flash rate of 30 flashes per minute (Sunrise Wind 2022e). ADLS may also be installed so that obstruction lights will only be activated when an aircraft are near the turbines. The use of ADLS will dramatically reduce the amount of time the obstruction lights are on. In the Sunrise Wind ADLS efficacy analysis (Appendix Y2 of the COP; Sunrise Wind 2022c), the total obstruction light system for historical air traffic data had an activated duration of 35 minutes and 14 seconds over a 1-year period for 636-ft WTGs. Total obstruction light system activated duration increases slightly to 1 hour 21 minutes and 29 seconds over a 1-year period for 968-ft WTGs. Since the Sunrise Wind WTGs would have a height of 787 ft above MSL, the activated duration of ADLS-controlled obstruction lights could fall around the middle of this range. Additionally, BOEM anticipates that any additional work lights on support vessels or Project structures will be hooded downward, directed when possible to reduce illumination of adjacent waters and upward illumination, and will be used only when required to complete a project task (Sunrise Wind 2022e). Therefore, the potential impacts from artificial lighting on structures and vessels during construction, O&M, and decommissioning of the Proposed Action on federally listed bird species would be expected to be **insignificant** and **discountable** and are **not likely to adversely affect** roseate tern, piping plover, or rufa red knot.

4.2.1.6 Collision Effects

This section discusses the potential for impacts on federally listed species resulting from collisions with WTGs, ESPs, and construction/maintenance vessels associated with the Proposed Action. These species are agile flyers and rarely collide with stationary structures such as bridges, communication towers, lighthouses, light poles, or moving vessels (e.g., boats). Birds will avoid colliding with fixed structures, such as WTG towers and ESPs, and vessels. As such, the likelihood of collisions with fixed structures or vessels associated with the Proposed Action to be **insignificant** and **discountable**. The potential for collision with operating WTGs is discussed for each included bird species below.

The primary hazard posed to federally listed birds from offshore wind energy development would be collision mortality (Everaert and Stienen 2007; Furness et al. 2013; Robinson Willmott et al. 2013). This section focuses on the collision risk from WTGs for the piping plover, rufa red knot, and roseate tern and uses the most relevant information about known occurrences and species' interactions with offshore wind developments on the Atlantic OCS. BOEM followed the parameterization of the Band Model (Band 2012) and Stochastic Collision Risk Assessment for Movement (SCRAM) (Gilbert et al. 2022) to evaluate the risk of bird collision with operating WTGs in offshore wind farms (**Appendix B**). These models factors bird size and flight behavior, number of individuals passing through the migratory corridor, migratory corridor and wind farm width, number of WTGs, RSZ area, percentage of individuals flying at altitudes within the RSZ, predicted operating time during the migration season by month, and a behavioral avoidance modifier to estimate collision risk.

Roseate Terns

The distance from shore to the offshore portions and the lack of suitable habitat of the Action Area precludes use by nesting and foraging roseate terns. Despite extensive regional surveys in the region and in the leased Action Area, there are no records of roseate terns in the area proposed for offshore wind turbines. In addition, statistical models using the survey data predict an absence of roseate terns in the area proposed for offshore wind turbines. Although it is possible for migrating roseate terns to pass through the lease area, a recent multiyear study did not track any migrating roseate terns through the area proposed for offshore wind turbines at or above the RSZ. Collison with WTGs is unlikely because terns are agile fliers and can easily avoid WTGs and fly well below the RSZ (40 to 240 m) of offshore turbines in the region; in addition, terns fly on the OCS usually during daylight hours and fair weather conditions when visibility is greater than 3 mi (5 km) and at 36 to 66 ft (11 to 20 m) above the water - below the RSZ (Loring et al. 2019).

Roseate tern exposure during SRWF operation is considered low, based on the Bay State Wind (2019) and MassCEC surveys (Veit et al. 2016), as well as BOEM and USFWS telemetry tracking data (Loring et al. 2019). Roseate terns may be vulnerable to displacement since terns have been demonstrated to avoid small (660 kW) operating WTGs (Vlietstra 2007). While some individual terns may be exposed to the SRWF, if displaced, they would be expected to be able to take advantage of other nearby more important foraging areas in the region, such as the Muskeget Channel between Martha's Vineyard and Nantucket Island (Veit et al. 2016); therefore, population-level impacts associated with displacement from the SRWF are unlikely.

Although "take" (a fatality due to colliding with a moving turbine blade) is unlikely due to reasons described above, a quantitative analysis was conducted. Typically, quantitative analyses are performed when "take" is expected and there is a need to estimate the amount of "take". Nevertheless, the quantitative analysis was conducted as an alternative approach to determine if there will be "take".

BOEM used the Band Model (Band 2012) to evaluate risk of injury or mortality to roseate tern from collision with turbines. Model input parameters and results are provided in **Appendix B**. The proportion of the population that flies through the wind development area during migration is not currently known. Therefore, it was assumed that the birds will spread themselves evenly along a 'migration front' spanning 83.9 mi (135 km) between Block Island and Monomoy and only birds passing through the approximately 23.6 mi (38 km) wide WDA would be exposed to the wind farm. For spring migration (April to May), the number of passages through the migration front was based on the number of United States and Canadian breeding adults in 2016. In June and July, the number of passages by second year birds migrating from South America was based on the number that fledged in 2015 in New York, Connecticut, and Massachusetts and survived to 2017. For fall migration, all United States and Canadian breeding adults (2017), fledglings (2017), and second-year birds (2015 birds that survived to 2017) passed through the front. A turbine avoidance rate of 95.01 percent was used for roseate tern (Cook 2021). The model used 94 operating 11-MW turbines. The monthly proportion of time the turbines were in operation is based on the proportion of the time the wind was above turbine cut-in speeds. The average revolutions per minute for a turbine operating at the site is not known, so the maximum revolution-per-minute speed was used. This is likely to be greater than the average and an increase in revolutions per minute will increase the estimated mortality. The flight height distribution was derived from the midpoints of 1,758 10-minute observations of 75 roseate terns flying nonstop over federal waters (Loring et al. 2018a). Given that the flight height distribution is known for this species, fatalities estimated are based on calculations from the extended model (Option 3).

Using these inputs and the operational parameters specified in **Appendix B**, no roseate terns would occur at rotor height or would fly through the RSZ in any given year, and thus, the number of fatalities due to collision is zero (**Appendix B**).

As described above for roseate tern, BOEM used the SCRAM model to further inform the ESA consultation and to estimate the likelihood of "take" or fatality due to collision with a rotating turbine blade – more specifically, to estimate the relative likelihood of the take of one individual in a year and during the 35-year operation period of the wind farm. SCRAM uses bird passage rates based on modeled flight paths of birds fitted with nanotag transmitters (Gilbert et al. 2022). The use of tracking data is representative of bird movements because the locations are recorded day and night for weeks and even months regardless of weather conditions. The wind farm and turbine operational inputs were similar to those used in the analysis using the Band model, and the developer provided estimates of monthly operational times, turbine down time, and average pitch. The annual average wind speed was obtained from the COP (p. 4-53), and the standard deviation was calculated from the range of average wind speeds. As recommended, the model was run for 1,000 iterations using Option 3 (Gilbert et al. 2022). The threshold number of collisions was set at one – this represents a take of one or more individuals.

As shown in **Appendix B**, the probability of at least one take from the SCRAM model was <0.001, thus a single collision during fall migration is extremely unlikely – in other words, a once in a thousand-year event. The probability of a collision event during the 35 -year operational period is also very small 0.034 (= $1-(1-0.001)^{35\text{ years}}$).

Based on the above information and the results from both the Band and SCRAM models, the chance of a fatality due to collision is extremely unlikely, and thus the estimated annual number of fatalities for migrating roseate tern is **zero**. Likewise, the estimated number of fatalities during the 35-year operations term is also **zero**. Therefore, based on the above findings, the likelihood of collision fatalities resulting from the Proposed Action would be too small to be measured or evaluated (**insignificant**) and unlikely to occur (**discountable**), and the proposed action is not likely to adversely affect to roseate tern.

Piping Plover

The distance from shore to the offshore portions of the Action Area precludes use by nesting and foraging piping plovers. As discussed previously, migration occurs mostly along the coast during favorable weather conditions. In addition, there is a chance that a small percentage plovers (7 percent from Massachusetts and northward) will fly over the operating turbines, and only 15 percent of the birds could be flying within the RSZ, while the remaining birds are expected to easily avoid turbines that are spaced 0.70 to 1 NM apart.

Telemetry data collected by BOEM and USFWS indicate that piping plover have the potential to cross the SRWF during migratory periods (Loring et al. 2018a; Loring et al. 2019), although migratory flights over offshore waters are infrequent (NYSERDA Burger et al. 2011; 2017). Available information suggests these species depart for migratory flights during fair conditions (Loring et al. 2018a; Loring et al. 2019) and are generally expected to occur over the region of the SRWF at great heights. Telemetry data indicated that offshore flights for piping plover were typically above the RSZ (greater than 820 ft [250 m]), and 21.3 percent of flights over federal waters were estimated to be within the RSZ (Loring et al. 2019); however, the authors cautioned that flight height estimates had large margins of error of 100 to 200 m (Loring et al. 2018a). USFWS indicated there is a large degree of uncertainty surrounding telemetry flight height data due to the estimation process and these data should be interpreted with caution.

Although "take" (a fatality due to colliding with a moving turbine blade) is unlikely due to reasons described above, a quantitative analysis was conducted. Typically, quantitative analyses are performed when "take" is expected and there is a need to estimate the amount of "take". Nevertheless, the quantitative analysis was conducted as an alternative approach to determine if there will be "take".

BOEM used the Band Model (Band 2012) to estimate the risk of bird collision with operating WTGs in offshore wind farms. The Band Model factors bird size and flight behavior, the number individuals passing through the migratory corridor (i.e., the WEA), migratory corridor and windfarm width, number of turbines, RSZ area, percentage of individuals flying at altitudes within the RSZ, predicted operating time during the migration season by month, and a behavioral avoidance modifier to estimate collision risk. The Band Model parameters used to estimate SRWF piping plover collision risk are presented in **Appendix B**. Most of the model inputs (e.g., migration passage, proportion flying in the RSZ, turbine specifications, and facility dimensions) were obtained or calculated from the COP and Loring et al. 2019 (see **Appendix B** for a snapshot of the model inputs). Radio telemetry studies of piping plover migratory behavior in the vicinity of the Action Area indicate that piping plovers are likely to fly through the Sunrise wind farm during the life of the project. Loring et al. (2019) found that 20 percent (8 out of 40) of tagged plovers leaving breeding areas in Massachusetts during fall migration flew through the RI/MA WEA. Extrapolating that percentage to recent population size[1], an estimated 1,369 piping plovers could have migrated through the WEA in 2021, 514 in spring and 855 in fall.

A turbine avoidance rate of 95.01 percent was used for piping plover (Cook 2021). The model used 94 operating 11-MW turbines. The monthly proportion of time the turbines were in operation is based on the proportion of the time the wind was above turbine cut-in speeds. The average revolutions per minute for a turbine operating at the site is not known, so the maximum revolution-per-minute speed was used. This is likely to be greater than the average and an increase in revolutions per minute will increase the estimated mortality. The flight height distribution was derived from the midpoints of 2,756 10-minute observations of 62 piping plovers flying nonstop over federal waters (Loring et al. 2018a). Given that the flight height distribution is known for this species, fatalities estimated are based on calculations from the extended model (Option 3).

As shown in **Appendix B**, the Band Model results indicate that approximately 159 plovers could have theoretically passed through the RSZ at the observed breeding abundance and productivity levels for New England and Canada breeding populations. Of those 159 passes, six could have resulted in a rotor collision assuming no avoidance (the equivalent of flying blind folded). Based on the collision risk model, the estimated annual mortality rate for migrating piping plovers was zero when avoidance was 95.01 percent.

As described above for piping plover, BOEM used the SCRAM model to further inform the ESA consultation and to estimate the likelihood of "take" or fatality due to collision with a rotating turbine blade – more specifically, to estimate the relative likelihood of the take of one individual in a year and during the 35-year operation period of the wind farm. SCRAM uses bird passage rates based on modeled flight paths of birds fitted with nanotag transmitters (Gilbert et al. 2022). The use of tracking data is representative of bird movements because the locations are recorded day and night for weeks and even months regardless of weather conditions. The wind farm and turbine operational inputs were similar to those used in the analysis using the Band model, and the developer provided estimates of monthly operational times, turbine down time, and average pitch. The annual average wind speed was obtained from the COP (p. 4-53), and the standard deviation was calculated from the range of average wind speeds. As recommended, the model was run for 1,000 iterations using Option 3 (Gilbert et al. 2022). The threshold number of collisions was set at one – this represents a take of one or more individuals.

As shown in Appendix B, the probability of at least one take from the SCRAM model was <0.001, thus a single collision during fall migration is extremely unlikely – in other words, a once in a thousand-year event. The probability of a collision event during the 35-year operational period is also very small 0.034 ($= 1-(1-0.001)^{35\ \text{years}}$).

Based on the above information and the results from both the Band and SCRAM models, the chance of a fatality due to collision is extremely unlikely, and thus the estimated annual number of fatalities for migrating

[1] Based on a breeding population abundance of 2,570 pairs in Massachusetts, New Hampshire, Maine, and eastern Canada, and an abundance-weighted mean productivity of 1.33 chicks fledged per pair USFWS (Fish and Wildlife Service). 2022a. Endangered and threatened wildlife and plants; Endangered species status for the northern long-eared bat. Final rule. Federal Register. 73488-73504 p. , equating to ,570 adults in spring and 4,276 adults and subadults in fall.

piping plover is **zero**. Likewise, the estimated number of fatalities during the 35-year operations term is also **zero**. Therefore, based on the above findings, the likelihood of collision fatalities resulting from the Proposed Action would be too small to be measured or evaluated (**insignificant**) and unlikely to occur (**discountable**), and the proposed action is not likely to adversely affect to piping plover.

Rufa Red Knot

Despite the presence of many onshore WTGs along the rufa red knot's overland migration route (Loring et al. 2018b), there are no records of rufa red knots colliding with WTGs (78 Federal Register 60024). The distance from shore to the offshore portions of the Action Area precludes use by foraging red knots. For this BA, the population of interest during the fall migration consists of the short-distance migrant subset of the rufa red knot population that stages at or near the Monomoy NWR; these birds fly in a westerly direction that may include the offshore portions of the Action Area. Based on a recent study, only 2 percent of these migrants would fly over the Sunrise Wind lease area (Loring et al. 2018a). In addition, most red knots migrate during visibility conditions of ~20 km with little or no precipitation; therefore, if some do fly lower within the RSZ, they would be able to see, maneuver, and avoid the widely spaced turbines.

Telemetry data collected by BOEM and USFWS indicate that red knot have the potential to cross the SRWF during migratory periods (Loring et al. 2018a; Loring et al. 2019), although migratory flights over offshore waters are infrequent (NYSERDA Burger et al. 2011; 2017). Available information suggests these species depart for migratory flights during fair conditions (Loring et al. 2018a; Loring et al. 2019) and are generally expected to occur over the region of the SRWF at great heights. Telemetry data indicated that offshore flights for red knot, the majority of documented flights (77 percent) that crossed WEAs in federal waters occurred at heights within 66 to 656 ft (20–200 m); however, the authors cautioned that flight height estimates had large margins of error of 100 to 200 m (Loring et al. 2018a). USFWS indicated there is a large degree of uncertainty surrounding telemetry flight height data due to the estimation process and these data should be interpreted with caution (P. Loring, USFWS pers. comm.). More recently, a study was conducted for Ocean Wind in tracking short-distance migrants in coastal New Jersey using global positioning system (GPS) telemetry. The team deployed 32 tags on red knots, and 17 tags provided location and altitudinal information. Overall, the majority of locations collected by satellite tags were associated with relatively low flight height estimates. A wind analysis indicated that the tagged red knots generally initiated migration with favorable tailwinds (BOEM 2022).

Although "take" (a fatality due to colliding with a moving turbine blade) is unlikely due to reasons described above, a quantitative analysis was conducted. Typically, quantitative analyses are performed when "take" is expected and there is a need to estimate the amount of "take". Nevertheless, the quantitative analysis was conducted as an alternative approach to determine if there will be "take".

The Band Model (Band 2012) input parameters and results for rufa red knot are presented in **Appendix B**. The flight height distribution was derived from the midpoints of 379 10-minute observations of 51 red knots flying nonstop over federal waters (Loring et al. 2018a). A turbine avoidance rate of 95.01 percent was used for red knot (Cook 2021). The model used 94 operating 11-MW turbines. The monthly proportion of time the turbines were in operation is based on the proportion of the time the wind was above turbine cut-in speeds. The model used flight distribution derived from Loring et al. (2018a); the more accurate flight height estimates from GPS data were not available. The average revolutions per minute for a turbine operating at the site is not known, so the maximum revolution-per-minute speed was used. This is likely to be greater than the average and an increase in revolutions per minute will increase the estimated mortality. Given that the flight height distribution is known for this species, fatalities estimated are based on calculations from the extended model (Option 3).

Applying a potential exposure of 83 adults with proportion at rotor height of 83 percent under the operating conditions shown, the Band Model estimates a total of nine potential bird transits through the RSZ with zero collisions under a no-avoidance assumption. Rufa red knots typically fly under high-visibility conditions (Loring et al. 2018a), indicating they would be able to detect and avoid the WTGs from distance without significantly altering their flight path. When avoidance is considered, the likelihood of injury or mortality from rotor collision is negligible.

As described above for red knot, BOEM used the SCRAM model to further inform the ESA consultation and to estimate the likelihood of “take” or fatality due to collision with a rotating turbine blade – more specifically, to estimate the relative likelihood of the take of one individual in a year and during the 35-year operation period of the wind farm. SCRAM uses bird passage rates based on modeled flight paths of birds fitted with nanotag transmitters (Gilbert et al. 2022). The use of tracking data is representative of bird movements because the locations are recorded day and night for weeks and even months regardless of weather conditions. The wind farm and turbine operational inputs were similar to those used in the analysis using the Band model, and the developer provided estimates of monthly operational times, turbine down time, and average pitch. The annual average wind speed was obtained from the COP (p. 4-53), and the standard deviation was calculated from the range of average wind speeds. As recommended, the model was run for 1,000 iterations using Option 3 (Gilbert et al. 2022). The threshold number of collisions was set at one – this represents a take of one or more individuals.

As shown in Appendix B, the probability of at least one take from the SCRAM model was 0.543, thus a single collision during fall migration is likely and could occur once every 1.8 years. Therefore, the estimated number of fatalities over the 35 -year operational period would be 19 (= 1.014 annual fatalities * 35 years / 1.8 years per fatality event).

The results between the Band and SCRAM models are in conflict. It is not clear why they do, but the reason may become clearer as estimates of red knots in region improve and our understanding of red knot movements also improve. Until then, there is currently a non-zero chance of fatalities due to collision with turbines during the project’s operational period. Therefore, based on the above findings, the Proposed Action proposed action is **likely to adversely affect** red knot.

Eastern Black Rail

Eastern black rails have a documented historical presence in the onshore portion of the Action Area; however, none have been observed in the region since 2009, with no breeding pairs recorded north of New Jersey since 2010 (Watts 2016). Because eastern black rails have not been seen in the region in which the project will occur for more than a decade, the likelihood of collisions with operating WTGs from the Proposed Action are extremely unlikely to occur and therefore **discountable**, and the Proposed Action is **not likely to adversely affect** the eastern black rail.

Saltmarsh Sparrow

Saltmarsh sparrows are generally believed to migrate along the coast, with overland transits rather than shoreline migration across the Cape Cod region and the Florida peninsula (Greenlaw 2020). Because their pattern of migrating along shorelines or across upland habitat rather than over coastal waters, and in particular their use over overland migration in the Cape Cod region, the likelihood of collisions with operating WTGs from the Proposed Action are extremely unlikely to occur and therefore **discountable**, and the Proposed Action is **not likely to adversely affect** the saltmarsh sparrow.

4.2.1.7 Decommissioning

It is expected that noise levels associated with WTG and ESP decommissioning activities would be similar in scope, nature, and intensity to noise impacts associated with pile driving and construction as described above. Similarly, noise impacts resulting from decommissioning would be localized and of short duration, lasting only for the duration of structure removal. If these activities were to occur during migration period, most red knots and piping plovers in the area will be flying well above the project area during removal while others including roseate terns are not expected to be in the area; however, should roseate terns or others be in the area, they would simply fly around the noise source; therefore, the noise generated is not anticipated to impact the migratory movement or migratory behavior through the area. Therefore, the Proposed Action may affect migrating roseate terns, piping plovers, rufa red knots, eastern black rails, and saltmarsh sparrows, but the effects, if any, would be **insignificant** and **discountable** and therefore **not likely to adversely affect** these species.

4.2.2 Indirect Effects

Indirect effects include effects such as displacement from habitat and barrier to migration that could occur as a result of the Proposed Action but at a later time. Displacement from suitable habitat is unlikely because the WTGs associated with the Proposed Action are located far from potentially suitable nesting and foraging habitat for roseate terns, piping plovers, red knots, eastern black rails, and saltmarsh sparrows. Given the lack of suitable habitat for these species and the highly disturbed nature of the onshore portions of the Action Area, no indirect effects in the form of displacement are expected to occur as a result of construction, O&M, and eventual decommissioning of the onshore portions of the proposed Action.

Some migrating birds may encounter the offshore portion of Action Area and perhaps barrier effects posed by the Proposed Action could result in longer migration flights for birds avoiding the offshore portions of the Action Area during migration. Eastern black rails are not expected to migrate through the offshore Action Area because of their lack of presence north of New Jersey. Saltmarsh sparrows are not expected to migrate through the SRWF due to their coastal and overland migration patterns. The roseate tern, piping plover, and rufa red knot are long distance migrants capable of long sustained over-water migration. It is reasonable to assume that any extra energy expenditure, if any, resulting from making a relatively minor course correction to avoid of the offshore portions of the Action Area would be inconsequential and would not result in a measurable negative affect. Based on the information above, indirect impacts due to barrier effects on migrating piping plovers, roseate terns, or red knots in from increased energy expenditure due would be **insignificant** and **discountable** and are **not likely to adversely affect** roseate tern, piping plover, or rufa red knot. Indirect impacts are expected to have **no effect** for eastern black rails and saltmarsh sparrows.

4.3 NORTHERN LONG-EARED BAT, LITTLE BROWN BAT, AND TRICOLORED BAT

An acoustic bat survey was conducted at the project in August 2022 following the USFWS 2022 Range Wide Indiana Bat Guidance, which is also used to determine the presence of northern long-eared and other rare bats. The acoustic survey did not document presence of northern long-eared bats or little brown bats. Tri-colored bats occurred at two acoustic detector locations (the Holbrook Substation detector and the Southaven County Park detector, located along the Onshore Transmission Cable Route). A report summarizing methods and results of this survey will be provided to the USFWS before December 31, 2022. Although northern long-eared bats were not detected during summer 2022 field surveys, a Northern Long-eared Bat Avoidance Plan is being prepared as part of the Project’s EM&CP to be submitted to NYS Public Service Commission in November 2022. This Plan describes practices to avoid impacts to northern long-eared bat but will also benefit other species including the tri-colored bat. In addition, the Vegetation Management and Restoration Plan states that Sunrise Wind will replace removed trees or shrubs with equivalent type trees or shrubs, subject to the provisions of 6 NYCRR Part 575; allow temporary construction areas to naturally revegetate or return to its original land use; and replant or reseed any existing vegetated areas of parkland that are disturbed during construction.

Although roosting habitat is not considered a limiting resource for bat species in the vicinity of the Project, these practices will minimize loss of potential roosting habitat for these and other bat species. Construction of Construction of the Project’s Onshore Facilities will largely be limited to work within existing paved road ROWs and/or cleared and maintained transportation and utility corridors. Limited tree clearing will be required where avoidance of natural areas is not feasible. Currently, selective tree clearing is anticipated to be restricted to the NYSDEC’s approved tree-clearing window from December 1 to February 28; however, depending on when permits are received, some tree clearing will likely need to occur outside of this window. The proposed tree-clearing work will be initiated upon issuance of necessary permits and prior to a decision on the proposed listing by the USFWS for tri-colored bats. Potential impacts to little brown bats and northern long-eared bats are expected to be extremely unlikely to occur as these species were not detected during summer 2022 field surveys.

4.3.1 Direct Effects

Direct effects include onshore construction, drilling and cable laying, pile driving and construction, lighting, collision with structures, decommissioning, and discharge of waste and accidental fuel leaks.

4.3.1.1 Substation Construction

The OnCS–DC construction in the Town of Brookhaven will require tree and vegetation clearing, potentially including suitable summer roosting habitat. The Union Avenue Site is primarily a developed industrial/commercial site with small narrow forested areas along parcel boundaries. As a result, very limited vegetation clearing would be required at this location (Sunrise Wind 2020). Construction of the OnCS–DC will impact up to 7 ac (2.8 ha) of land currently utilized for industrial/commercial activities; however, the operational footprint will be no more than 6 ac (2.4 ha). The general area in the vicinity of OnCS–DC is largely developed, and limited existing suitable summer bat habitat is expected in these areas. If tree clearing is required in areas with trees suitable for bat roosting during the period when bats may be present, avoidance and minimization measures should be developed in coordination with USFWS and NYDEC and pre-construction habitat surveys should be conducted to minimize potential impacts. This change in the visible landscape presents a minimal change to available habitats in the broader region.

To the extent feasible, tree removal for the Onshore Facilities will occur between December 1 and February 28, as identified by the NYSDEC specifically for the Project to avoid the northern long-eared bat active periods (COP, Appendix P; Sunrise Wind 2022d), but which will also avoid periods when other bats species are likely to be present. If work is anticipated to occur outside of these time-of-year restriction periods, Sunrise Wind will work with state and federal agencies to develop construction monitoring and impact minimization plans or mitigation plans, as appropriate. As such, direct mortality or injury impacts to bat species as a result of clearing activities and land disturbances during construction are not expected.

Active construction will be completed primarily during daylight hours, when bats are inactive (Speakman and Thomas 2003; Geiser 2004), making strikes from vehicle traffic extremely unlikely to occur. Bats also acclimate quickly to construction noise and exhibit limited reactions to traffic noise. Construction noise may temporarily displace roosting or foraging bats, but these effects will be temporary and localized. Because no active roosts or habitat will be disturbed by the Proposed Action, and any effects from construction noise will be temporary and localized, the onshore portions of the Proposed Action are **not likely to adversely affect** northern long-eared bats, little brown bats, or tricolored bats.

4.3.1.2 Onshore Export Cable Installation

There is no suitable roosting habitat for bats at the Landfall/ICE Work areas or the coastal habitats associated with the Landfall/ICW. The workspaces at the Landfall/ICW Work Area at Smith Point County Park and Smith Point Marina will be located within paved areas of the parking lots or open land used for recreational activities.

Construction of the OnCS–DC, Onshore Transmission Cable, and Onshore Interconnection Cable is expected to result in approximately 2.3 ac (0.9 ha) of permanent tree clearing. Sunrise Wind will use mechanical clearing methods for the construction of the Project and does not intend to use any herbicides/pesticides during the construction phase and thus direct (potential exposure to toxins) and indirect (potential impacts to habitat) impacts to bats related to herbicides/pesticides will be avoided during construction.

Any disturbances associated with the installation of the Onshore Transmission Cable will be for a short duration and limited to daytime hours. The Onshore Transmission Route/Interconnection Cable is generally located within the paved portion of existing roadway or utility-owned or controlled property and previously disturbed and developed areas to the extent practicable to minimize impacts to natural locations. The duct bank for the Onshore Transmission Cable will be installed via open trench excavation for the majority of the Cable. Terrestrial land cover types adjacent to the Onshore Transmission Cable mainly consists of developed residential or industrial land uses, with the exception of forested wetlands and waterways at the Carmans River crossing (Stantec 2020). The Project will utilize trenchless crossing installation to avoid sensitive environmental resources or other physical obstructions (i.e., railroads) at certain crossing locations. The use of trenchless crossings for installation of portions of the Onshore Transmission Cable/Interconnection Cable, such as in the vicinity of the Carmans River, will minimize impacts to terrestrial habitats. This will avoid impacts potentially suitable roosting habitat for bats.

To the extent feasible, tree removal for the Onshore Facilities will occur between December 1 and February 28, as identified by the NYSDEC specifically for the Project to avoid the northern long-eared bat active periods (COP, Appendix P; Sunrise Wind 2022d), but which will also avoid periods when other bats species are likely to be present. If work is anticipated to occur outside of these time-of-year restriction periods, Sunrise Wind will work with state and federal agencies to develop construction monitoring and impact minimization plans or mitigation plans, as appropriate. As such, direct mortality or injury impacts to bat species as a result of clearing activities and land disturbances during construction are not expected.

Active construction will be completed primarily during daylight hours, when bats are inactive (Speakman and Thomas 2003; Geiser 2004), making strikes from vehicle traffic extremely unlikely to occur. Bats also acclimate quickly to construction noise and exhibit limited reactions to traffic noise. Construction noise may temporarily displace roosting or foraging bats, but these effects will be temporary and localized.

Because no removal of active roosting habitat is anticipated, work will be completed during daylight hours, and the vast majority of onshore construction will occur within existing ROW or otherwise developed areas installation of the Onshore Transmission Cable/Interconnection cable would be expected to have an **insignificant** and **discountable** potential for effects and **not likely to adversely affect** northern long-eared bats, little brown bats, and tricolored bats.

4.3.1.3 Construction and Pile Driving

The construction of the Proposed Action would result in increased noise levels, primarily from pile-driving activities. The type and intensity of the sound and the distance it travels can vary greatly and are dependent on multiple factors, including but not limited to atmospheric conditions, the type and size of the pile, the type of substrate, the depth of the water, and the type and size of the impact hammer. If present in the area, bats may be exposed to increased noise levels due to construction activities. Species responses may range from escape behavior to mild annoyance (BOEM 2014; BOEM 2016); however, the potential noise impacts would be short-term, lasting only for the duration of the pile-driving activity. In addition, these species are highly mobile and would be able to avoid the construction area; the noise from pile driving is not anticipated to impact the migratory movements or behaviors of these species through the area. Therefore, pile-driving-related construction noise may affect northern long-eared bats, little brown bats, and tricolored bats, but the effect would be **insignificant** and **not likely to adversely affect** these species**.**

4.3.1.4 Collision Effects

This section discusses the potential for impacts on federally listed bat species resulting from collisions with WTGs, ESPs, and construction/maintenance vessels associated with the Proposed Action. Bats are agile flyers and rarely collide with stationary structures such as buildings bridges, communication towers, lighthouses, light poles, or moving vessels (e.g., boats). Bats will avoid colliding with fixed structures, such as non-operating WTG towers and ESPs, and vessels. As such, the likelihood of collisions with fixed structures or vessels associated with the Proposed Action to be **insignificant** and **discountable**. The potential for collisions with operating WTGs is discussed below for each species of bat.

Northern Long-eared Bat

There are no records of northern long-eared bats over the OCS (Pelletier et al. 2013; ESS Group Inc. 2014; Peterson and Pelletier 2016). A recent study of bat movement on Martha's Vineyard did not find evidence of offshore movement by northern long-eared bats and presented evidence of northern long-eared bats hibernating on Martha's Vineyard and Nantucket islands (Dowling et al. 2017). Similarly, WTG acoustic detectors in the Dominion Energy Coastal Virginia Offshore Wind pilot project off Virginia did not detect northern long-eared bat (Dominion 2022). During offshore construction of the Block Island Wind Farm, bats were monitored with acoustic detectors on boats; among the 1,546 passes of bats, no northern long-eared bats were detected (Stantec 2018a). During post-construction monitoring of Block Island Wind Farm (August 2017 to January 2018), no northern long-eared bats were detected out of the 1,086 passes recorded by bat acoustic detectors mounted on two turbines 3 mi (5 km) from shore, and 99 percent of bat passes occurred when wind speeds were less 6.4 ft per second (5 meters per second) (33 percent when there was no wind) (Stantec 2018a). Therefore, given the rarity of the bat in the region, its ecology, and habitat requirements, it is extremely unlikely northern long-eared bats would traverse the offshore portions of the Action Area or experience any affects from offshore activities. Therefore, the offshore portions of the Proposed Action will have **no effect** on northern long-eared bats.

Little Brown Bat

Little brown bats have been recorded in the onshore portions of the Action Area and have the potential to occur in the offshore portions of the Project Area. In addition to historical observations of offshore flights, little brown bats tagged on Martha's Vineyard were detected offshore (Dowling et al. 2017; NYSERDA 2017a). They are capable of extended flights, making seasonal migrations between 32 and 344 mi (51 and 554 km) between their spring roosts and hibernacula (Dowling et al. 2017). Because there is documented presence of little brown bats at many of the islands in the Cape Cod region, BOEM anticipates that it is possible that they may migrate through the offshore project area where WTGs will operate.

Information regarding little brown bats migration patterns and flight elevations is very limited. A European study on collision risk for bats at wind farms found significant correlation between flight height and collision risk (Roemer et al. 2017). Small species of the genus *Myotis* were found to fly at the lowest heights, with very little activity at a height of 98 ft (30 m), and also had the lowest susceptibility to collision with wind turbines despite having the second highest activity levels. Lacking direct data for little brown bats, we anticipate similar collision risk for little brown backs because they are a small species of the genus *Myotis* and anticipate a very low risk of collision due to the SRWF turbine blades operating above 131 ft (40 m).

Standard environmental operating conditions for the proposed WTGs include cut-in wind speeds of 7 to 11 miles per hour (3 to 5 meters per second). The WTGs will automatically shut down outside of the operational criteria for the WTG design. In general, bat activity declines as wind speed increases, which narrows the band of wind speeds where bats are active and WTGs are operating.

Tricolored Bat

There is evidence of a limited presence of tricolored bats in the onshore portions of the Action Area which includes suitable habitat for their spring and summer roosting (Jackson and Schwager 2012). Prior to the appearance of WNS, tricolored bats were still considered rare in NYS, and their numbers have steadily declined (NYSDEC 2017b). They have previously been detected in offshore environments; however, there is little data on their offshore presence compared to other species (Peterson and Pelletier 2016). Tricolored bats are short-distance migrants, generally migrating less than 31 mi (50 km) between their hibernacula and summer habitats (Griffin 1940). This short range of migration would preclude their migration through the Project Area where WTGs will be located. When foraging they typically travel as far as 3 to 4 mi (5 to 6 km) from their roosting areas (Poissant 2009), while the nearest WTG is approximately 15 mi (24 km) offshore.

Because WTGs are located in areas where tricolored bats are not expected to be able to reach, either during migration or foraging, the likelihood of collision with operating WTGs is extremely unlikely to occur and therefore **discountable**. Collision risk to tricolored bats from operating WTGs **may affect but is not likely to adversely affect** this species.

4.3.1.5 Decommissioning

It is expected that noise levels associated with WTG and ESP decommissioning activities would be similar in scope, nature, and intensity to noise impacts associated with pile driving and construction as described above. Similarly, noise impacts resulting from decommissioning would be localized and of short duration, lasting only for the duration of structure removal. If these activities were to occur during bats' active season, they would simply fly around the noise source; therefore, the noise generated is not anticipated to impact the migratory movement or migratory behavior through the area. Therefore, the Proposed Action could potentially affect northern long-eared bats, little brown bats, and tricolored bats, but the effects, if any, would be **insignificant** and **discountable** and therefore **not likely to adversely affect** these species.

4.3.2 Indirect Effects

Indirect effects include effects such as displacement from habitat and barrier to migration that could occur as a result of the Proposed Action but at a later time. Displacement from suitable habitat is unlikely because the WTGs associated with the Proposed Action are located far from potentially suitable nesting and foraging habitat for bats. Given the lack of suitable habitat for these species and the highly disturbed nature of the onshore portions of the Action Area, no indirect effects in the form of displacement are expected to occur as a result of construction, O&M, and eventual decommissioning of the onshore portions of the proposed Action.

Some bats may encounter the offshore portion of Action Area, and perhaps barrier effects posed by the Proposed Action could result in longer migration flights for bats avoiding the offshore portions of the Action Area during migration. It is reasonable to assume that any extra energy expenditure, if any, resulting from making a relatively minor course correction to avoid of the offshore portions of the Action Area would be inconsequential and would not result in a measurable negative affect. Based on the information above, indirect impacts due to barrier effects on migrating northern long-eared bats, little brown bats, or tricolored bats from increased energy expenditure due would be **insignificant** and **discountable** and are **not likely to adversely affect** these species.

4.4 MONARCH BUTTERFLY

Monarch butterflies may be subject to impacts from the Proposed Action from increased vehicle traffic, equipment operation, and disturbance of habitat. Land disturbance is expected to account for the greatest amount of impact to monarchs and their habitats when compared to other IPFs. Monarch butterflies utilize milkweed (*Asclepias* spp.) as their larval host plants, and without it, monarch larvae would not be able to develop into adult butterflies. Adult butterfly forage for nectar on numerous common native and introduced flowering plants that are found in variety of open upland and wetland habitats including fields, meadows, woodlands, emergent wetlands, roadsides, and horticultural gardens. Milkweed was not recorded as a dominant or characteristic species within the habitats observed during ecological surveys (including wetland delineations, rare plant and invasive species surveys, or tree inventories), although a limited number of milkweed plants were incidentally observed in scattered vegetated roadside areas. Flowering plants providing potential nectar sources for monarch butterflies occur within the vegetated habitats associated with the Onshore Transmission Cable Corridor. Habitats along the Onshore Transmission Cable corridor were further reviewed for suitability for milkweed based on information collected during those field visits.

Onshore activities expected to result in habitat disturbance/modifications with respect to plant species important to monarchs include land disturbance due to cable placement, the OnCS-DC construction, and off-road vehicle traffic. The total footprint of onshore facilities is an estimated 102.7 ac (41.6 ha). The OnCS-DC location will be converted to structures and either paved/gravel surfaces that no longer provide potential habitat for nectar forage and larval host plants or to early successional grass/forb habitat that increases the potential habitat for nectar forage and larval host plants.

The majority of the Onshore Transmission Cable will be installed within existing paved parking lots, paved roadway ROWs and their associated maintained vegetated road shoulders, and/or cleared and maintained transportation corridors, thereby minimizing potential permanent impacts to monarch butterfly breeding and foraging habitat. Construction of the OnCS–DC and Interconnection Cable and limited portions of the Onshore Transmission Cable will result in clearing of vegetated areas. These forested locations support potential adult monarch butterfly nectar forage plants and may support small populations of milkweed. Construction of the Onshore Transmission Cable and Onshore Interconnection Cable will involve site preparation, trench excavation, duct bank and vault installation, cable installation, cable jointing, and final testing, and restoration with additional steps associated with HDD and other trenchless crossing methods. Temporary laydown yards will be required to support the staging of necessary equipment and materials for the installation of the Onshore Transmission Cable and Onshore Interconnection Cable. These areas will be generally confined to locations containing open land or previously disturbed commercial/industrial sites with existing roadway access, such that no or minimal site improvements are required.

A Vegetation Management and Restoration Plan is required by Article VII of the Public Service Law in NYS and by the Certificate Conditions proposed as part of the Joint Proposal recently filed with the Public Service Commission (Case 20-T-0617) for the Project. As part of that plan, Sunrise Wind commits to reseed wetland adjacent areas with a seed mix of native plants specified in the approved EM&CP; replace removed trees or shrubs with equivalent type trees or shrubs, subject to the provisions of 6 NYCRR Part 575; allow temporary construction areas to naturally revegetate or return to its original land use; and replant or reseed any existing vegetated areas of parkland and beach/dunes that are disturbed during construction with an appropriate restoration seed mix. These practices will continue to provide suitable open and early successional habitat that contains potential opportunities for nectar foraging for adult monarch butterflies and recruitment of milkweed for potential larval development.

Operation of construction equipment could pose a risk of injury or mortality to monarchs; however, in general, the heavy equipment used for construction is slow moving, and monarch butterflies would be expected to avoid moving construction equipment. Vehicle traffic poses another potential risk to monarchs; however, the project is anticipated to result in a negligible increase in overall traffic levels in the onshore project area and will not create a measurable increase in risk to this species and, therefore, would be **discountable**.

Other than the OnCS-DC location, disturbance of specific sites is expected to be of short duration, after which they will be returned to preconstruction conditions. The butterfly life stage can feed on a large assortment of flowers, many of which are pioneer species and are expected to rapidly recolonize disturbed areas; however, monarchs are obligate users of milkweed for feeding and reproduction (USFWS 2020). Because ROWs where the majority of cable installation will occur are maintained with regular vegetation clearing, it is not anticipated that these areas would have significant numbers of milkweed plants due to this regular disturbance. Wetland impacts, where swamp milkweed occurs, are expected to be minimized through HDD and trenchless installation methods and are unlikely to reduce swamp milkweed abundance. Overall, the project is anticipated to have short-term impacts on food resources for the butterfly life stage at disturbed sites, which are expected to rapidly recover with pioneer flower species. Areas where milkweed species are expected to be more abundant, such as wetlands and relatively undisturbed grasslands, are expected to experience only limited impacts from the Proposed Action. The Proposed Action will have an **insignificant** impact on monarchs from effects to habitat and food resources. Because the effects from vehicle traffic and the operation of construction equipment are expected to be extremely unlikely to occur and, therefore, **discountable** and impacts to habitat and food resource availability are expected to be **insignificant**, the Proposed Action **may affect but is not likely to adversely affect** monarch butterflies.

4.5 SANDPLAIN GERARDIA AND SEABEACH AMARANTH

Onshore activities expected to result in habitat disturbance/modifications with respect to listed plant species include land disturbance due to cable placement and pedestrian and off-road vehicle traffic.

The total footprint of onshore facilities is an estimated 102.7 ac (41.6 ha) for the construction footprint associated with the 30-ft disturbance area, inclusive of the 30-ft disturbance corridor, landfall/ICW work areas, HDD stringing area, and splicing vaults. Landfall activities would include HDD stringing on the beach and the use of a drill rig and sheet piles in the landfall work areas to anchor the onshore drill rig drilling activities. Where the offshore transmission cable makes landfall onshore (i.e., above the mean high-water line) and is joined with the onshore transmission cable at the transition joint bays, all proposed cable routes intercept maritime beach, a rare and significant coastal community (see **Figure 2**). Impacts to habitats proximate to the landfall/ICW work areas would be avoided by using HDD technology to bury the cable beneath the beach and dune habitats and to take the transmission cable across the ICW in Great South Bay at Smith Point. Landfall activities would also include HDD stringing on the beach and the use of a drill rig and sheet-piles in the landfall work areas to anchor the onshore drill rig drilling activities. HDD conduit stringing and associated pedestrian and vehicle traffic and the use of equipment on the beach would result in the loss of any vegetation it intercepts. Post construction, all work areas would be graded and/or backfilled and returned to pre-construction conditions.

Land disturbance is expected to account for the greatest amount of impact to listed plant species and their habitats when compared to other IPFs. Impacts to listed plant species would occur due to cable placement, specifically cable stringing on or near the maritime beach at Smith Point County Park. HDD will eliminate most of the disturbance on the beach, but cable stringing activities will result in temporary disturbance of maritime beach habitat and mortality of individual plants if present. No impacts of maintenance activities are anticipated.

Time-of-year restrictions for certain work activities (e.g., HDD conduit stringing) will be applied to the extent practicable to avoid or minimize direct impacts to sandplain gerardia, seabeach amaranth, and their habitat during construction of the landfall and onshore facilities. If work is anticipated to occur outside of these time-of-year restriction periods, coordination with state and federal agencies will be accomplished to develop construction monitoring and impact minimization plans or mitigation plans, as appropriate.

Construction activities may contribute to erosion and sedimentation of maritime beach habitat. Where appropriate, temporary erosion controls will be installed and maintained until the work areas are restored and stabilized. An ERP/OSRP, SWPPP, and SPCC Plan will be implemented to avoid and minimize impacts to sensitive environmental resources. Disturbed habitats are expected to return to their previous condition following construction completion without further restoration.

Both pedestrian and vehicle traffic are heavy in Smith Point County Park (USFWS 2014a). Construction activities would preclude recreational use of the area by the public, but construction activities are likely to create additional adverse conditions due to the duration, frequency, and intensity of ongoing activities during construction.

5.0 DETERMINATION OF EFFECTS

Given the Action Area is outside of the known distribution of the Black-Capped Petrel, there would be no effect to Black-Capped Petrel.

Based on the analysis in **Section 4**, adverse effects, if any, on listed bird species resulting from the construction, O&M, and eventual decommissioning of the proposed onshore facilities are not likely to adversely affect listed bird species. This finding is due to (1) the lack of suitable nesting and/or foraging habitat (2), the limited amount of required habitat conversion, and (3) the localized and short-tern nature of the potential impacts.

Given the geographic scope of the Proposed Action, federally listed birds could occur within the offshore portions of the Action Area. Based on prior analyses in **Section 4**, the Proposed Action **may affect** migrating roseate terns, piping plovers, red knots, eastern black rails, and saltmarsh sparrows due to pile driving noise, onshore drilling and cable laying, tower lighting, turbine operation, and tower decommissioning. Impacts could include escape responses and alteration of migration paths. Due to the anticipated use of flashing red tower lights, small number of migrants that could occur in the Action Area, the restricted time period of exposure during migration; BOEM concludes that the effects of the Proposed Action are **insignificant** and/or **discountable**. Therefore, the Proposed Action would **not likely adversely affect** roseate terns and piping plovers, but is **likely adversely affect** red knots (**Table 7**).

Northern long-eared bats, little brown bats, and tricolored bats are known to occur within the Action Area for onshore components for the Proposed Action. Based on the analysis in Section 4, the Proposed Action **may affect** these species due to traffic, construction noise, and habitat disturbance. These effects could include behavioral disturbance, disruption of migration patterns. Because these effects are expected to be temporary and localized, construction traffic will be primarily limited to daylight hours, and no roosts will be disturbed, BOEM concludes that the potential for effects from the Proposed Action are **insignificant** and/or **discountable**. Therefore, the Proposed Action would **not likely adversely affect** northern long-eared bats, little brown bats, and tricolored bats.

The onshore portions of the Action Area are within the summer range of monarch butterflies and contain suitable habitat for their feeding and reproduction. Based on prior analysis in Chapter 4, the Proposed Action may affect monarch butterflies due to the operation of construction equipment, vehicle traffic, and habitat disturbance. Monarchs are expected to avoid operating construction equipment, and the Proposed Action will result in a negligible increase in vehicle traffic. Disturbance to food resources and habitat will be short-term and anticipated to have an insignificant impact on the availability of food resources for the butterfly life stage and the obligate milkweed plants for reproduction. Therefore, BOEM concludes that the effects of the Proposed Action are **insignificant** and/or **discountable** and **may affect but is not likely to adversely affect** monarch butterflies.

The landfall/ICW work areas at Smith Point County Park includes paved parking lot and open land used for recreational activities. The use of HDD for installation will minimize impacts to habitats and vegetation, including listed plant species. However, HDD stringing activities on the maritime would potentially result in mortality to any other vegetation present and disturbance to maritime beaches.

The landfall/ICW work area on Fire Island and the mainland includes habitat for sandplain gerardia and seabeach amaranth. Sandplain gerardia was not observed in the Action Area and it is not recorded as occurring within the Action Area. Seabeach amaranth was not observed during habitat surveys of the Action Area but has been observed at Smith Point County Park. Therefore, surveys will be undertaken to determine the presence or absence of seabeach amaranth prior to construction activities and, if it is present, actions to avoid and minimize impacts, described earlier, will be implemented. Consequently, the Proposed Action would have **no effect** on the sandplain gerardia and **may affect but is not likely to adversely affect** seabeach amaranth.

Table 7. Bureau of Ocean Energy Management conclusions by species.

Species	ESA Listing Status	Effect Determination
Birds		
Roseate tern	E	NLAA
Piping plover	T	NLAA
Rufa red knot	T	LAA
Eastern black rail	T	NLAA
Saltmarsh sparrow	SSA	NLAA
Bats		
Northern long-eared bat	E	NLAA
Little brown bat	SSA	NLAA
Tricolored Bat	Proposed	NLAA
Insects		
Monarch butterfly	Candidate	NLAA
Plants		
Sandplain gerardia	E	NE
Seabeach amaranth	T	NLAA

Notes:

Candidate = enough information has been collected to determine the need for listing but has not been proposed due to workload; E = endangered; ESA = Endangered Species Act; NE = no effect; NLAA = not likely to adversely affect; LAA = likely to adversely affect; Proposed = species has been proposed for listing; SSA = undergoing a species status assessment to determine if listing is warranted; T = threatened

6.0 REFERENCES

AKRF I. 2022. Invasive species control and management plan: Sunrise Wind New York cable project, Town of Brookhaven. Prepared for Sunrise Wind LLC by AKRF, Inc. 80 p.

Atlantic Coast Joint Venture. 2019a. Salt marsh bird conservation plan for the Atlantic Coast. 144 p.

Atlantic Coast Joint Venture. 2019b. Eastern black rail conservation plan for the Atlantic Coast. 76 p.

Atlantic Coast Joint Venture. 2022. Saltmarsh restoration priorities for the saltmarsh sparrow: New York. Available at: www.acjv.org.

Baker A, Gonzalez P, Morrison RIG, Harrington BA. 2013. Red knot (*Calidris canutus*), version 2.0. In: Poole AF, editor. The birds of North America. Ithaca (NY): Cornell Lab of Ornithology.

Band W. 2012. Using a collision risk model to assess bird collision risks for offshore windfarms. The Crown Estate Strategic Ornithological Support Services. Report No.: SOSS-02.

Bay State Wind. 2019. Construction and operations plan, Volume II: Site characterization and assessment of impact-producing factors and list of references Submitted to BOEM March 15, 2019, Revised June 28, 2019.

BOEM. 2012. Commercial wind lease issuance and site assessment activities on the Atlantic Outer Continental Shelf offshore Rhode Island and Massachusetts - Biological assessment. Prepared for U.S. Fish and Wildlife Service. 55 p.

BOEM. 2018. Draft guidance regarding the use of a project design envelope in a construction and operations plan. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. 7 p.

BOEM. 2019. National Environmental Policy Act documentation for impact-producing factors in the offshore wind cumulative impacts scenario on the North Atlantic Continental Shelf. Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. 213 p. Report No.: 2019- 036.

BOEM. 2022. Ocean Wind Offshore Wind Farm biological assessment for the United States Fish and Wildlife Service. Submitted to the United States Fish and Wildlife Service by U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. 186 p.

BOEM (Bureau of Ocean Energy Management). 2014. Virginia offshore wind technology advancement project on the Atlantic Outer Continental Shelf offshore Virginia. Environmental Assessment. Herndon, Virginia: United States Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs.

BOEM (Bureau of Ocean Energy Management). 2016. Commercial wind lease issuance and site assessment activities on the Atlantic Outer Continental Shelf offshore New York, biological assessment. Prepared for the U.S. Fish and Wildlife Service by U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. 20 p.

BOEM (Bureau of Ocean Energy Management). 2021. Notice of intent to prepare an Environmental Impact Statement for the proposed Sunrise Wind Farm Project on the Northeast Atlantic Outer Continental Shelf. Federal Register. 48763-48767 p.

Burger J, Gordon C, Lawrence J, Newman J, Forcey G, Vlietstra L. 2011. Risk evaluation for federally listed (roseate tern, piping plover) or candidate (red knot) bird species in offshore waters: A first step for managing the potential impacts of wind facility development on the Atlantic Outer Continental Shelf. Renewable Energy. 36(1):338-351. doi:https://doi.org/10.1016/j.renene.2010.06.048.

Cheng TL, Gerson A, Moore MS, Reichard JD, DeSimone J, Willis CKR, Frick W, Kilpatrick AM. 2019. Higher fat stores contribute to persistence of little brown bat populations with white-nose syndrome. Journal of Animal Ecology. 88(4):591-600. doi:10.1111/1365-2656.12954.

Cohen JB, Karpanty SM, Fraser JD, Truitt BR. 2010. The effect of benthic prey abundance and size on red knot (*Calidris canutus*) distribution at an alternative migratory stopover site on the US Atlantic Coast. Journal of Ornithology. 151:355-364.

Cook ASCP. 2021. Additional analysis to inform SNCB recommendations regarding collision risk modelling. Prepared for Natural England by British Trust for Ornithology. 48 p.

CSA Ocean Sciences Inc. 2020. Application for Incidental Harassment Authorization for the non-lethal taking of marine mammals: site characterization surveys Lease OCS-A 0486, 0517, 0487, 0500 and associated export cable routes. Submitted to Orsted Wind Power North America, LLC. July 2020. 89 p.

Dominion. 2022. Dominion Energy CVOW pilot project: Avian and bat protection progress report RAPR condition 4.3.3.1 (March 29, 2022). 8 p.

DoN. 2018. Atlantic Fleet Training and Testing Environmental Impact Statement/ Overseas Environmental Impact Statement. Norfolk, Virginia: Department of the Navy, U.S. Fleet Forces Command.

Dowling Z, Sievert PR, Baldwin E, Johnson L, Oettingen Sv, Reichard J. 2017. Flight activity and offshore movements of nano-tagged bats on Martha's Vineyard, MA. Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management. 43 p. Report No.: BOEM 2017-054.

Edinger GJ, Evans DJ, Gebauer S, Howard TG, Hunt DM, Olivero AM, eds. 2014. Ecological communities of New York State. Second edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. Albany (NY): New York Natural Heritage Program, New York State Department of Environmental Conservation. 160 p.

Elliott-Smith E, Haig SM. 2004. Piping Plover *Charadrius melodus*. The Birds of North America. (Published Online):doi:10.2173/bna.2172.

ESS Group Inc. 2014. Cape Wind avian & bat pre-construction monitoring report: 2013-2014. Prepared for Cape Wind Associates. 57 p.

Everaert J, Stienen EWM. 2007. Impact of wind turbines on birds in Zeebrugge (Belgium): Significant effect on bredding tern colony due to collisions. Biodiversity and Conservation. 16:3345-3359.

Farr ER, Johnson MR, Nelson MW, Hare JA, Morrison WE, Lettrich MD, et al. 2021. An assessment of marine, estuarine, and riverine habitat vulnerability to climate change in the Northeast U.S. PLoS ONE. 16(12). doi:10.1371/journal.pone.0260654.

Freeman CC, Rabeler RK, Elisens WJ. 2019. Orobanchaceae. In: Flora of North America. New York: Oxford University Press, Inc.; [accessed 2022 Jun 25]. http://floranorthamerica.org/Orobanchaceae.

Furness RW, Wade HM, Masden EA. 2013. Assessing vulnerability of marine bird populations to offshore wind farms. Journal of Environmental Management. 119:56-66. doi:https://doi.org/10.1016/j.jenvman.2013.01.025.

Geiser F. 2004. Metabolic rate and body temperature reduction during hibernation and daily torpor. Annual Review of Physiology. 66(1):239-274. doi:10.1146/annurev.physiol.66.032102.115105.

Gilbert AT, Adams EM, Loring P, Williams KA. 2022. User documentation for the Stochastic Collision Risk Assessment for Movement (SCRAM). Developed by Biodiversity Research Institute, The University of Rhode Island, and U.S. Fish and Wildlife Service with funding from the Bureau of Ocean Energy Management. 40 p.

Gillings S, Atkinson PW, Baker AJ, Bennett KA, Clark NA, Cole KB, González PM, Kalasz KS, Minton CDT, Niles LJ, et al. 2009. Staging behavior in Red Knot (*Calidris canutus*) in Delaware Bay: Implications for monitoring mass and population size. Auk. 126(1):54-63.

Gochfeld M, Burger J. 2020. Roseate Tern (*Sterna dougallii*), Version 1.0. Ithaca, NY: Cornell Lab of Ornithology; [accessed February 17, 2022]. https://birdsoftheworld.org/bow/species/roster/cur/introduction.

Gorman KM, Barr EL, Ries L, Nocera T, Ford WM. 2021. Bat activity patterns relative to temporal and weather effects in a temperate coastal environment. Global Ecology and Conservation. 30:e01769. doi:https://doi.org/10.1016/j.gecco.2021.e01769.

GOSR (Governor's Office of Storm Recovery). 2020. Environmental assessment for the Long Beach Water Pollution Control Plant Consolidation Project, Nassau County, NY. Appendix L. New York (NY): Governor's Office of Storm Recovery. 62 p. Report No.: USFWS Consultation Code: 05E1LI00-2020-SLI-0088.

Goyert HF. 2014. Relationship among prey availability, habitat, and the foraging behavior, distribution, and abundance of common terns *Sterna hirundo* and roseate terns *S. dougallii*. Marine Ecology Progress Series. 506:291-302.

Greenlaw JS, C. S. Elphick, W. Post, and J. D. Rising. 2020. Saltmarsh sparrow (*Ammospiza caudacuta*), version 1.0. Ithaca, NY: Cornell Lab of Ornithology; [accessed November 27, 2022]. https://birdsoftheworld.org/bow/species/sstspa/1.0/introduction.

Grémillet D, Boulinier T. 2009. Spatial ecology and conservation of seabirds facing global climate change: a review. Marine Ecology Progress Series. 391:121-137. doi:10.3354/meps08212.

Griffin DR. 1940. Migrations of New England bats. Bulletin of the Museum of Comparative Zoology. 96:217-246.

Hancock TE. 2010. Ecophysiology of barrier island beach plants: Responses in form and function to daily, seasonal and episodic stresses [PhD dissertation]. [Winston-Salem (NC)]: Wake Forest University Graduate School of Arts and Sciences.

Hancock TE, Hosier PE. 2003. Ecology of the threatened species Amaranthus pumilus Rafinesque. Castanea. 68(3):236-244.

Hartley MJ, Weldon AJ, eds. 2020. Saltmarsh sparrow conservation plan. Atlantic Coast Joint Venture. 128 p.

Henry M, Thomas DW, Vaudry R, Carrier M. 2002. Foraging distances and home range of pregnant and lactating little brown bats (*Myotis lucifugus*). Journal of Mammalogy. 83(3):767-774.

Hüppop O, Dierschke J, Exo K-M, Fredrich E, Hill R. 2006. Bird migration studies and potential collision risk with offshore wind turbines. Ibis. 148:90-109.

IALA. 2013. IALA recommendation O-139 on the marking of man-made offshore structures, Edition 2, December 2013. International Association of Marine Aids to Navigation and Lighthouse Authorities. 34 p.

Jackson N, Schwager K. 2012. Identification of bat species in Suffolk County. Upton, New York: Office of Science, Science Undergraduate Laboratory Internship (SULI) and Brookhaven National Laboratory. 16 p.

Jennings K. 2018. 2018 Long Island colonial waterbird & piping plover update. Harbor herons & other waterbirds of the greater NY/NJ harbor working group: presentation. New York Department of Environmental Conservation.

Jepsen S, Schweitzer DF, Young B, Sears N, Ormes M, Black SH. 2015. Conversation status and ecology of the monarch butterfly in the United States. Prepared for the U.S. Forest Service by the NatureServe, Arlington, Virginia and the Xerces Society for Invertebrate Conservation, Portland, Oregon. 36 p.

Johnston A, Cook ASCP, Wright LJ, Humphreys EM, Burton NHK. 2014. Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines. Journal of Applied Ecology. 51(1):31-41.

Jolls CL, Sellars JD, Johnson SE, Wigent CA. 2004. Restore seabeach amaranth: A federally threatened species habitat assessment and restoration of (Amaranthus pumilus, Amaranthaceae) using remote sensing data. Greenville (NC): Department of Biology, East Carolina University. 127 p. Report No.: RMP Project Statement Number: CAHA-N-018.000.

Jordan M. 2003. Sandplain gerardia – A success story on Long Island. New York Flora Association. 15(2):1-2.

Kath JA. 2022. Species status assessment for little brown bat (*Myotis lucifugus*). Illinois Department of Natural Resources. 15 p.

Kerlinger P, Gehring JL, Erickson WP, Curry R, Jain A, Guarnaccia J. 2010. Night migrant fatalities and obstruction lighting at wind turbines in North America. The Wilson Journal of Ornithology. 122(4):744-754. doi:10.1676/06-075.1.

Kunz TH, Reichard JD. 2010. Status review of the little brown myotis (*Myotis lucifugus*) and determination that immediate listing under the Endangered Species Act is scientifically and legally warranted. Boston, MA: Boston University, Center for Ecology and Conservation Biology. 32 p.

Lane O, Adams EM, Pau N, O'Brien KM, Regan K, Farina M, Schneider-Moran T, Zarudsky J. 2020. Long-term monitoring of mercury in adult saltmarsh sparrows breeding in Maine, Massachusetts and New York, USA 2000-2017. Ecotoxicology. 29:1148-1160.

Loring P, McLaren J, Smith P, Niles L, Koch S, Goyert H, Bai H. 2018a. Tracking movements of threatened migratory rufa red knots in U.S. Atlantic Outer Continental Shelf Waters. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. 145 p. Report No.: OCS Study BOEM 2018-046.

Loring PH, McLaren JD, Smith PA, Niles LJ, Koch SL, Goyert HF, Bai H. 2018b. Tracking movements of threatened migratory *rufa* red knots in U.S. Atlantic Outer Continental Shelf waters. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. 147 p. Report No.: BOEM 2018-046.

Loring PH, Paton PWC, McLaren JD, Bai H, Janaswamy R, Goyert HF, Griffin CR, Sievert PR. 2019. Tracking offshore occurrence of common terns, endangered roseate terns, and threatened piping plovers with VHF arrays. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. 158 p. Report No.: OCS Study BOEM 2019-017.

Lyons JE, Winn B, Keyes T, Kalasz KS. 2018. Post-breeding migration and connectivity of red knots in the Western Atlantic. The Journal of Wildlife Management. 82(2):383-396. doi:https://doi.org/10.1002/jwmg.21389.

Mitchell I, Daunt F, Frederiksen M, Wade K. 2020. Impacts of climate change on seabirds, relevant to the coastal and marine environment around the UK. MCCIP Science Review 2020.382–399. doi:10.14465/2020.arc17.sbi.

Niles LJ, Burger J, Porter RR, Dey AD, Koch S, Harrington B, Iaquinto K, Boarman M. 2012. Migration pathways, migration speeds and non-breeding areas used by northern hemisphere wintering Red Knots *Calidris canutus* of the subspecies *rufa*. Wader Study Group Bulletin. 119(3):1-9.

Niles LJ, Bart J, Sitters HP, Dey AD, Clark KE, Atkinson PW, Baker AJ, Bennett KA, Kalasz KS, Clark NA, et al. 2009. Effects of horseshoe crab harvest in Delaware Bay on red knots: are harvest restrictions working? BioScience. 59(2):153–164. doi:10.1525/bio.2009.59.2.8.

Niles LJ, Sitters HP, Dey AD, Atkinson PW, Baker AJ, Bennett KA, Carmona R, Clark KE, Clark NA, Espoz C, et al. 2008. Status of the Red Knot, *Calidris canutus rufa*, in the Western Hemisphere. Studies in Avian Biology. 36:1-185.

NPS. 2018. Threatened and endangered species. National Park Service, Fire Island National Seashore; [updated 2018 May 2; accessed 2020 Jun 29]. https://www.nps.gov/fiis/learn/nature/threatened-and-endangered-species.htm.

NPS (National Park Service). 2015. Monarch butterflies. Fire Island National Seashore New York. Patchogue, NY; [updated 22 June 2015; accessed 2 November 2022]. https://www.nps.gov/fiis/learn/nature/monarchbutterflies.htm.

NYSDEC. 2014a. Species status assessment for roseate tern. New York State Department of Environmental Conservation. 15 p.

NYSDEC. 2014b. Species status assessment for red knot. New York State Department of Environmental Conservation. 12 p.

NYSDEC. 2017a. Species status assessment for piping plover. New York State Department of Environmental Conservation. 18 p.

NYSDEC. 2017b. Species status assessment for tricolored bat. New York State Department of Environmental Conservation. 18 p.

NYSDEC (New York State Department of Environmental Conservation). 2022. Protection of northern long-eared bats; Protective measures required for northern long-eared bats when projects occur within occupied habitat. [accessed 26 June 2022]. https://www.dec.ny.gov/animals/106090.html.

NYSDOS (New York State Department of State). Division of Coastal Resources. 2008. Significant coastal fish and wildlife habitats. Attachment B.: NYDOS, Division of Coastal Resources. 11 p.

NYSERDA. 2017a. New York State offshore wind master plan: birds and bats study. Albany (NY): Prepared for NYSERDA by Ecology and Environment Engineering, P.C. 142 p. Report No.: NYSERDA 17-25d.

NYSERDA. 2017b. New York State offshore wind master plan: Cable landfall permitting study. Albany (NY): Prepared for NYSERDA by Ecology and Environment Engineering, PC. 248 p. Report No.: NYSERDA 17-25e.

NYSERDA (New York State Energy Research and Development Authority). 2017. New York State offshore wind master plan. Birds and bats study. Prepared for New York State Energy Research and Development Authority by Ecology and Environment Engineering, P.C. 142 p. Report No.: NYSERDA Report 17-25d.

Orgeret F, Thiebault A, Kovacs KM, Lydersen C, Hindell MA, Thompson SA, Sydeman WJ, Pistorius PA. 2022. Climate change impacts on seabirds and marine mammals: the importance of study duration, thermal tolerance, and generation time. Ecology Letters. 25:218-225.

Paton P, Winiarski K, Trocki C, McWilliams S. 2010. Technical report 11. Spatial distribution, abundance, and flight ecology of birds in nearshore and offshore waters of Rhode Island. Interim technical report for the Rhode Island Ocean Special Area Management Plan 2010. Wakefield, Rhode Island: Rhode Island Coastal Resources Management Council. Appendix A, 971-1274 p.

Pelletier SK, Omland KS, Watrous KS, Peterson TS. 2013. Information synthesis on the potential for bat interactions with offshore wind facilities. Herndon (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. 112 p. Report No.: OCS Study BOEM 2013-01163.

Peters KA. 2008. Avian inventory and monitoring needs for Fire Island National Seashore: a review of available literature and data. National Park Service.

Peterson TS, Pelletier SK. 2016. Long-term bat monitoring on islands, offshore structures, and coastal sites in the Gulf of Maine, mid-Atlantic, and Great Lakes—final report. Prepared for U.S. Department of Energy by Stantec Consulting Services Inc. 171 p.

Pettengill JB, Neel MC. 2011. A sequential approach using genetic and morphological analyses to test species status: The case of United States federally endangered Agalinis acuta (Orobanchaceae). American Journal of Botany. 98(5):859–871. doi:10.3732/ajb.1000267.

Poissant JA. 2009. Roosting and social ecology of the tricolored bat, Perimyotis subflavus, in Nova Scotia [Master's degree]. [Halifax, Nova Scotia]: Saint Mary's University.

Randall J. 2002. Bringing back a fugitive. Endangered Species Bulletin. 27(3):16-17.

Ricci G, Robadue Jr. DD, Rubinoff P, Casey A, Babson AL. 2020. Integrated coastal climate change vulnerability assessment: Fire Island National Seashore. Fort Collins (CO): National Park Service. 222 p. Report No.: NPS/FIIS/NRR—2020/2156.

Roberts SG, Longenecker RA, Etterson MA, Elphick CS, Olsen BJ, Shriver WG. 2019. Preventing local extinctions of tidal marsh endemic seaside sparrows and saltmarsh sparrows in Eastern North America. The Condor. 121:1-14. doi:10.1093/condor/duy024.

Robinson Willmott J, Forcey G, Kent A. 2013. The relative vulnerability of migratory bird species to offshore wind energy projects on the Atlantic outer continental shelf: An assessment method and database. Herndon, VA: U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. 275 pp. p.

Rock J, Leonard M, Boyne A. 2007. Foraging habitat and chick diets of Roseate Tern, *Sterna dougallii,* breeding on Country Island, Nova Scotia. Avian Conservation and Ecology. 2(1):4.

Roemer C, Disca T, Coulon A, Bas Y. 2017. Bat flight height monitored from wind masts predicts mortality risk at wind farms. Biological Conservation. 215:116-122. doi:https://doi.org/10.1016/j.biocon.2017.09.002.

Russell R, Tinsley K, Erickson R, Thogmartin WE, Szymanski J. 2014. Estimating the spatial distribution of wintering little brown bat populations in the eastern United States. Ecology and Evolution 4(19):3746-3754. doi:doi: 10.1002/ece3.1215.

Sherwin HA, Montgomery WI, Lundy MG. 2013. The impact and implications of climate change for bats. Mammal Review. 43(3):171-182. doi:10.1111/j.1365-2907.2012.00214.x.

Smith AD, McWilliams SR. 2016. Bat activity during autumn relates to atmospheric conditions: Implications for coastal wind energy development. Journal of Mammalogy. 97(6):1565–1577. doi:10.1093/jmammal/gyw116.

Speakman JR, Thomas DW. 2003. Physiological ecology and energetics of bats. In: Kunz TH, Fenton MB, editors. Bat Ecology. Chicago, IL: University of Chicago Press. p. 430-490.

Stantec. 2018a. Avian and bat risk assessment: South Fork Wind Farm and South Fork Export Cable. Prepared for Deepwater Wind South Fork, LLC, Providence, RI by Stantec Consulting Services Inc., Topsham, ME. 224 p.

Stantec. 2018b. Vessel-based acoustic bat monitoring: South Fork Wind Farm and South Fork Export Cable. Prepared for Deepwater Wind Block Island, LLC.

Stantec. 2018c. 2017 acoustic monitoring: Block Island Wind Farm, Rhode Island. Prepared for Deepwater Wind Block Island, LLC.

Stantec. 2020. SFWF – Montauk O&M Facility in-water work. Assessment of potential impacts to natural resources from in-water work. Prepared for Deepwater Wind South Fork, LLC by Stantec Consulting Services Inc.

Stantec. 2022. Sunrise Wind Farm rare bat acoustic survey report. Topsham, ME: Prepared for Sunrise Wind LLC by Stantec Consulting Services Inc. 49 p.

Sunrise Wind. 2020. Appendix L - Onshore ecological assessment and field surveys report. Construction & operations plan. Sunrise Wind Farm Project. Revision 2 – June 1, 2021. Prepared for Sunrise Wind LLC by Stantec Consulting Services Inc. 228 p.

Sunrise Wind. 2021a. Construction & operations plan. Sunrise Wind Farm Project. Revised August 23, 2021. Prepared for Sunrise Wind LLC by Stantec Consulting Services Inc. Submitted to Bureau of Ocean Energy Management. 1011 p.

Sunrise Wind. 2021b. Construction & operations plan. Sunrise Wind Farm Project. Revised October 29, 2021. Prepared for Sunrise Wind LLC by Stantec Consulting Services Inc. Submitted to Bureau of Ocean Energy Management. 998 p.

Sunrise Wind. 2021c. Appendix K - Air quality emissions calculations and methodology. Construction & operations plan. Sunrise Wind Farm Project. August 23, 2021. Prepared for Sunrise Wind LLC by AKRF, Inc. Submitted to Bureau of Ocean Energy Management. 129 p.

Sunrise Wind. 2022a. Appendix L - Onshore ecological assessment and field survey report. Construction & operations plan. Sunrise Wind Farm Project. Revision 2 – August 19, 2022. Prepared for Sunrise Wind LLC by Stantec Consulting Services Inc. 252 p.

Sunrise Wind. 2022b. Construction & operations plan. Sunrise Wind Farm Project. Revised April 8, 2022. Prepared for Sunrise Wind LLC by Stantec Consulting Services Inc. Submitted to Bureau of Ocean Energy Management. 997 p.

Sunrise Wind. 2022c. Appendix Y2 - Air traffic flow analysis/ADLS analysis. Construction & operations plan. Sunrise Wind Farm Project. Revision 3 – August 19, 2022. Prepared for Sunrise Wind LLC by Stantec Consulting Services Inc., Capitol Airspace Group. 18 p.

Sunrise Wind. 2022d. Appendix P – Avian and bat risk assessment. Construction & operations plan. Sunrise Wind Farm Project. Revision 2 – August 19, 2022. Prepared for Sunrise Wind LLC by Stantec Consulting Services Inc. 176 p.

Sunrise Wind. 2022e. Construction & operations plan. Sunrise Wind Farm Project. Revised August 19, 2022. Prepared for Sunrise Wind LLC by Stantec Consulting Services Inc. Submitted to Bureau of Ocean Energy Management. 1013 p.

Sunrise Wind. 2022f. Appendix H - Sediment transport modeling report. Construction & operations plan. Sunrise Wind Farm Project. Revision 2 – August 19, 2022. Prepared for Sunrise Wind LLC by Woods Hole Group. Submitted to Bureau of Ocean Energy Management. 127 p.

Sydeman WJ, Thompson SA, Kitaysky A. 2012. Seabirds and climate change: A road map for the future. Marine Ecology Progress Series. 454:107-117.

True MC, Reynolds RJ, Ford WM. 2021. Monitoring and modeling tree bat (Genera: *Lasiurus*, *Lasionycteris*) occurrence using acoustics on structures off the mid-Atlantic coast - implications for offshore wind development. Animals. 11. doi:10.3390/ani11113146.

Tsipoura N, Burger J. 1999. Shorebird diet during spring migration stopover on Delaware Bay. Condor. 101(3):635-644.

U.S. Department of Energy, U.S. Department of the Interior. 2016. National offshore wind strategy: facilitating the development of the offshore wind industry in the United States. U.S. Department of Energy, U.S. Department of the Interior. 84 p. Report No.: DOE/GO-102016-4866.

USACE (US Army Corps of Engineers) New York District. 2016. Biological assessment for the Fire Island National Seashore Breach Management Plan/EIS. USACE. 102 p.

USFWS. 2001. Roseate tern habitat model. [accessed February 18, 2022]. http://www.fws.gov/r5gomp/gom/habitatstudy/metadata/roseate_tern_model.htm

USFWS. 2010. Caribbean roseate tern and North Atlantic roseate tern (*Sterna dougallii dougallii*) 5-Year Review: summary and evaluation. Boquerón, Puerto Rico, and Concord, New Hampshire: 148 pp. p.

USFWS. 2012. Letter of concurrence for BOEM October 2012 biological assessment for the commercial wind lease issuance and site assessment activities on the Atlantic Outer Continental Shelf offshore Rhode Island and Massachusetts. Concord (NH): U.S. Fish and Wildlife Service, New England Field Office. 4 p.

USFWS. 2021a. Species status assessment report for the tricolored bat (*Perimyotis subflavus*). Hadley, MA: United States Fish and Wildlife Service. 166 p. Report No.: Version 1.1.

USFWS. 2021b. ECOS: Indiana Bat (*Myotis sodalis*). [accessed February https://ecos.fws.gov/ecp/species/5949.

USFWS. 2022. Endangered and threatened wildlife and plants; endangered species status for tricolored bat. Federal Register. 87(177):56381-56393.

USFWS (Fish and Wildlife Service). 1988. Endangered and threatened wildlife and plants; Determination of *Agalinis acuta* (Sandplain gerardia) to be an endangered species. Federal Register. 34701-34705 p.

USFWS (Fish and Wildlife Service). 1993. Endangered and threatened wildlife and plants; *Amaranthus pumilus* (Seabeach amaranth) determined to be threatened. Federal Register. 18035-18042 p.

USFWS (Fish and Wildlife Service). 2018. Species status assessment report for the black-capped petrel (*Pterodroma hasitata*). Atlanta, GA: Report No.: Version 1.1. (June 2018).

USFWS (Fish and Wildlife Service). 2019. Species status assessment report for the eastern black rail (*Laterallus jamaicensis jamaicensis*). Atlanta, GA. 194 p.

USFWS (Fish and Wildlife Service). 2020. Monarch (*Danaus plexippus*) species status assessment report, version 2.1. U.S. Fish and Wildlife Service. 126 p.

USFWS (Fish and Wildlife Service). 2021a. Endangered and threatened wildlife and plants; Designation of critical habitat for rufa red knot (*Calidris canutus rufa*). 37410-37668 p.

USFWS (Fish and Wildlife Service). 2021b. Draft recovery plan for the rufa red knot (*Calidris canutus rufa*). Hadley, Massachusetts: U.S. Fish and Wildlife Service, North Atlantic-Appalachian Region. 21 p.

USFWS (Fish and Wildlife Service). 2022a. Endangered and threatened wildlife and plants; Endangered species status for the northern long-eared bat. Final rule. Federal Register. 73488-73504 p.

USFWS (Fish and Wildlife Service). 2022b. Species status assessment report for the northern long-eared bat (*Myotis septentrionalis*), Version 1.1. Bloomington, MN:

USFWS (U.S. Fish and WIldlife Service). 1985. Endangered and threatened wildlife and plants; Determination of endangered and threatened status for piping plover. Federal Register. 50726-50734 p.

USFWS (U.S. Fish and Wildlife Service). 1987. Endangered and threatened wildlife and plants; Determination of endangered and threatened status for two populations of the roseate tern. Federal Register. 42064-42068 p.

USFWS (U.S. Fish and Wildlife Service). 1989. Sandplain gerardia (Agalinis acuta) recovery plan. Newton Corner (MA): U.S. Fish and Wildlife Service. 47 p.

USFWS (U.S. Fish and Wildlife Service). 1996. Piping plover (*Charadrius melodus*), Atlantic Coast population, revised recovery plan. Hadley, Massachusetts: U.S. Fish and Wildlife Service.

USFWS (U.S. Fish and Wildlife Service). 2001. Endangered and threatened wildlife and plants; final determinations of critical habitat for wintering piping plovers. Federal Register. p. 36038-36079.

USFWS (U.S. Fish and Wildlife Service). 2008a. Revised designation of critical habitat for the wintering population of the piping plover (*Charadrius melodus*) in North Carolina: Final rule. Federal Register. 73(204):62816-62841.

USFWS (U.S. Fish and Wildlife Service). 2008b. Biological opinion for the Cape Wind Energy Project, Nantucket Sound, Massachusetts. U.S Fish and Wildlife Service. 97 p. Report No.: Formal Consultation # 08-F-0323.

USFWS (U.S. Fish and Wildlife Service). 2009. Endangered and threatened wildlife and plants; Revised designation of critical habitat for the wintering population of the piping plover (*Charadrius melodus*) in Texas. Federal Register. 23476-23600 p.

USFWS (U.S. Fish and Wildlife Service). 2014a. Biological opinion and conference opinion, Fire Island Inlet to Moriches Inlet, Fire Island Stabilization Project, Suffolk County, New York. Prepared for U.S. Army Corps of Engineers by U.S. Fish and Wildlife Service, Northeast Regional Office. 217 p.

USFWS (U.S. Fish and Wildlife Service). 2014b. Endangered and threatened wildlife and plants; threatened species status for the rufa red knot. Federal Register. 79(238):73706-73748.

USFWS (U.S. Fish and Wildlife Service). 2015. Endangered and threatened wildlife and plants; Threatened species status for the northern long-eared bat with 4(d) rule. Federal Register: 17974-18033 p.

USFWS (U.S. Fish and Wildlife Service). 2019. Sandplain gerardia (Agalinis acuta), 5-Year review: summary and evaluation. Cortland (NY): U.S. Fish and Wildlife Service, Region 5. New York Field Office. 14 p.

USFWS (U.S. Fish and Wildlife Service). 2020a. Piping plover (*Charadrius melodus*) 5-year review: Summary and evaluation.

USFWS (U.S. Fish and Wildlife Service). 2020b. Endangered and threatened wildlife and plants; threatened species status for eastern black rail with a section 4(d) rule. Federal Register. 63764-63803 p.

USFWS (U.S. Fish and Wildlife Service). 2020c. Roseate tern Northeastern North American population (*Sterna dougallii dougallii*) 5-year review: Summary and evaluation. U.S. Fish and Wildlife Service, New England Field Office, North Atlantic-Appalachian Region, Concord, NH:

USFWS (U.S. Fish and Wildlife Service). 2021. Abundance and productivity estimates - 2021 update - Atlantic coast piping plover population. 16 p.

USFWS (U.S. Fish and Wildlife Service), NMFS (National Marine Fisheries Service). 1998. Endangered species consultation handbook: Procedures for conducting consultation and conference activities under Section 7 of the Endangered Species Act. can be downloaded in pieces at: http://www.fws.gov/endangered/consultations/s7hndbk/s7hndbk.htm.

Veit RR, Petersen WR. 1993. Birds of Massachusetts. Massachusetts Audubon Society.

Veit RR, White TP, Perkins SA, Curley S. 2016. Abundance and distribution of seabirds off Southeastern Massachusetts, 2011-2015. Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management. 82 p. Report No.: OCS Study BOEM 2016-067.

Vlietstra L. 2007. Potential impact of the MMA wind turbine on common and roseate terns. Massachusetts Maritime Academy, Marine Safety & Environmental Protection. p. 21.

Watts B. 2016. Status and distribution of the eastern black rail along the Atlantic and Gulf Coasts of North America. Williamsburg, Virginia: College of William and Mary & Virginia Commonwealth University. 161 p.

Watts B. 2020. Breeding phenology of the eastern black rail (*Laterallus jamaicensis*). The Wilson Journal of Ornithology 132(4):1043-1047.

Watts BD, Smith FM. 2015. Winter composition of Nelson's sparrow (*Ammodramus Nelsoni*) and saltmarsh sparrow (*Ammodramus caudacutus*) mixed flocks in coastal Virginia. The Wilson Journal of Ornithology 127:387-394.

WDNR (Wisconsin Department of Natural Resources). 2013a. Northern long-eared bat *Myotis septentrionalis* species guidance. Madison, WI: Wisconsin Department of Natural Resources, Bureau of Natural Heritage Conservation. Report No.: PUB ER-700 (last updated June 23, 2017).

WDNR (Wisconsin Department of Natural Resources). 2013b. Wisconsin little brown bat species guidance. Madison, WI: Wisconsin Department of Natural Resources, Bureau of Natural Heritage Conservation. Report No.: PUB-ER-705 (last updated June 23, 2017).

Weakley A, Bucher M, Murdock N. 1996. Recovery plan for seabeach amaranth (Amaranthus pumilus) Rafinesque. Atlanta (GA): U.S. Fish and Wildlife Service, Southeast Region. 59 p.

White EE, Ury EA, Bernhardt ES, Yang X. 2022. Climate change driving widespread loss of coastal forested wetlands throughout the North American Coastal Plain. Ecosystems. 25(4):812-827. doi:10.1007/s10021-021-00686-w.

Zeigler SL, Gutierrez BT, Lentz EE, Plant NG, Sturdivant EJ, Doran KS. 2022. Predicted sea-level rise-

Appendix A
NYSDEC and USFWS Correspondence Regarding Listed Species in the Project Area

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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March 27, 2020

Sarah Boucher Gravel
Stantec
30 Park Drive
Topsham, ME 04086

Re: Sunrise Offshore Wind Farm
County: Suffolk Town/City: Brookhaven

Dear Ms. Boucher Gravel:

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to the above project.

Enclosed is a report of rare or state-listed animals and plants, and significant natural communities that our database indicates occur along the proposed cable routes and landfall locations or in their vicinity. Note there are state-listed animal species documented from the proposed routes.

For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our database. We cannot provide a definitive statement as to the presence or absence of all rare or state-listed species or significant natural communities. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other sources may be required to fully assess impacts on biological resources.

The presence of the plants and animals identified in the enclosed report may result in this project requiring additional review or permit conditions. For further guidance, and for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the NYS DEC Region 1 Office, Division of Environmental Permits, at dep.r1@dec.ny.gov, (631) 444-0365.

Sincerely,

Nick Conrad

Nicholas Conrad
Information Resources Coordinator
New York Natural Heritage Program

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NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

The following state-listed animals have been documented along the proposed cable routes and landfall locations or in their vicinity.

The following list includes animals that are listed by NYS as Endangered, Threatened, or Special Concern; and/or that are federally listed.

For information about any permit considerations for the project, contact the NYSDEC Region x Office, Division of Environmental Permits, at dep.r1@dec.ny.gov, (631) 444-0365.

The following species have been documented on or very near the proposed cable routes and landfall locations at Fire Island and Smith Point County Park.

COMMON NAME	SCIENTIFIC NAME	NY STATE LISTING	FEDERAL LISTING
Piping Plover *Breeding*	*Charadrius melodus*	Endangered	Threatened
Least Tern *Breeding*	*Sternula antillarum*	Threatened	
Common Tern *Breeding*	*Sterna hirundo*	Threatened	

The following species have been documented in the offshore waters crossed by the proposed offshore cable route.

COMMON NAME	SCIENTIFIC NAME	NY STATE LISTING	FEDERAL LISTING
Humpback Whale *Nonbreeding*	*Megaptera novaeangliae*	Endangered	Endangered
Fin Whale	*Balaenoptera physalus*	Endangered	Endangered

The following species has been documented at several locations within .5 mile of much of the onshore cable routes, and several more locations are within 1.5 miles. Individual animals may travel 1.5 miles or more from documented locations.
The main impact of concern for bats is the removal of potential roost trees.

COMMON NAME	SCIENTIFIC NAME	NY STATE LISTING	FEDERAL LISTING
Northern Long-eared Bat *Maternity roosts and other summer locations*	*Myotis septentrionalis*	Threatened	Threatened

This report only includes records from the NY Natural Heritage database.

Information about many of the listed animals in New York, including habitat, biology, identification, conservation, and management, are available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org, and from NYSDEC at www.dec.ny.gov/animals/7494.html.

The following rare plants, rare animals, and significant natural communities along the proposed cable routes and landfall locations or in their vicinity.

We recommend that potential impacts of the proposed project on these species or communities be addressed as part of any environmental assessment or review conducted as part of the planning, permitting and approval process. Field surveys of the project site may be necessary to determine whether a species currently occurs at the site, particularly for sites that are currently undeveloped and may still contain suitable habitat. Final requirements of the project to avoid, minimize, or mitigate potential impacts are determined by the lead permitting agency or the government body approving the project.

The animals listed in this report, while not listed by New York State as Endangered or Threatened, are rare in New York and are of conservation concern.

The plants listed in this report are listed as Endangered or Threatened by New York State, and/or are rare in New York State, and so are a vulnerable natural resource of conservation concern.

The natural communities listed in this report are considered significant from a statewide perspective by the NY Natural Heritage Program. Each community is either an example of a community type that is rare in the state, or a high-quality example of a more common community type. By meeting specific, documented criteria, the NY Natural Heritage Program considers these community occurrences to have high ecological and conservation value.

The following species and communities have been documented at the proposed cable route and landfall on Fire Island.

COMMON NAME	*SCIENTIFIC NAME*	*NY STATE LISTING*	*HERITAGE CONSERVATION STATUS*
Hairy-necked Tiger Beetle	*Cicindela hirticollis*	Unlisted	Critically Imperiled in NYS

Fire Island Great South Beach, 2017: Sand beach.

Maritime Beach			High Quality Occurrence of Uncommon Community Type

Fire Island: A 32 mile long maritime beach along the south shore of Fire Island, 7 miles of which is designated as Federal Wilderness Area where driving is not allowed for most of the year. Natural processes are affected by stablization and nourishment in some areas.

The following species has been documented within .5 mile of the proposed cable route.

COMMON NAME	*SCIENTIFIC NAME*	*NY STATE LISTING*	*HERITAGE CONSERVATION STATUS*
Sandplain Wild Flax	*Linum intercursum*	Threatened	Imperiled in NYS

Station Avenue roadside, 1996-08-08: The plants are on a pine barrens roadside with very sparse vegetation, dominated by grasses and legumes.

The following significant community is crossed by the proposed cable route at Carmans River, and also extends along Yaphank Creek to within 100 yards of the proposed cable route.

COMMON NAME	HERITAGE CONSERVATION STATUS
Red Maple-Blackgum Swamp	High Quality Occurrence of Rare Community Type

Carmans River Wetlands, extending north and south of Montauk Highway: The swamp is of moderate size with good diversity and some large diameter trees. The swamp is minimally buffered and located at the edge of a locally intact landscape block.

The following species and community have been documented south of the proposed cable route in or along the Carmans River in Wertheim National Wildlife Refuge.

COMMON NAME	SCIENTIFIC NAME	NY STATE LISTING	HERITAGE CONSERVATION STATUS
Water Pigmyweed	*Crassula aquatica*	Endangered	Critically Imperiled in NYS

Carmans River, west side immediately south of Montauk Highway, 1988-08-31: Bank of an intertidal section of river at a road embankment.

Eastern Pirate Perch	*Aphredoderus sayanus sayanus*	Unlisted	Critically Imperiled in NYS

Carmans River within .3 mile south of Montauk Highway, also Yaphank Creek, 1990-11-15.

Atlantic Silverside	*Menidia menidia*	Unlisted	Imperiled in NYS

Carmans River within .4 mile south of Montauk Highway, 1990-11-14.

Brackish Tidal Marsh	High Quality Occurrence of Uncommon Community Type

Carmans River Wetlands, within .4 mile south of Montauk Highway: This is a large marsh in good to fair condition, in a good landscape that is mostly protected.

The following species have been documented north of the proposed cable route in Southaven County Park.

COMMON NAME	SCIENTIFIC NAME	NY STATE LISTING	HERITAGE CONSERVATION STATUS
Eastern Pirate Perch	*Aphredoderus sayanus sayanus*	Unlisted	Critically Imperiled in NYS

Carmans River just north of NYS Route 27, 2015-08-04.

Collins' Sedge	*Carex collinsii*	Endangered	Critically Imperiled in NYS

Southaven County Park, within .25 mile of proposed cable route, 1986-11-04: Abandoned fish hatchery (part of Suffolk County Park) in a red maple-tupelo swamp.

Blunt-lobe Grape Fern	*Botrychium oneidense*	Threatened	Imperiled in NYS

Southaven County Park, within .25 mile of proposed cable route, 1986-11-04: In wet soil under shrubs and vines in red maple swamp.

The following communities are crossed by the proposed cable route in the waters between Fire Island and the mainland (Smith Point County Park).

COMMON NAME	*HERITAGE CONSERVATION STATUS*
Marine Eelgrass Meadow	High Quality Occurrence of Rare Community Type

Great South Bay and Moriches Bay: This is an expansive patch of eelgrass in good condition within a fair quality landscape.

Marine Back-barrier Lagoon	High Quality Occurrence of Rare Community Type

Great South Bay and Moriches Bay: This is a very large marine back-barrier lagoon that is in good condition within a fair quality, but mostly developed landscape.

This report only includes records from the NY Natural Heritage database. For most sites, comprehensive field surveys have not been conducted, and we cannot provide a definitive statement as to the presence or absence of all rare or state-listed species. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other sources may be required to fully assess impacts on biological resources.

If any rare plants or animals are documented during site visits, we request that information on the observations be provided to the New York Natural Heritage Program so that we may update our database.

Information about many of the rare animals and plants in New York, including habitat, biology, identification, conservation, and management, are available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org, from NatureServe Explorer at www.natureserve.org/explorer, and from USDA's Plants Database at http://plants.usda.gov/index.html (for plants).

Information about many of the natural community types in New York, including identification, dominant and characteristic vegetation, distribution, conservation, and management, is available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org. For descriptions of all community types, go to www.dec.ny.gov/animals/29384.html for Ecological Communities of New York State.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Long Island Ecological Services Field Office
340 Smith Road
Shirley, NY 11967-2258
Phone: (631) 286-0485 Fax: (631) 286-4003

In Reply Refer To: March 11, 2020
Consultation Code: 05E1LI00-2020-SLI-0367
Event Code: 05E1LI00-2020-E-00839
Project Name: Confidential Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Long Island Ecological Services Field Office
340 Smith Road
Shirley, NY 11967-2258
(631) 286-0485

Project Summary

Consultation Code: 05E1LI00-2020-SLI-0367

Event Code: 05E1LI00-2020-E-00839

Project Name: Confidential Project

Project Type: POWER GENERATION

Project Description: Proposed wind energy project

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/40.81649280425459N72.91040200081957W

Counties: Suffolk, NY

Endangered Species Act Species

There is a total of 6 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Birds

NAME	STATUS
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot *Calidris canutus rufa* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Roseate Tern *Sterna dougallii dougallii* Population: Northeast U.S. nesting population No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2083	Endangered

Flowering Plants

NAME	STATUS
Sandplain Gerardia *Agalinis acuta* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8128	Endangered
Seabeach Amaranth *Amaranthus pumilus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8549	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Appendix B
Collision Risk Assessment

The following pages present the outputs of a model used to assess collision risk of birds through wind farms. The results were generated by BOEM in October 2022 using a revised version of the Band (2012) model. One scenario was assessed for three ESA-listed bird species included in this BA (piping plover, rufa red knot, and roseate tern): 94, 11-MW turbines. Refer to the first sheet of each output for the details of the model inputs. The second sheet presents the overall collision risk applying the number of bird transits, flight timing, flight height distribution, and avoidance rates. The results for each bird species are summarized in **Section 4.2.1.6** of the BA.

Section 508 of the Rehabilitation Act of 1973 requires that the information in federal documents be accessible to individuals with disabilities. The Bureau of Ocean Energy Management has made every reasonable effort to ensure that the information in this document is accessible. If you have any problems accessing the information, please contact BOEM's Office of Public Affairs at boempublicaffairs@boem.gov or (202) 208-6474.

COLLISION RISK ASSESSMENT
Sheet 1 - Input data

Colour key	
used in overall collision risk sheet	used in available hours sheet
used in migrant collision risk sheet	used in large array correction sheet
used in single transit collision risk sheet or extended model	not used in calculation but stated for reference

	Units	Value	Data sources	Source
Bird data				
Species name		**Piping plover**		
Bird length	m	0.17		Gilbert et al 2022, Table A12
Wingspan	m	0.38		Gilbert et al 2022, Table A12
Flight speed	m/sec	9.3		Gilbert et al 2022, Table A12
Nocturnal activity factor (1-5)		4		Loring et al 2019, Fig 66; value = 4
Flight type, flapping or gliding		flapping		

Bird survey data			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daytime bird density	birds/sq km													
Proportion at rotor height	%													
Proportion of flights upwind	%	8.6%												

Birds on migration data			Data sources												Source
Migration passages	birds				171	171	171		855						Adult & fledgings derived from USFWS 2018c, P.Loring et al 2019
Width of migration corridor	km	39													assume all pass through lease
Proportion at rotor height	%	15%													Loring et al 2019, Table 26
Proportion of flights upwind	%	8.6%													Loring et al 2019, Fig 72

Windfarm data	Units	Value	Data sources	Source
Name of windfarm site		**Sunrise**		
Latitude	degrees	41.00		
Number of turbines		94		BA
Width of windfarm	km	39		Calculated from BA Figure 3
Tidal offset	m	1		

Turbine data	Units	Value	Data sources	Source
Turbine model		**SG DD-200 11 MW**		BA, Table 1
No of blades		3		BA, Table 1
Rotation speed	rpm	9.03		Max, M. Evans email 10/5/22
Rotor radius	m	97		Offshore Wind Turbine SG 11.0-200 DD I Siemens Gamesa
Hub height	m	140		BA, Table 1
Max blade width	m	5.800		BA, Table 1
Pitch	degrees	6.005		M. Evans email 10/5/22

	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Source
Monthly proportion of time operational	%	93%	93%	93%	93%	93%	93%	91%	92%	92%	93%	93%	93%	Total Operation = MonthOp*(1 – MonthOpMean), calc from M. Evans email 10/5/22*

Avoidance rates used in presenting results			Data sources (if applicable)
	95.01%	X	Cook 2021, Table A2 "All Gulls and Terns" Extended Band (2012) model
	98.00%		
	99.00%		
	99.50%		

*Apr & aug were averaged using vals 1 mon before and after

COLLISION RISK ASSESSMENT (BIRDS ON MIGRATION)

Sheet 2 - Overall collision risk

All data input on Sheet 1:
no data entry needed on this sheet!
other than to choose option for final tables

(green)	from Sheet 1 - input data
(lavender)	from Sheet 6 - available hours
(orange)	from Sheet 3 - single transit collision risk
(yellow)	from survey data
(light blue)	calculated field

Bird details:															
Species		Piping plover													
Flight speed	m/sec	9.3													
Flight type		flapping													
Windfarm data:															
Number of turbines		94													
Rotor radius	m	97													
Minimum height of rotor	m	140													
Total rotor frontal area	sq m	2778569													
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**year average**
Proportion of time operational	%		93%	93%	93%	93%	93%	93%	91%	92%	92%	93%	93%	93%	92.7%
Stage A - flight activity															**per annum**
Migration passages			0	0	171	171	171	0	855	0	0	0	0	0	**1368**
Migrant flux density	birds/ km		0	0	4.3846	4.3846	4.384615	0	21.92308	0	0	0	0	0	
Proportion at rotor height	%	15%													
Flux factor			0	0	63	63	63	0	314	0	0	0	0	0	
Option 1 -Basic model - Stages B, C and D															
Potential bird transits through rotors			0	0	10	10	10	0	48	0	0	0	0	0	**76**
Collision risk for single rotor transit	(from sheet 3)	3.2%													
Collisions for entire windfarm, allowing for non-op time, assuming no avoidance	birds per month or year		**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**2**
Option 2-Basic model using proportion from flight distribution			**0**	**0**	**1**	**1**	**1**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**4**
Option 3-Extended model using flight height distribution															
Proportion at rotor height	(from sheet 4)	27.9%													
Potential bird transits through rotors	Flux integral	0.3169	0	0	20	20	20	0	100	0	0	0	0	0	**159**
Collisions assuming no avoidance	Collision integral	0.01393	**0**	**0**	**1**	**1**	**1**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**6**
Average collision risk for single rotor transit		4.4%													
Stage E - applying avoidance rates															
Using which of above options?	**Option 3**	0.00%	0	0	1	1	1	0	4	0	0	0	0	0	**6**
	birds per month														
Collisions assuming avoidance rate	or year	95.01%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		98.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		99.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		99.50%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Collisions after applying large array correction		95.01%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		98.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		99.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		99.50%	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Summary of simulation results from SCRAM: a stochastic collision risk assessment for movement data

08 December 2022

SCRAM was developed by Biodiversity Research Institute, the University of Rhode Island, and the U.S. Fish and Wildlife Service with funding from the Bureau of Ocean Energy Management.

SCRAM run details

```
## SCRAM - the Stochastic Collision Risk Assessment for Movement version
## Version: 0.91.1 - Lyrical Brachycarpus
## Iterations: 1000
## Model option: Option 3: slower but more accurate assessment
## Project: Sunrise
## Modeler: David Bigger
## The model run was started at: Thu Dec 08 15:23:27 2022 EST
## The model run was completed at: Thu Dec 08 15:45:45 2022 EST
## Run 1: the probability of exceeding specified threshold (1) is < 0.001.
```

Model inputs used for this analysis

Table 1: Species input parameters (mean and 95 perc. range).

Species	Turbine model	Avoidance	Wing span	Body length	Speed
Piping Plover	SG DD-200	0.93 (0.92, 0.94)	0.38 (0.38, 0.38)	0.17 (0.17, 0.18)	11.88 (2.68, 20.76)

Table 2: Species monthly (Jan-Jun) population estimates ± SD and assumptions/limitations as specified by the USFWS using the most recent data.

Species	Jan	Feb	Mar	Apr	May	Jun
Piping Plover	0 ± 0	0 ± 0	4578 ± 0	4578 ± 0	4578 ± 0	4578 ± 0

Table 3: Species monthly (Jul-Dec) population estimates ± SD and assumptions/limitations as specified by the USFWS using the most recent data.

Species	Jul	Aug	Sep	Oct	Nov	Dec
Piping Plover	4578 ± 0	7423 ± 0	7423 ± 0	7423 ± 0	0 ± 0	0 ± 0

Population data assumptions/limitations:
1) Entire Atlantic coast population could be present in area during months listed.
2) Occurrence through October to include birds stopping over in mid-Atlantic (e.g. North Carolina). Number of birds still present in Atlantic likely lower.
3) Estimate of HY fledges, uses the 20-year (2002 - 2021) average productivity (unweighted).

Table 4: Wind farm input parameters (mean and 95 perc. range).

Species	Turbine model	Num. turbines	Rotor radius	Hub height (m)	Blade width (m)	Wind speed (mps)
Piping Plover	SG DD-200	94 (94, 94)	97 (97, 97)	137 (137, 137)	5.8 (5.8, 5.8)	7.52 (5.09, 10.33)

Table 5: Wind farm input parameters (mean and 95 perc. range).

Species	Turbine model	Prop. upwind	Rotor speed (rpm)	Pitch (radians)	Farm width (km)	Lat.	Long.
Piping Plover	SG DD-200	1 (1, 1)	4.07 (2.76, 5.59)	0.11 (0.1, 0.11)	39 (39, 39)	41	-71.1

Table 6: Monthly wind farm operational data (mean and 95 perc. range) is given for each wind farm specification.

Species	Turbine model	Jan Op.	Feb Op.	Mar Op.	Apr Op.	May Op.	Jun Op.
Piping Plover	SG DD-200	93.1 (90.4, 95.9)	93 (90.8, 95.2)	92.6 (90.2, 94.9)	92.9 (89.9, 95.8)	93.3 (89.9, 97)	93 (88.8, 97.3)

Table 7: Monthly wind farm operational data (mean and 95 perc. range) is given for each wind farm specification.

Species	Turbine model	Jul Op.	Aug Op.	Sep Op.	Oct Op.	Nov Op.	Dec Op.
Piping Plover	SG DD-200	91.4 (87, 95.5)	91.8 (87.3, 96.4)	92.4 (87.8, 97.2)	93.1 (89.5, 96.7)	93 (90.9, 94.9)	92.8 (90.2, 95.1)

Results for the SCRAM simulation

Table 8: The predicted mean and 95 perc. prediction intervals of the number of collisions per month and the total summed monthly number of collisions and 95 perc. prediction interval. Results are not shown for months that do not have movement data.

Species	Turbine model	month	Mean number of collisions	Lower pred. interval	Upper pred. interval
Piping Plover	SG DD-200	Jan			
Piping Plover	SG DD-200	Feb			
Piping Plover	SG DD-200	Mar			
Piping Plover	SG DD-200	Apr			
Piping Plover	SG DD-200	May	0	0	0.001
Piping Plover	SG DD-200	Jun	0	0	0.001
Piping Plover	SG DD-200	Jul	0	0	0.001
Piping Plover	SG DD-200	Aug	0	0	0.001
Piping Plover	SG DD-200	Sep	0	0	0.001
Piping Plover	SG DD-200	Oct			
Piping Plover	SG DD-200	Nov			
Piping Plover	SG DD-200	Dec			
Piping Plover	SG DD-200	annual	0.001	0	0.005

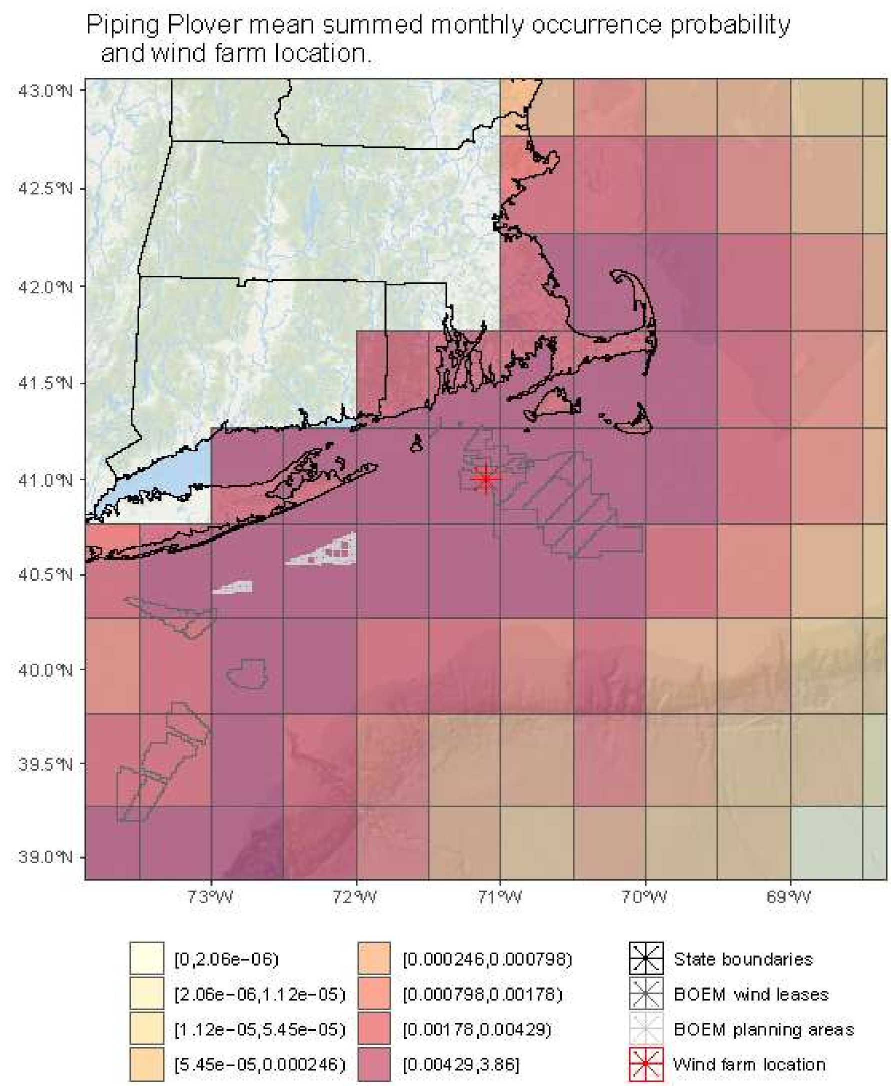

Figure 1: A map of the species occurrence probabities and wind farm location.

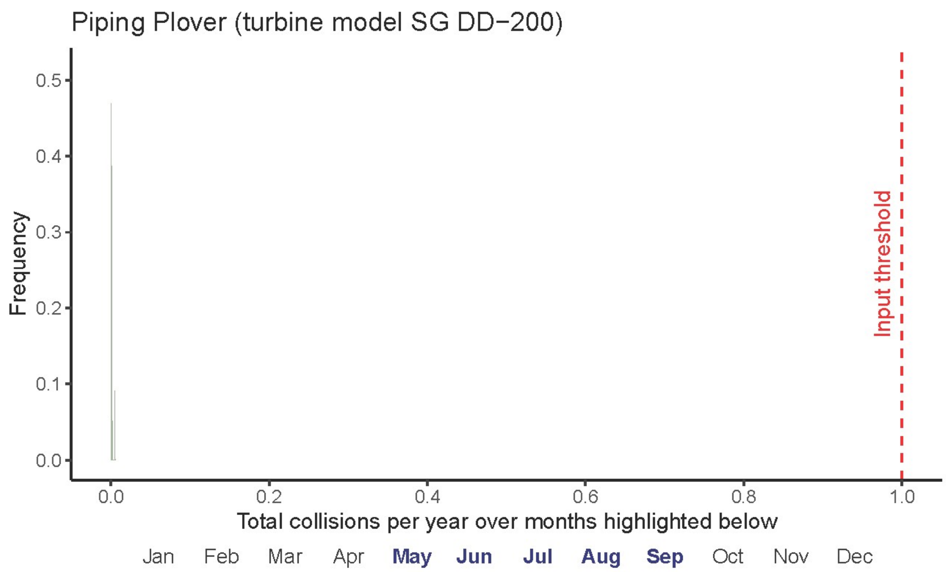

Figure 2: A frequency histogram of the total number of collisions per year. The heights of the bars show the relative frequency of each value. Months for which movement data were provided or available are shown in bold; only bold months are shown in histogram of annual collisions.

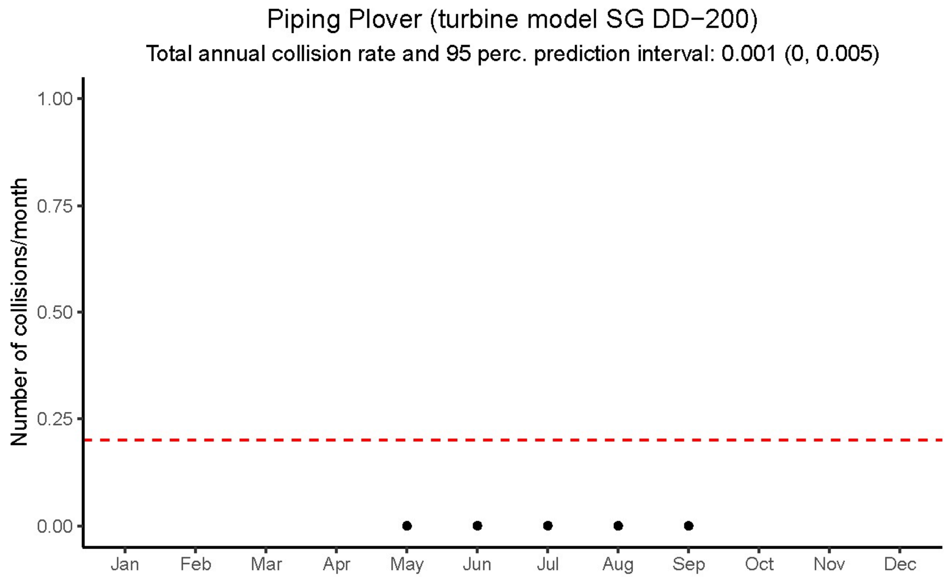

Figure 3: The predicted mean and 95 perc. prediction intervals of the number of collisions per month. Results are not shown for months that do not have movement data. Total annual collision rate and 95 perc. prediction interval are given at top. The threshold is shown divided by the number of months that movement data were available.

COLLISION RISK ASSESSMENT
Sheet 1 - Input data

- used in overall collision risk sheet
- used in migrant collision risk sheet
- used in single transit collision risk sheet or extended model
- used in available hours sheet
- used in large array correction sheet
- not used in calculation but stated for reference

Bird data	Units	Value	Data sources	Source
Species name		RedKnot		
Bird length	m	0.24		Gilbert et al 2022, Table A12
Wingspan	m	0.50		Gilbert et al 2022, Table A12
Flight speed	m/sec	20.1		Gilbert et al 2022, Table A12
Nocturnal activity factor (1-5)		5		Table A-8, Robinson Willmott et al., 2013; Loring et al 2018
Flight type, flapping or gliding		flapping		

Data sources

Bird survey data	Units	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daytime bird density	birds/sq km													
Proportion at rotor height	%													
Proportion of flights upwind	%	34.6%												

Data sources

Birds on migration data	Units	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Source
Migration passages	birds						8						75		Fall:1500 birds*5% (Gordon and Nations 2016, Loring et al 2018); Spr: 150*5%
Width of migration corridor	km	39													assume all pass through lease
Proportion at rotor height	%	0%													Feigin et al., 2022, Table A
Proportion of flights upwind	%	34.6%													Loring et al 2018, Fig. 14

Windfarm data	Units	Value	Data sources	Source
Name of windfarm site		Sunrise		
Latitude	degrees	41.00		
Number of turbines		94		BA
Width of windfarm	km	39		Calculated from BA Figure 3
Tidal offset	m	1		

Turbine data	Units	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Source
Turbine model		SG DD-200 11 MW													BA, Table 1
No of blades		3													BA, Table 1
Rotation speed	rpm	9.03													Max, M. Evans email 10/5/22
Rotor radius	m	97													[Offshore Wind Turbine SG 11.0-200 DD I Siemens Gamesa]
Hub height	m	140													BA, Table 1
Monthly proportion of time operational	%		93%	93%	93%	93%	93%	93%	91%	92%	92%	93%	93%	93%	Total Operation = MonthOp*(1 – MonthOpMean), calc from M. Evans email 10/5/22*
Max blade width	m	5.800													BA, Table 1
Pitch	degrees	6.005													M. Evans email 10/5/22

Avoidance rates used in presenting results	Value		Data sources (if applicable)
	95.01%	X	Cook 2021, Table A2 "All Gulls and Terns" Extended Band (2012) model
	98.00%		
	99.00%		
	99.50%		

*Apr & aug were averaged using vals 1 mon before and after

COLLISION RISK ASSESSMENT (BIRDS ON MIGRATION)

Sheet 2 - Overall collision risk

All data input on Sheet 1:
no data entry needed on this sheet!
other than to choose option for final tables

from Sheet 1 - input data
from Sheet 6 - available hours
from Sheet 3 - single transit collision risk
from survey data
calculated field

Bird details:															
Species		RedKnot													
Flight speed	m/sec	20.1													
Flight type		flapping													
Windfarm data:															
Number of turbines		94													
Rotor radius	m	97													
Minimum height of rotor	m	140													
Total rotor frontal area	sq m	2778569													
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**year average**
Proportion of time operational	%		93%	93%	93%	93%	93%	93%	91%	92%	92%	93%	93%	93%	92.7%
Stage A - flight activity															**per annum**
Migration passages			0	0	0	0	8	0	0	0	0	0	75	0	**83**
Migrant flux density	birds/ km		0	0	0	0	0.205128	0	0	0	0	0	1.923077	0	
Proportion at rotor height	%	0%													
Flux factor			0	0	0	0	3	0	0	0	0	0	28	0	
Option 1 -Basic model - Stages B, C and D															
Potential bird transits through rotors			0	0	0	0	0	0	0	0	0	0	0	0	**0**
Collision risk for single rotor transit	(from sheet 3)	4.1%													
Collisions for entire windfarm, allowing for non-op time, assuming no avoidance	birds per month or year		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Option 2-Basic model using proportion from flight distribution			**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**
Option 3-Extended model using flight height distribution															
Proportion at rotor height	(from sheet 4)	33.3%													
Potential bird transits through rotors	Flux integral	0.3099	0	0	0	0	1	0	0	0	0	0	9	0	**9**
Collisions assuming no avoidance	Collision integral	0.00943	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Average collision risk for single rotor transit		3.0%													
Stage E - applying avoidance rates															
Using which of above options?	**Option 3**	0.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Collisions assuming avoidance rate	birds per month or year	95.01%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		98.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		99.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		99.50%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Collisions after applying large array correction		95.01%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		98.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		99.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		99.50%	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Summary of simulation results from SCRAM: a stochastic collision risk assessment for movement data

08 December 2022

SCRAM was developed by Biodiversity Research Institute, the University of Rhode Island, and the U.S. Fish and Wildlife Service with funding from the Bureau of Ocean Energy Management.

1

SCRAM run details

```
## SCRAM - the Stochastic Collision Risk Assessment for Movement version
## Version: 0.91.1 - Lyrical Brachycarpus
## Iterations: 1000
## Model option: Option 3: slower but more accurate assessment
## Project: Sunrise
## Modeler: David Bigger
## The model run was started at: Thu Dec 08 14:52:22 2022 EST
## The model run was completed at: Thu Dec 08 15:14:46 2022 EST
## Run 1: the probability of exceeding specified threshold (1) is 0.543.
```

Model inputs used for this analysis

Table 1: Species input parameters (mean and 95 perc. range).

Species	Turbine model	Avoidance	Wing span	Body length	Speed
Red Knot	SG DD-200	0.93 (0.92, 0.94)	0.49 (0.45, 0.54)	0.24 (0.23, 0.25)	20.06 (16.45, 23.77)

Table 2: Species monthly (Jan-Jun) population estimates ± SD and assumptions/limitations as specified by the USFWS using the most recent data.

Species	Jan	Feb	Mar	Apr	May	Jun
Red Knot	10400 ± 0	10400 ± 0	10400 ± 0	10400 ± 0	59200 ± 0	59200 ± 0

Table 3: Species monthly (Jul-Dec) population estimates ± SD and assumptions/limitations as specified by the USFWS using the most recent data.

Species	Jul	Aug	Sep	Oct	Nov	Dec
Red Knot	59200 ± 0	59200 ± 0	72520 ± 0	54720 ± 0	41400 ± 0	10400 ± 0

Population data assumptions/limitations:
1) All pass through in spring - #s consistent w/Lyons et al super-population estimate for 2020 in DE Bay: 40,444 (95 perc. credible interval: 33,627–49,966).
2) Winter population estimates represent the total # of adults and sub-adults (in general).
3) Southern and northern wintering birds could be present during July - Sept.
4) Only northern wintering birds could be present during Oct - Nov.
5) Only southeast US and Caribbean birds could be present during Dec.
6) Birds from western Gulf population are excluded from totals in Atlantic region due to lack of information on extent to which they use the Atlantic region.
7) Numbers do not include HY birds in fall.
8) Dec number coming from Lyons et al 2017. Just includes SE US Birds, not Caribbean.
9) Issues with double counting addressed because birds may be present in different areas of Atlantic region for weeks to months.

Table 4: Wind farm input parameters (mean and 95 perc. range).

Species	Turbine model	Num. turbines	Rotor radius	Hub height (m)	Blade width (m)	Wind speed (mps)
Red Knot	SG DD-200	94 (94, 94)	97 (97, 97)	137 (137, 137)	5.8 (5.8, 5.8)	7.49 (5.05, 10.05)

Table 5: Wind farm input parameters (mean and 95 perc. range).

Species	Turbine model	Prop. upwind	Rotor speed (rpm)	Pitch (radians)	Farm width (km)	Lat.	Long.
Red Knot	SG DD-200	1 (1, 1)	4.05 (2.73, 5.44)	0.11 (0.1, 0.11)	39 (39, 39)	41	-71.1

Table 6: Monthly wind farm operational data (mean and 95 perc. range) is given for each wind farm specification.

Species	Turbine model	Jan Op.	Feb Op.	Mar Op.	Apr Op.	May Op.	Jun Op.
Red Knot	SG DD-200	93.1 (90.3, 95.7)	93.1 (90.8, 95.4)	92.6 (90.2, 95.1)	93 (90.1, 95.8)	93.2 (89.4, 96.7)	93 (89, 97.3)

Table 7: Monthly wind farm operational data (mean and 95 perc. range) is given for each wind farm specification.

Species	Turbine model	Jul Op.	Aug Op.	Sep Op.	Oct Op.	Nov Op.	Dec Op.
Red Knot	SG DD-200	91.4 (87, 95.7)	91.9 (87.3, 96.3)	92.5 (87.8, 97.1)	92.9 (89.3, 96.6)	93 (91.1, 95.2)	92.8 (90.3, 95.4)

Results for the SCRAM simulation

Table 8: The predicted mean and 95 perc. prediction intervals of the number of collisions per month and the total summed monthly number of collisions and 95 perc. prediction interval. Results are not shown for months that do not have movement data.

Species	Turbine model	month	Mean number of collisions	Lower pred. interval	Upper pred. interval
Red Knot	SG DD-200	Jan			
Red Knot	SG DD-200	Feb			
Red Knot	SG DD-200	Mar			
Red Knot	SG DD-200	Apr			
Red Knot	SG DD-200	May			
Red Knot	SG DD-200	Jun			
Red Knot	SG DD-200	Jul			
Red Knot	SG DD-200	Aug	0.04	0.031	0.05
Red Knot	SG DD-200	Sep	0.906	0.737	1.096
Red Knot	SG DD-200	Oct	0.068	0.056	0.082
Red Knot	SG DD-200	Nov	0	0	0.006
Red Knot	SG DD-200	Dec			
Red Knot	SG DD-200	annual	1.014	0.824	1.225

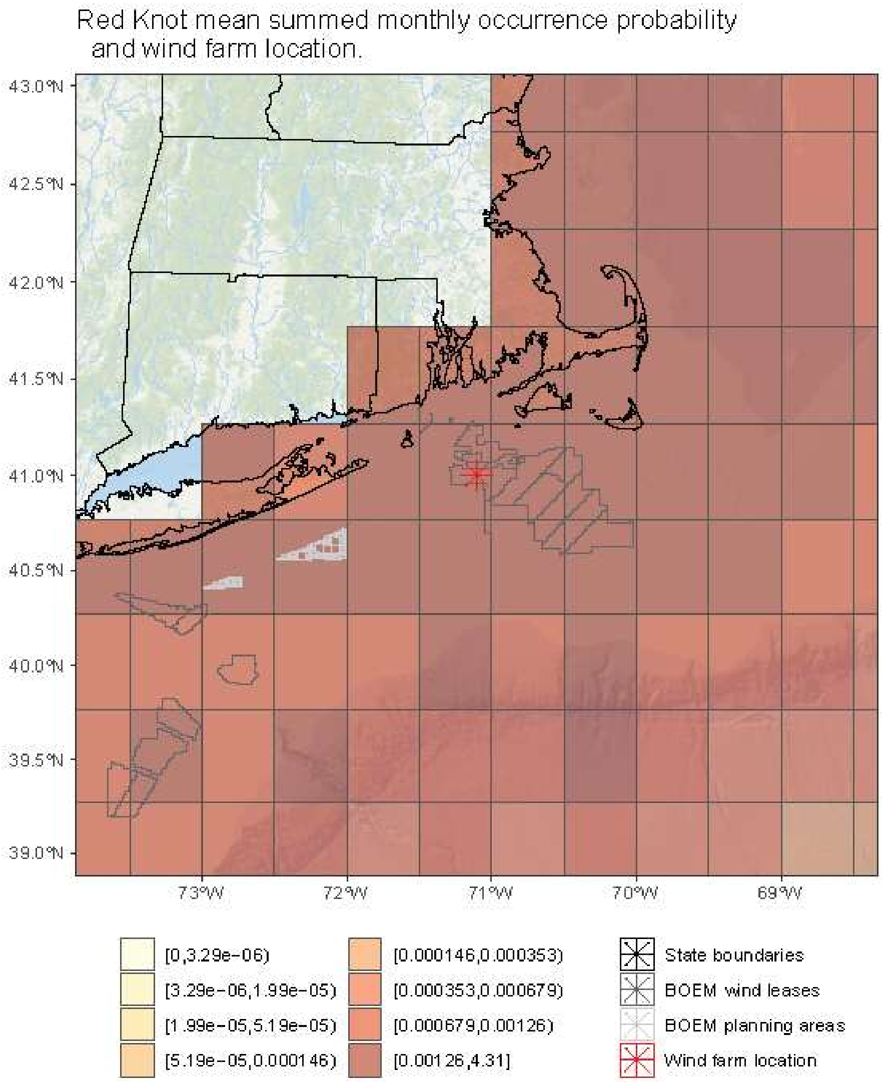

Figure 1: A map of the species occurrence probabities and wind farm location.

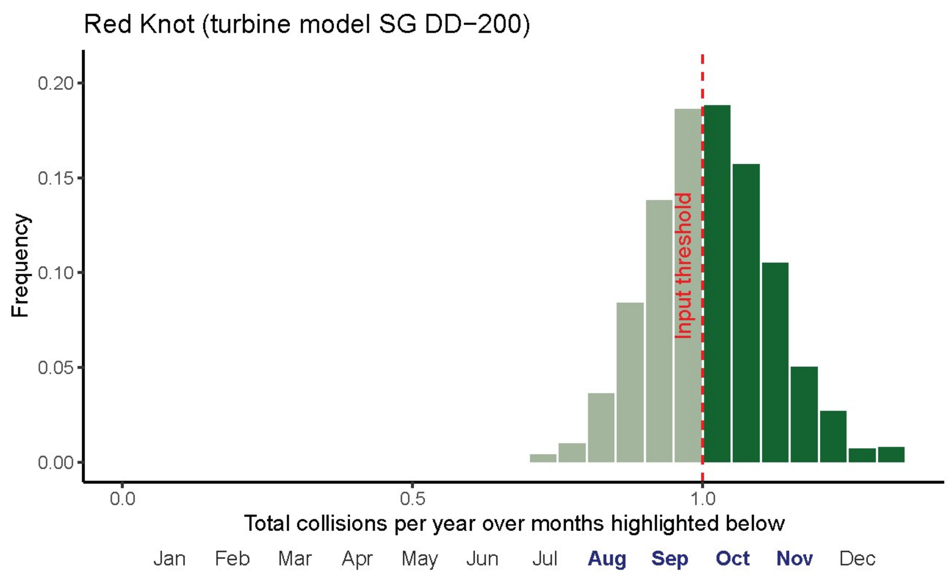

Figure 2: A frequency histogram of the total number of collisions per year. The heights of the bars show the relative frequency of each value. Months for which movement data were provided or available are shown in bold; only bold months are shown in histogram of annual collisions.

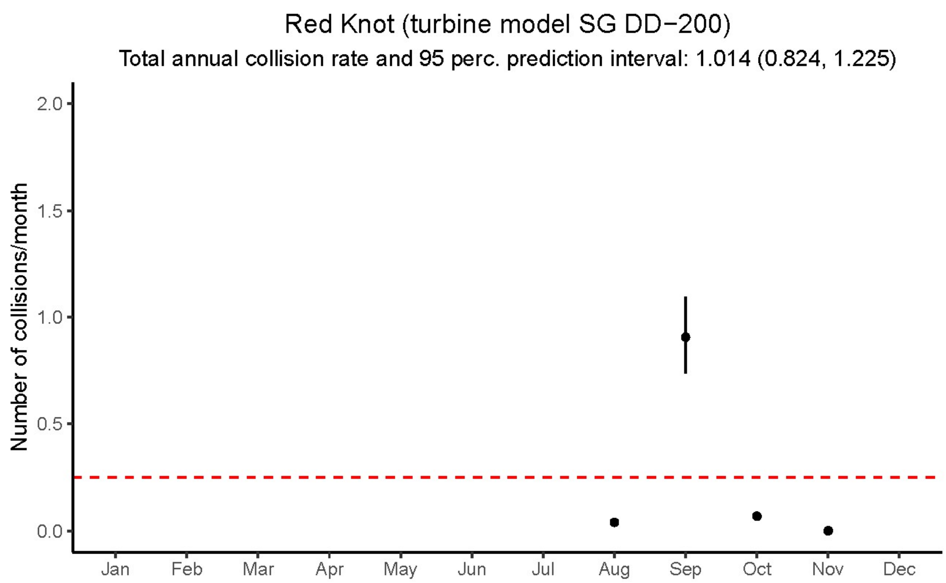

Figure 3: The predicted mean and 95 perc. prediction intervals of the number of collisions per month. Results are not shown for months that do not have movement data. Total annual collision rate and 95 perc. prediction interval are given at top. The threshold is shown divided by the number of months that movement data were available.

COLLISION RISK ASSESSMENT
Sheet 1 - Input data

(light green)	used in overall collision risk sheet
(yellow-green)	used in migrant collision risk sheet
(orange)	used in single transit collision risk sheet or extended model
(lavender)	used in available hours sheet
(light yellow)	used in large array correction sheet
(pink)	not used in calculation but stated for reference

Bird data	Units	Value	Data sources	Source
Species name		Roseate tern		
Bird length	m	0.37		Gilbert et al 2022, Table A12
Wingspan	m	0.76		Gilbert et al 2022, Table A12
Flight speed	m/sec	12.8		Gilbert et al 2022, Table A12
Nocturnal activity factor (1-5)		1		Table A-8, Robinson Willmott et al., 2013 value = 1 (PL data confirms)
Flight type, flapping or gliding		flapping		

Bird survey data	Units	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daytime bird density	birds/sq km													
Proportion at rotor height	%	6.0%												
Proportion of flights upwind	%	37.5%												

Birds on migration data	Units	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Source
Migration passages	birds					4331	4331	817	817	8657	8657				Adult, fledglings, non-breeding, numbers devived from Mostello unpub data & Nisbet et al 2014
Width of migration corridor	km	135													Migration front is Block Island to Monomoy
Proportion at rotor height	%	6%													Loring et al 2019, Table 18 Fed waters
Proportion of flights upwind	%	37.5%													Loring et al 2019, Fig 50

Windfarm data	Units	Value	Data sources	Source
Name of windfarm site		Sunrise		
Latitude	degrees	41.00		
Number of turbines		94		BA
Width of windfarm	km	39		Calculated from BA Figure 3
Tidal offset	m	1		

Turbine data	Units	Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Source
Turbine model		SG DD-200 11 MW													BA, Table 1
No of blades		3													BA, Table 1
Rotation speed	rpm	9.03													Max, M. Evans email 10/5/22
Rotor radius	m	97													Offshore Wind Turbine SG 11.0-200 DD I Siemens Gamesa
Hub height	m	140													BA, Table 1
Monthly proportion of time operational	%		93%	93%	93%	93%	93%	93%	91%	92%	92%	93%	93%	93%	Total Operation = MonthOp*(1 – MonthOpMean), calc from M. Evans email 10/5/22*
Max blade width	m	5.800													BA, Table 1
Pitch	degrees	6.005													M. Evans email 10/5/22

Avoidance rates used in presenting results	Value		Data sources (if applicable)
	95.01%	X	Table A2, recommended avoid rates for all other terns, extended (2012) Band model, Cook 2021
	98.00%		
	99.00%		
	99.50%		

*Apr & aug were averaged using vals 1 mon before and after

COLLISION RISK ASSESSMENT (BIRDS ON MIGRATION)

Sheet 2 - Overall collision risk

All data input on Sheet 1:
no data entry needed on this sheet!
other than to choose option for final tables

from Sheet 1 - input data
from Sheet 6 - available hours
from Sheet 3 - single transit collision risk
from survey data
calculated field

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year average
Bird details:															
Species		Roseate tern													
Flight speed	m/sec	12.8													
Flight type		flapping													
Windfarm data:															
Number of turbines		94													
Rotor radius	m	97													
Minimum height of rotor	m	140													
Total rotor frontal area	sq m	2778569													
Proportion of time operational	%		93%	93%	93%	93%	93%	93%	91%	92%	92%	93%	93%	93%	92.7%
Stage A - flight activity															**per annum**
Migration passages			0	0	0	4331	4331	817	817	8657	8657	0	0	0	**27610**
Migrant flux density	birds/ km		0	0	0	32.081	32.08148	6.051852	6.051852	64.12593	64.12593	0	0	0	
Proportion at rotor height	%	6%													
Flux factor			0	0	0	459	459	87	87	918	918	0	0	0	
Option 1 -Basic model - Stages B, C and D															
Potential bird transits through rotors			0	0	0	29	29	6	6	59	59	0	0	0	**187**
Collision risk for single rotor transit	(from sheet 3)	4.8%													
Collisions for entire windfarm, allowing for non-op time, assuming no avoidance	birds per month or year		**0**	**0**	**0**	**1**	**1**	**0**	**0**	**3**	**3**	**0**	**0**	**0**	**8**
Option 2-Basic model using proportion from flight distribution			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Option 3-Extended model using flight height distribution															
Proportion at rotor height	(from sheet 4)	0.0%													
Potential bird transits through rotors	Flux integral	0.0000	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Collisions assuming no avoidance	Collision integral	0.00000	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Average collision risk for single rotor transit		#DIV/0!													
Stage E - applying avoidance rates															
Using which of above options?	**Option 3**	0.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Collisions assuming avoidance rate	birds per month or year	95.01%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		98.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		99.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		99.50%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Collisions after applying large array correction		95.01%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		98.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		99.00%	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		99.50%	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Summary of simulation results from SCRAM: a stochastic collision risk assessment for movement data

08 December 2022

SCRAM was developed by Biodiversity Research Institute, the University of Rhode Island, and the U.S. Fish and Wildlife Service with funding from the Bureau of Ocean Energy Management.

SCRAM run details

```
## SCRAM - the Stochastic Collision Risk Assessment for Movement version
## Version: 0.91.1 - Lyrical Brachycarpus
## Iterations: 1000
## Model option: Option 3: slower but more accurate assessment
## Project: Sunrise
## Modeler: David Bigger
## The model run was started at: Thu Dec 08 17:01:46 2022 EST
## The model run was completed at: Thu Dec 08 17:23:56 2022 EST
## Run 1: the probability of exceeding specified threshold (1) is < 0.001.
```

Model inputs used for this analysis

Table 1: Species input parameters (mean and 95 perc. range).

Species	Turbine model	Avoidance	Wing span	Body length	Speed
Roseate Tern	SG DD-200	0.93 (0.92, 0.94)	0.76 (0.72, 0.8)	0.37 (0.33, 0.41)	12.79 (3.94, 22.1)

Table 2: Species monthly (Jan-Jun) population estimates ± SD and assumptions/limitations as specified by the USFWS using the most recent data.

Species	Jan	Feb	Mar	Apr	May	Jun
Roseate Tern	0 ± 0	0 ± 0	0 ± 0	10916 ± 0	10916 ± 0	10916 ± 0

Table 3: Species monthly (Jul-Dec) population estimates ± SD and assumptions/limitations as specified by the USFWS using the most recent data.

Species	Jul	Aug	Sep	Oct	Nov	Dec
Roseate Tern	16251 ± 0	16251 ± 0	16251 ± 0	16251 ± 0	0 ± 0	0 ± 0

Population data assumptions/limitations:
1) Entire NW Atlantic pop could be present in area during months listed.
2) Average of most recent (2018 and 2019) productivity data from three largest colonies (representing >90 perc. of population) representative of entire population.
3) Fledging and post-breeding dispersal period occurs from July through Sept.
4) Numbers of non-breeding adults are not included.
5) Does not include non-breeding 1 and 2 year old birds that return but do not breed.
6) From Gochfeld and Burger (2020): Northeastern birds first arrive at Nantucket and Martha's Vineyard, MA, in large flocks, then disperse north as well as west. They arrive 26 Apr-20 May at Bird I., MA (Nisbet 1980, Nisbet 1981b, Nisbet 1989b), slightly later at Falkner I., CT, and Great Gull I., NY.
7) From Gochfeld and Burger (2020): Apparently all birds migrate directly from the staging area around Cape Cod across the w. North Atlantic to the West Indies (Nisbet 1984, C. Mostello). Very small numbers occur at sea off N. Carolina from late Aug to late Sep, with a peak in early Sep; the latest date was 28 Oct (D. Lee).

Table 4: Wind farm input parameters (mean and 95 perc. range).

Species	Turbine model	Num. turbines	Rotor radius	Hub height (m)	Blade width (m)	Wind speed (mps)
Roseate Tern	SG DD-200	94 (94, 94)	97 (97, 97)	137 (137, 137)	5.8 (5.8, 5.8)	7.46 (5.05, 10.12)

Table 5: Wind farm input parameters (mean and 95 perc. range).

Species	Turbine model	Prop. upwind	Rotor speed (rpm)	Pitch (radians)	Farm width (km)	Lat.	Long.
Roseate Tern	SG DD-200	1 (1, 1)	4.04 (2.74, 5.48)	0.11 (0.1, 0.11)	39 (39, 39)	41	-71.1

Table 6: Monthly wind farm operational data (mean and 95 perc. range) is given for each wind farm specification.

Species	Turbine model	Jan Op.	Feb Op.	Mar Op.	Apr Op.	May Op.	Jun Op.
Roseate Tern	SG DD-200	93.1 (90.4, 95.7)	93 (90.7, 95.3)	92.6 (90.2, 95.2)	93 (90.2, 96.1)	93.3 (89.7, 96.9)	93.1 (88.7, 97)

Table 7: Monthly wind farm operational data (mean and 95 perc. range) is given for each wind farm specification.

Species	Turbine model	Jul Op.	Aug Op.	Sep Op.	Oct Op.	Nov Op.	Dec Op.
Roseate Tern	SG DD-200	91.4 (87.3, 95.4)	91.9 (87.3, 96.4)	92.4 (88, 97.2)	92.9 (89.3, 96.6)	93 (90.9, 95)	92.9 (90.3, 95.4)

Results for the SCRAM simulation

Table 8: The predicted mean and 95 perc. prediction intervals of the number of collisions per month and the total summed monthly number of collisions and 95 perc. prediction interval. Results are not shown for months that do not have movement data.

Species	Turbine model	month	Mean number of collisions	Lower pred. interval	Upper pred. interval
Roseate Tern	SG DD-200	Jan			
Roseate Tern	SG DD-200	Feb			
Roseate Tern	SG DD-200	Mar			
Roseate Tern	SG DD-200	Apr			
Roseate Tern	SG DD-200	May			
Roseate Tern	SG DD-200	Jun	0	0	0
Roseate Tern	SG DD-200	Jul	0.001	0	0.002
Roseate Tern	SG DD-200	Aug	0	0	0.001
Roseate Tern	SG DD-200	Sep	0	0	0.001
Roseate Tern	SG DD-200	Oct			
Roseate Tern	SG DD-200	Nov			
Roseate Tern	SG DD-200	Dec			
Roseate Tern	SG DD-200	annual	0.001	0.001	0.003

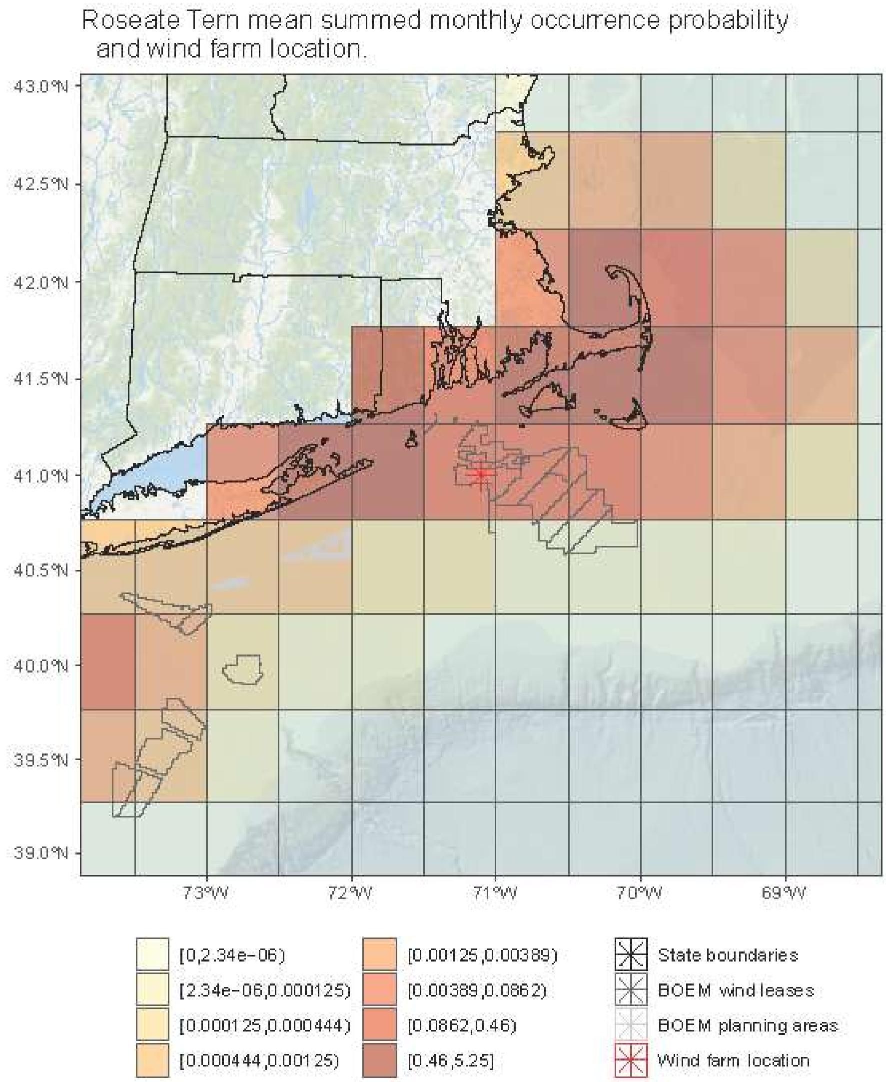

Figure 1: A map of the species occurrence probabities and wind farm location.

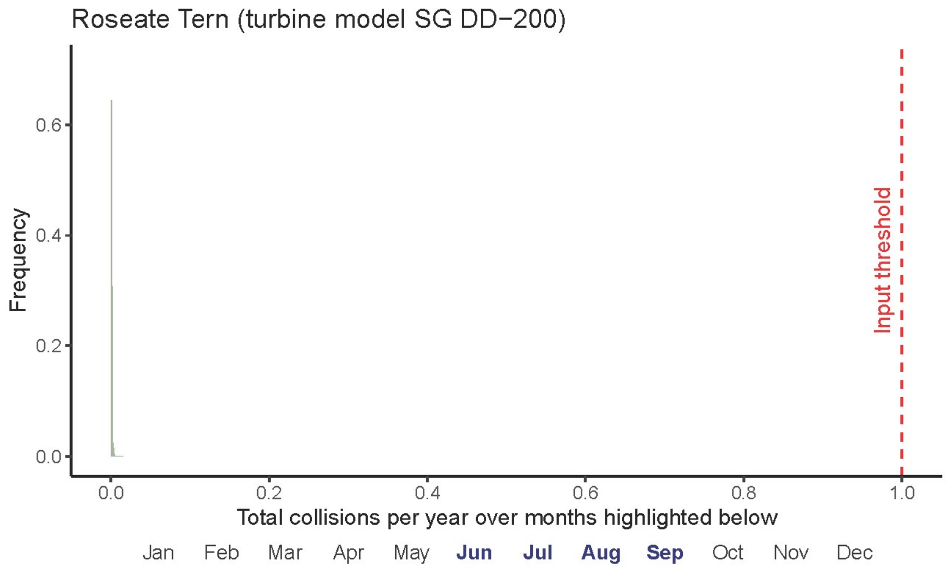

Figure 2: A frequency histogram of the total number of collisions per year. The heights of the bars show the relative frequency of each value. Months for which movement data were provided or available are shown in bold; only bold months are shown in histogram of annual collisions.

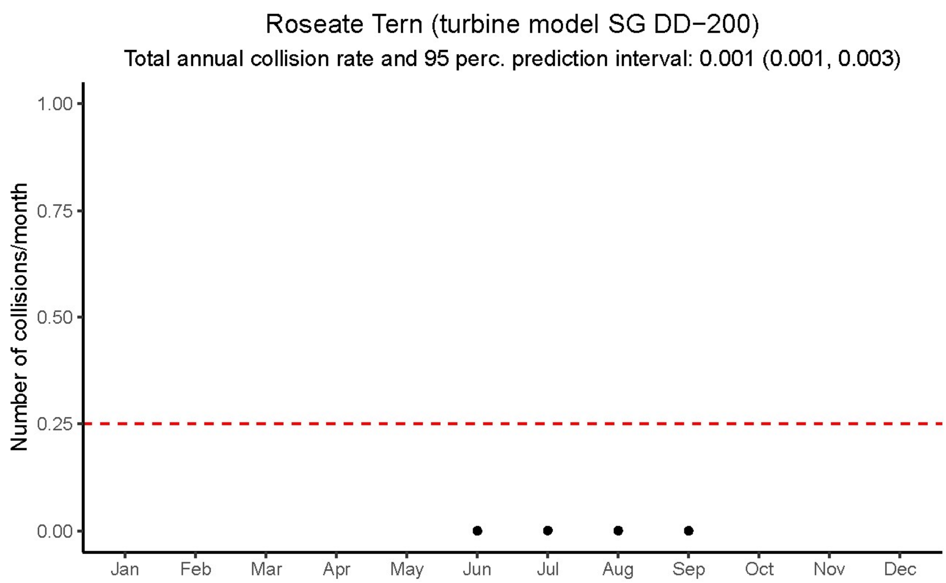

Figure 3: The predicted mean and 95 perc. prediction intervals of the number of collisions per month. Results are not shown for months that do not have movement data. Total annual collision rate and 95 perc. prediction interval are given at top. The threshold is shown divided by the number of months that movement data were available.

Appendix C
Avian and Bat Post-Construction Monitoring Framework

Sunrise Wind Farm Project

Appendix P2
Post-construction Avian and Bat Monitoring Framework

Prepared for:

Sunrise Wind | Powered by Ørsted & Eversource

August 19, 2022

Sunrise Wind | Powered by Ørsted & Eversource

Sunrise Wind Avian and Bat Post-Construction Monitoring Framework

Submitted by:
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Introduction

Sunrise Wind LLC (Sunrise Wind), a 50/50 joint venture between Orsted North America Inc. (Orsted NA) and Eversource Investment LLC (Eversource), proposes to construct and operate the Sunrise Wind Farm (SRWF) and the Sunrise Wind Export Cable (SRWEC), collectively the Sunrise Wind Farm Project (hereinafter referred to as the Project). The wind farm portion of the Project will be in Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0487 (Lease Area), south of Martha's Vineyard, Massachusetts, and east of Montauk, New York. The Project's generating capacity will range between 924 megawatts (MW) and 1,034 MW with power transmitted to shore on direct current (DC) submarine cables. This *SRWF Avian and Bat Post-Construction Monitoring Framework* (hereafter the "Framework") focuses solely on the offshore footprint of the Project within the Lease Area, and does not apply to the offshore export cable, cable landfall, or onshore portions of the Project.

Sunrise Wind has developed this Framework to outline an approach to post-construction monitoring that supports advancement of the understanding of bird and bat interactions with offshore wind farms. The scope of monitoring is designed to meet federal requirements [30 CFR 585.626(b)(15) and 585.633(b)] and is scaled to the size and risk profile of the Project with a focus on species of conservation concern.

The intent of the Framework is to outline overarching monitoring objectives, monitoring questions, proposed monitoring elements, and reporting requirements. A detailed *Avian and Bat Post-Construction Monitoring Plan* (Monitoring Plan), based on this Framework, will be developed in coordination with BOEM, U.S. Fish and Wildlife Service (USFWS), and other relevant regulatory agencies prior to beginning monitoring. Where feasible, monitoring conducted at the SRWF will be coordinated with monitoring at neighboring Orsted/Eversource offshore wind projects—South Fork Wind Farm (SFWF) and Revolution Wind Farm (RWF)—to facilitate integrated analyses across a broader geographic area.

Monitoring objectives, questions, and associated methods are summarized in Table 1. Technical approaches were selected based on offshore logistical constraints, their ability to address monitoring objectives, and their effectiveness in the marine environment. Emerging technologies, such as multi-sensor radar/camera collision detection systems, are not proposed under this Framework because they have not yet been broadly deployed offshore or demonstrated to effectively reduce uncertainties related to potential impacts on birds and bats.

Table 1. Monitoring objectives, questions, general approaches to be used, and duration.

Taxa	Monitoring Objective	Primary Questions	Approach	Duration
Bats	Monitor occurrence of bats	What times of year and under what environmental conditions are bats detected in the wind farm?	Acoustics	2 years
Birds	Monitor use by ESA listed birds	What times of year and under what environmental conditions are ESA birds present in the wind farm?	Radio-tags	up to 3 years
Birds	Monitor use by nocturnal migratory birds	What are the flux rates and flight heights of nocturnally migrating birds?	Radar	1–2 years
Birds	Monitor movement of marine birds around the turbines	What are the avoidance rates of marine birds?	Radar	1–2 years
Both	Document mortality	What dead or injured species are found incidentally?	Incidental observations	Project lifetime

Bat Acoustic Monitoring

The presence of bats in the marine environment has been documented in the U.S. (Hatch et al. 2013, Solick and Newman 2021). However, there remains uncertainty regarding the extent to which bats occur offshore, particularly within offshore wind farms. Acoustic detectors are commonly used to study bat movements and migration (Johnson et al. 2011). Following the approach taken at SFWF (Final Environmental Impact Statement Appendix F[1]), Orsted/Eversource would conduct bat acoustic monitoring to assess bat activity at SRWF, targeting key data gaps related to species presence/composition, temporal patterns of activity, and correlation with weather and atmospheric conditions. <u>The primary monitoring questions are: What times of year and under what environmental conditions are bats detected in the wind farm?</u>

Acoustic monitoring of bat presence would be conducted for two years post-construction. A detector would first be tested onsite to determine if there is any sound interference. Contingent on a successful test, ultrasonic bat detector stations would be installed on the offshore convertor station, wind turbine platforms, and/or buoys. The specific number and location of detector stations would be selected to optimize study design goals, and would be determined in cooperation with BOEM, USFWS, and other relevant regulatory agencies. While specific timing would be dictated by logistics, detectors would likely be deployed in the early spring or late winter (March), and removed in the late fall or early winter (December) after migration, or the most appropriate period as determined in cooperation with BOEM, USFWS, and other relevant regulatory agencies. The detectors would record calls of both cave-hibernating bats, including the northern long-eared bat (*Myotis septentrionalis*), and migratory tree bats; the resulting information can be used to identify bats to species. All acoustic data recorded would be

[1] https://www.boem.gov/renewable-energy/state-activities/south-fork

processed with approved software to filter out poor quality data and identify the presence of bat calls. Where information is insufficient to make a species identification, calls would be classified to one of two phonic groups: low frequency bats (LoF), or high frequency bats (HiF). The HiF group includes both migratory tree bats and cave hibernating bats. Since HiFi include the ESA-listed northern long-eared bat, they would then be manually vetted by an experienced acoustician to the highest resolution possible (e.g., species or genus).

All bat calls detected and identified would be analyzed to understand relationships with time of day, season, and weather/atmospheric conditions. The results would provide information on bat presence offshore and the conditions under which they may occur near offshore wind turbines.

Motus Tracking Network and ESA Use Study

Tracking studies indicate that at least some individual ESA-listed Piping Plovers (*Charadrius melodus*), Red Knots (*Calidris canutus rufa*), and Roseate Terns, may pass through the Rhode Island and Massachusetts lease areas (Loring et al. 2018, 2019). However, due to limited coverage of onshore automated telemetry receiving stations and low probability of detecting tags (hereafter, Motus receivers and tags) in the offshore environment (Loring et al. 2019), there remains uncertainty related to offshore movements of ESA-listed birds in New England. Sunrise Wind would install offshore Motus receiver stations and contribute funding to radio-tagging efforts to address this data gap. The exact species being studied would be determined in consultation with federal agencies and would be dependent on existing, ongoing field efforts. The Motus receivers would also provide opportunistic presence/absence data on other species carrying Motus tags, such as migratory songbirds and bats. The primary monitoring questions are: What times of year and under what environmental conditions are ESA birds present in the wind farm?

Movements of radio-tagged ESA-listed birds in the vicinity of the SRWF would be monitored for up to three years post-construction, during the spring, summer, and fall. Motus receivers would be installed within the wind farm to determine the presence/absence of ESA-listed species. The specific number and location of offshore receiver stations would be selected to optimize study design goals, and would be determined using a design tool currently being developed through a New York State Energy Research and Development Authority (NYSERDA) funded project[2]. If there is a need identified by USFWS and in coordination with efforts at SFWF and RWF, existing Motus receiver stations at up to two onshore locations near the SRWF would be refurbished or maintained to confirm the presence and movements of radio-tagged ESA-species in areas adjacent to SRWF. Funding for up to 150 Motus tags per year would be provided to researchers working with ESA-listed birds for up to three consecutive years.

ESA-listed bird presence/absence in the wind farm would be analyzed by comparing detections within the wind farm to coastal receiver towers. All detections would be analyzed to understand relationships with time of day, season, and weather.

[2] https://www.briloon.org/renewable/automatedvhfguidance

Radar Monitoring: Nocturnal Migrants Flux and Flight Heights

Nocturnal migrants, including songbirds and shorebirds, are documented to fly offshore (Adams et al. 2015, Loring et al. 2020). Since nocturnal migration events are episodic and cannot be detected during daytime surveys, there is uncertainty on the timing and intensity of migration offshore. Radar, oriented vertically, has been used at offshore wind farms in Europe to study nocturnal migration events (Hill et al. 2014). Orsted/Eversource is considering conducting a one-to-two-year radar study across SRWF, SFWF, and RWF to record the passage rates (flux) of migrants and flight heights. The primary monitoring questions are: What are the flux rates and flight heights of nocturnally migrating birds?

Since radar approaches to monitoring birds are actively evolving and feasibility would need to be determined, a specific system and methods would be identified closer to when the projects begin operating. The results would be related to time of year and weather conditions, to increase the understanding on when nocturnal migrants may have higher collision risk.

Radar Monitoring: Marine Bird Avoidance

Marine birds, particularly loons, sea ducks, auks, and the Northern Gannet (*Morus bassanus*), have been documented to avoid offshore wind farms, potentially leading to displacement from habitat (Goodale and Milman 2016). However, there remains uncertainty on how birds would respond to Orsted/Eversource's large turbines that would be spaced one nautical mile apart. Based on methods used by Desholm and Kahlert (2005), Skov et al. (2018), and others, Orsted/Eversource is considering conducting a one-to-two-year cross-project (SRWF, SFWF, and RWF) radar study to collect data on macro (and potentially meso—i.e., flying between turbines) avoidance rates. These data on avoidance would support understanding of both displacement and collision vulnerability. The primary monitoring questions is: What are the avoidance rates of marine birds?

Documentation of Dead and Injured Birds and Bats

Sunrise Wind, or its designated operator, would implement a reporting system to document dead or injured birds or bats found incidentally on vessels and project structures during construction, operation, and decommissioning. The location would be marked using GPS, an Incident Reporting Form would be filled out, and digital photographs taken. Any animals detected that could be ESA-listed, would have their identity confirmed by consulting biologists, and a report would be submitted to the designated staff at Sunrise Wind who would then report it to BOEM, USFWS, and other relevant regulatory agencies. Carcasses with federal or research bands or tags would be reported to the U.S. Geological Survey (USGS) Bird Band Laboratory, BOEM, and USFWS.

Adaptive Monitoring

Adaptive monitoring is an important principle underlying Sunrise Wind's post-construction monitoring Framework. Over the course of monitoring, Sunrise Wind would work with BOEM, USFWS, and other relevant regulatory agencies, to determine the need for adjustments to monitoring approaches, consideration of new monitoring technologies, and/or additional periods of monitoring, based on an ongoing assessment of monitoring results. Potential triggers for adaptive monitoring may include, but not be limited to, equipment failure, an unexpected impact to birds or bats identified through monitoring, or new opportunities to collaborate with other projects in the region. The Monitoring Plan would include a series of potential adaptive monitoring actions, developed in coordination with BOEM, USFWS, and other relevant regulatory agencies, to be considered as appropriate.

Reporting

Sunrise Wind would submit an annual report to BOEM and USFWS summarizing post-construction monitoring activities, preliminary results as available, and any proposed changes in the monitoring program. Sunrise Wind would participate in an annual meeting with BOEM and USFWS to discuss the report.

References

Adams, E., P. Chilson, and K. Williams (2015). Chapter 27: Using WSR-88 weather radar to identify patterns of nocturnal avian migration in the offshore environment. [Online.] Available at https://www.briloon.org/uploads/Library/item/450/file/MABS Project Chapter 27 - Adams et al 2015.pdf.

Desholm, M., and J. Kahlert (2005). Avian collision risk at an offshore wind farm. Biology Letters 1:296–298.

Goodale, M. W., and A. Milman (2016). Cumulative adverse effects of offshore wind energy development on wildlife. Journal of Environmental Planning and Management 59:1–21. doi: 10.1080/09640568.2014.973483

Hatch, S. K., E. E. Connelly, T. J. Divoll, I. J. Stenhouse, and K. A. Williams (2013). Offshore observations of eastern red bats (*Lasiurus borealis*) in the Mid-Atlantic United States using multiple survey methods. PLoS ONE 8:e83803. doi: 10.1371/journal.pone.0083803

Hill, R., K. Hill, R. Aumuller, A. Schulz, T. Dittmann, C. Kulemeyer, and T. Coppack (2014). Of birds, blades, and barriers: Detecting and analysing mass migration events at alpha ventus. In Ecological Research at the Offshore Windfarm alpha ventus (Federal Maritime and Hydrographic Agency and Federal Ministry of the Environment Nature Conservation and Nuclear Safety, Editors). Springer Spektrum, Berlin, Germany, pp. 111–132. doi: 10.1007/978-3-658-02462-8

Loring, P. H., J. D. McLaren, P. A. Smith, L. J. Niles, S. L. Koch, H. F. Goyert, and H. Bai (2018). Tracking Movements of Threatened Migratory rufa Red Knots in U.S. Atlantic Outer Continental Shelf Waters. OCS Study BOEM 2018-046. US Department of the Interior, Bureau of Ocean Energy Management, Sterling (VA) 145 pp.

Loring, P. H., P. W. C. Paton, J. D. McLaren, H. Bai, R. Janaswamy, H. F. Goyert, C. R. Griffin, and P. R. Sievert (2019). Tracking offshore occurrence of Common Terns, endangered Roseate Terns, and threatened Piping Plovers with VHF arrays. [Online.] Available at https://espis.boem.gov/final reports/BOEM_2019-017.pdf.

Loring, P., A. Lenske, J. McLaren, M. Aikens, A. Anderson, Y. Aubrey, E. Dalton, A. Dey, C. Friis, D. Hamilton, B. Holberton, et al. (2020). Tracking Movements of Migratory Shorebirds in the US Atlantic Outer Continental Shelf Region. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2021-008. 104 p.

Skov, H., S. Heinanen, T. Norman, R. M. Ward, S. Mendez-Roldan, and I. Ellis (2018). ORJIP Bird Collision and Avoidance Study. Final Report - April 2018.

Solick, D., and C. Newman (2021). Oceanic records of North American bats and implications for offshore wind energy development in the United States. Ecology and Evolution:1–15. doi: 10.1002/ece3.8175