Empire Offshore Wind: Empire Wind Projects (EW 1 and EW 2) Biological Assessment

For the United States Fish and Wildlife Service

November 2022

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

BOEM
Bureau of Ocean Energy Management

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS AND ACRONYMS

Abbreviation	Definition
ADLS	Aircraft Detection Lighting System
APM	Applicant-proposed measure
BA	Biological Assessment
BOEM	Bureau of Ocean Energy Management
Call	Call for Information and Nominations
CFR	Code of Federal Regulations
COP	Construction and Operations Plan
EA	Environmental Assessment
EIS	Environmental Impact Statement
Empire	Empire Offshore Wind, LLC
ESA	Endangered Species Act
EW 1	Empire Wind 1 Project
EW 2	Empire Wind 2 Project
FAA	Federal Aviation Administration
GAP	Gap Analysis Project
GPS	global positioning system
HDD	horizontal directional drilling
IPaC	Information for Planning and Consultation
IPF	impact-producing factor
kV	kilovolt
Lease Area	Lease Area OCS-A 0512
MDAT	Marine-life Data and Analysis Team
MW	megawatt
nm	nautical mile
NYCEDC	New York City Economic Development Corporation
NYPA	New York Power Authority
NYSDEC	New York State Department of Environmental Conservation
NYSERDA	New York State Energy Research and Development Authority
O&M	operations and maintenance
OCS	Outer Continental Shelf
OSS	Offshore Substation
PDE	Project Design Envelope
POI	point of interconnection
Projects	Empire Wind Projects
RAL	radar-activated light
ROW	right-of-way
rpm	revolutions per minute
RSZ	rotor-swept zone
SBMT	South Brooklyn Marine Terminal
SCRAM	Stochastic Collision Risk Assessment for Movement
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service

Abbreviation	Definition
USGS	U.S. Geological Survey
WEA	Wind Energy Area
WNS	white-nose syndrome
WTG	wind turbine generator

1. Introduction

Pursuant to Section 7(a)(2) of the Endangered Species Act (ESA), the Bureau of Ocean Energy Management (BOEM) requests informal consultation with the U.S. Fish and Wildlife Service (USFWS) regarding species that may be affected by the approval of a Construction and Operations Plan (COP) for the Empire Wind Projects (Projects). As detailed in the COP (Empire 2022), the proposed Projects would include the construction, operations and maintenance (O&M), and eventual decommissioning of the approximately 816-megawatt (MW) Empire Wind 1 Project (EW 1) and 1,260-MW Empire Wind 2 Project (EW 2) (Figure 1). EW 1 would consist of up to 57 wind turbine generators (WTG), interarray cables, an Offshore Substation (OSS), up to 40 nautical miles (nm) (74 kilometers) of submarine export cable, a cable landfall at South Brooklyn Marine Terminal (SBMT), an onshore substation, and interconnection cable to the point of interconnection (POI) to the electrical grid at Gowanus Substation in Brooklyn, New York. EW 2 would consist of up to 90 WTGs, interarray cables, an OSS, up to 26 nm (48 kilometers) of submarine export cable, up to two cable landfalls in Long Beach or Lido Beach, New York, onshore cable route options, and an onshore substation and POI to the electrical grid in Oceanside, New York. The EW 1 and EW 2 wind energy facilities are within BOEM Renewable Energy Lease Area OCS-A 0512 (Lease Area) of the New York Bight Wind Energy Area (WEA) on the Outer Continental Shelf (OCS), approximately 14 miles (12 nm, 24 kilometers) south of Long Island, New York and 19.5 miles (16.9 nm) east of Long Branch New Jersey, respectively.

This Biological Assessment (BA) evaluates the potential effects of the proposed Projects on federally listed species under the jurisdiction of USFWS that would occur or potentially occur within the Project area if BOEM were to approve the COP. Federally listed species under the jurisdiction of the National Marine Fisheries Service are being evaluated in a separate BA. This BA describes the proposed Projects (Section 2), defines the Action Area (Section 3), describes the federally listed species potentially affected by the proposed Projects (Section 4), provides an analysis and determination of how the proposed Projects may affect listed species or their habitats (Section 5), and states BOEM's ESA Section 7 effects determinations (Section 6).

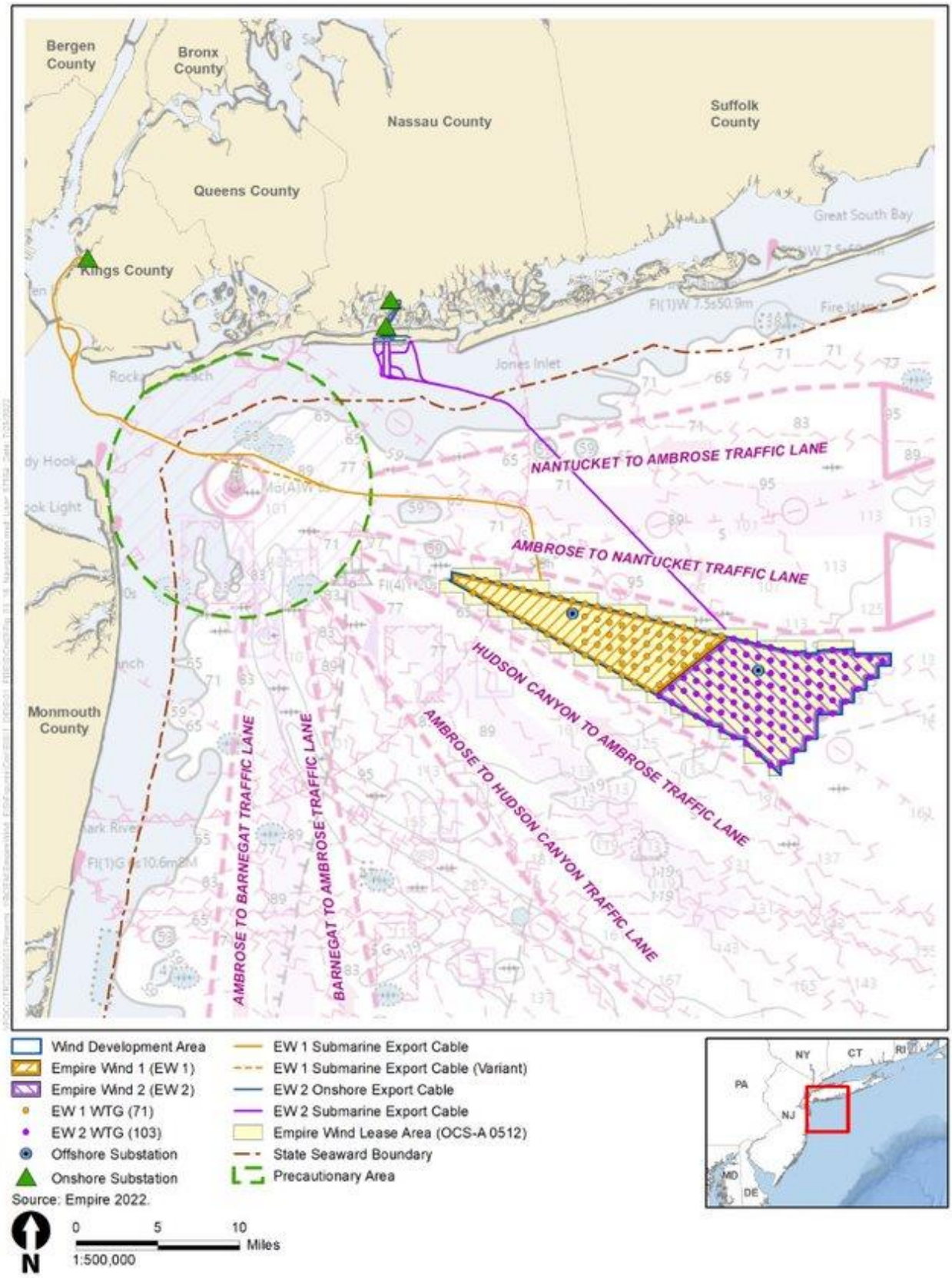


Figure 1 Empire Wind Project Location

1.1. Background

In 2009, the Department of the Interior announced final regulations for the OCS Renewable Energy Program, which was authorized by the Energy Policy Act of 2005. The act, implemented by BOEM, provides a framework for issuing leases, easements, and rights-of-way (ROW) for OCS activities. BOEM's renewable energy program occurs in four distinct phases: (1) planning and analysis, (2) lease issuance, (3) site assessment, and (4) construction and operations. The location of the WEA was identified by BOEM through a multi-year effort by state and federal regulatory agencies to identify OCS areas suitable for offshore renewable energy development in the Mid-Atlantic. The original Area of Interest considered by BOEM for leasing was reduced in size and aliquots were removed to address potential environmental constraints, user group conflicts, navigational safety, public health and safety, and stakeholder concerns (e.g., commercial fishing). The history of BOEM's planning and leasing activities for the Lease Area includes the following:

- On September 8, 2011, BOEM received an unsolicited request from New York Power Authority (NYPA), Long Island Power Authority, and Consolidated Edison for a commercial lease from NYPA. The proposal included the installation of up to 194 3.6-MW WTGs, yielding a potential 700 MW of wind energy generation.
- On January 4, 2013, BOEM issued a Request for Interest in the *Federal Register* under Docket No. BOEM-2012-0083 to assess whether there are other parties interested in developing commercial wind facilities in the same area proposed by NYPA. In addition to inquiring about competitive interest, BOEM also sought public comment on the NYPA proposal, its potential environmental consequences, and the use of the area in which the proposed project would be located. In response, BOEM received indications of interest from Fishermen's Energy, LLC and Energy Management, Inc.
- After reviewing nominations of interest received in response to the Request for Interest, BOEM determined that competitive interest in the area proposed by NYPA exists and initiated the competitive leasing process pursuant to 30 Code of Federal Regulations (CFR) 585.211. On May 28, 2014, BOEM published a Call for Information and Nominations (Call) under Docket No. BOEM-2013-0087 to seek additional nominations from companies interested in commercial wind energy leases within the Call area. BOEM also sought public input on the potential for wind development in the Call area, including comments on site conditions, resources, and existing uses of the area that would be relevant to BOEM's wind energy development authorization process. In response to the Call, BOEM received three additional nominations, for a total of six, plus one additional qualifications package submission.
- On the same day BOEM published the Call (May 28, 2014), BOEM also published a Notice of Intent to prepare an Environmental Assessment (EA) for commercial wind leasing and site assessment activities within the Call area.
- On June 6, 2016, BOEM published a Proposed Sale Notice for Commercial Leasing for Wind Power on the Outer Continental Shelf Offshore New York (Docket No. BOEM-2016-0027) and a Notice of Availability for the EA for commercial wind leasing and site assessment activities (Docket No. BOEM-2016-0038).
- On October 27, 2016, BOEM published the Final Sale Notice for a lease sale offshore New York (Docket No. BOEM-2016-0071).
- On October 31, 2016, BOEM published a Notice of Availability for a revised EA (Docket No. BOEM-2016-0066). Within the EA, BOEM issued a Finding of No Significant Impact, which concluded that reasonably foreseeable environmental effects associated with the activities that would likely be performed following lease issuance (e.g., site characterization surveys in the WEA and deployment of meteorological buoys) would not significantly affect the environment (BOEM 2016).

In response to the public comments BOEM received on the original EA, five aliquots (approximately 1,780 acres [720 hectares]) were removed from the northwestern portion of the initial WEA due to concerns over the sensitive habitat on Cholera Bank.

- On December 15–16, 2016, the lease sale for an area offshore New York, or the New York Lease Area, was held by BOEM, pursuant to 30 CFR 585.211. Statoil Wind US, LLC (subsequently renamed to Equinor Wind US, LLC in 2018) was awarded Lease Area OCS-A 0512.
- Equinor Wind US, LLC submitted a Site Assessment Plan for Lease Area OCS-A 0512 to BOEM in June 2018, with revisions filed in July, August, and October 2018. BOEM determined the Site Assessment Plan was complete on August 22, 2018, and BOEM approved the Site Assessment Plan on November 21, 2018.
- Empire Offshore Wind, LLC (Empire) submitted its COP on January 10, 2020. An updated COP was submitted on April 14, 2021, and again on July 6, 2021.
- On June 24, 2021, BOEM published a Notice of Intent to Prepare an Environmental Impact Statement (EIS) for the Empire Wind Projects offshore New York (Docket No. BOEM-2021-0038).

1.2. Consultation History

This informal consultation for Proposed Action builds upon BOEM's experience with similar offshore wind assessment and development projects in the Atlantic.

- BOEM was involved in consultation with USFWS regarding the construction, O&M, and decommissioning of offshore WTGs for the Cape Wind Energy Project in federal waters of Nantucket Sound, Massachusetts. The USFWS biological opinion (dated November 21, 2008) concluded that the proposed Cape Wind Energy Project was not likely to jeopardize the continued existence of the threatened piping plover (*Charadrius melodus*) and endangered roseate tern (*Sterna dougallii dougallii*) and that, in all cases except collisions, the effects were insignificant or discountable and would not result in take (mortality) of roseate terns and piping plovers (USFWS 2008).
- On March 24, 2011, BOEM requested informal ESA Section 7 consultation with USFWS for lease issuance and site assessment activities off New Jersey, Delaware, Maryland, and Virginia. On June 20, 2011, USFWS concurred with BOEM's determinations that the risk to the endangered roseate tern, threatened piping plover, endangered Bermuda petrel (*Pterodroma cahow*), and candidate *rufa* red knot (*Calidris canutus rufa*) regarding lease issuance, associated site characterization (survey work), and site assessment activities (construction, O&M, and decommission of buoys and meteorological towers) was "small and insignificant" and therefore "not likely to adversely affect" the three federally listed species and one candidate species.
- On October 19, 2012, BOEM requested informal ESA Section 7 consultation with USFWS for lease issuance and site assessment activities off Rhode Island and Massachusetts. On November 1, 2012, USFWS concurred with BOEM's determination that the proposed action was "not likely to adversely affect" the endangered roseate tern, threatened piping plover, and candidate *rufa* red knot. To evaluate collision risk, USFWS recommended the placement of visibility sensors on the meteorological towers to collect data on the occurrence, frequency, and duration of poor visibility conditions.
- BOEM was a cooperating agency with the U.S. Army Corps of Engineers (USACE), which informally consulted with USFWS on the Deepwater Wind Block Island Wind Facility and Block Island Transmission System. The Block Island Wind Facility is composed of five 6-MW WTGs within 3 miles (2.6 nm, 4.8 kilometers) of Block Island, Rhode Island. On July 31, 2013, USFWS concurred that the proposed Block Island Wind Facility and Block Island Transmission System were "not likely to adversely affect" the American burying beetle (*Nicrophorus americanus*), roseate tern,

piping plover, or *rufa* red knot "due to insignificant (should never reach the scale where take occurs) and discountable (extremely unlikely to occur) effects."

- On February 12, 2014, BOEM requested informal ESA Section 7 consultation with USFWS for lease issuance and site assessment activities offshore North Carolina, South Carolina, and Georgia. On March 17, 2014, USFWS concurred with BOEM's determination that commercial wind lease issuance and site assessment activities would "not likely adversely affect" the Bermuda petrel, Kirtland's warbler (*Setophaga kirtlandii*), roseate tern, piping plover, and *rufa* red knot.
- BOEM was the lead agency and informally consulted with USFWS on the Virginia Offshore Wind Technology Advancement Project. The project is composed of two 6-MW WTGs 27.6 miles (24 nm, 44.4 kilometers) offshore with a subsea export cable making landfall on Camp Pendleton Beach. On January 29, 2015, USFWS acknowledged the determinations of "no effect" on hawksbill sea turtles (*Eretmochelys imbricata*) and leatherback sea turtles (*Dermochelys coriacea*) and "not likely to adversely affect" the green sea turtle (*Chelonia mydas*), Kemp's ridley sea turtle (*Lepidochelys kempii*), loggerhead sea turtle (*Caretta caretta*), piping plover, *rufa* red knot, roseate tern, Bermuda petrel, and black-capped petrel (*Pterodroma hasitata*). On March 27, 2019, USFWS completed its review of the revised plan and found that no effects on federally listed species or designated critical habitat would occur.
- On September 3, 2020, BOEM requested informal consultation from USFWS regarding the approval of the Vineyard Wind Offshore Energy Project COP for the construction, O&M, and decommissioning of a commercial-scale offshore wind energy facility within a BOEM Renewable Energy Least Area (OCS-A 0501) 14 miles southeast of Martha's Vineyard, Massachusetts. On October 16, 2020, USFWS concurred with BOEM's determination that the project would "not likely adversely affect" the roseate tern, piping plover, and *rufa* red knot.
- On January 28, 2021, BOEM requested informal consultation from USFWS regarding the approval of the South Fork Offshore Wind COP for the construction, O&M, and decommissioning of a commercial-scale offshore wind energy facility within a BOEM Renewable Energy Least Area (OCS-A 0486) 19 miles southeast of Block Island, Rhode Island and 35 miles east of Montauk Point, New York. On March 14, 2021, USFWS concurred with BOEM's determination that the project would "not likely adversely affect" the roseate tern, piping plover, *rufa* red knot, seabeach amaranth (*Amaranthus pumilus*), and northern long-eared bat (*Myotis septentrionalis*).
- On August 10, 2021, BOEM requested informal consultation with USFWS for lease and grant issuance and site assessment activities on the Atlantic OCS of the New York Bight. On March 15, 2021, USFWS concurred with BOEM's determination that commercial wind lease issuance and site assessment activities would "not likely adversely affect" the Bermuda petrel, roseate tern, piping plover, and *rufa* red knot.
- On May 27, 2022, BOEM requested informal consultation from USFWS regarding the approval of the Ocean Wind COP for the construction, O&M, and decommissioning of a commercial-scale offshore wind energy facility within a BOEM Renewable Energy Lease Area (OCS-A 0498). BOEM has determined that the Proposed Action would have "no effect" on the bog turtle or American chaffseed. BOEM has also determined that the Proposed Action "may affect, but is not likely to adversely affect" the northern long-eared bat, piping plover, *rufa* red knot, roseate tern, eastern black rail, saltmarsh sparrow, monarch butterfly, Knieskern's beaked-rush, seabeach amaranth, sensitive joint-vetch, and swamp pink.

On February 16, 2022, in preparation for this BA, BOEM used USFWS's Information for Planning and Consultation (IPaC) system to determine that six federally listed, proposed, or candidate species occur or potentially occur in the Action Area (see details in Section 3, *Action Area*, and Section 4, *Covered Species*).

2. Description of Proposed Action

The Proposed Action (Alternative A in the EIS) is to construct, operate, maintain, and eventually decommission EW 1 and EW 2 within the range of design parameters described in Volume 1 of the Empire Wind COP (Empire 2022). EW 1 would consist of up to 57 WTGs, interarray cables, an OSS, up to 40 nm (74 kilometers) of submarine export cable, a cable landfall at SBMT, an onshore substation, interconnection cable, and a POI at Gowanus Substation in Brooklyn, New York. EW 2 would consist of up to 90 WTGs, interarray cables, an OSS, up to 26 nm (48 kilometers) of submarine export cable, up to two cable landfalls on Long Beach or Lido Beach, New York, onshore cable route options, an onshore substation, and a POI in Oceanside, New York. The key components of the Projects are summarized in Table 1, and a schematic of the Project components is depicted on Figure 2. COP Volume 1, Section 3.0 (Empire 2022) provides further details and discussion on the description of the Proposed Action and construction methods and schedule, which this document summarizes below.

Table 1 Project Components

Project Component	Location	Project Details & Envelope Characteristic(s)
Wind Turbines	Offshore	• Up to 57 WTGs (EW 1) • Up to 90 WTGs (EW 2) • Rotor diameter up to 853 feet (260 meters) • Hub height above HAT up to 525 feet (160 meters) • Upper blade tip above HAT up to 951 feet (290 meters) • Lower blade tip above HAT height 85 feet (26 meters)
Foundations	Offshore	• Two foundation types: monopiles to support WTGs and piled jackets to support OSS • Foundation piles to be installed using a pile-driving hammer and drilling techniques • Scour protection likely to be required around all foundations
Interarray Cable	Offshore	• Target burial depth of 6 feet (1.8 meters), depending on site conditions • Final interarray cable arrangement will depend on WTG layout, environmental conditions, detailed electrical design, seabed conditions, and micro-siting requirements • Total interarray cable length not anticipated to exceed 116 nm for EW 1 • Total interarray cable length not anticipated to exceed 144 nm for EW 2 • Cable lay, installation, and burial: cable burial methods being considered include plowing, jetting, trenching, and dredging

Project Component	Location	Project Details & Envelope Characteristic(s)
Offshore Substations	Offshore	• One OSS for EW 1 • One OSS for EW 2 • Height of topside up to 92 feet (28 meters); height above MSL (topside only) up to 174 feet (53 meters); height above MSL (with ancillary structures) up to 295 feet (90 meters); base height above MSL (air gap) 72 feet (22 meters) • Maximum length of topside structure 203 feet (62 meters) • Maximum width of topside structure 194 feet (59 meters) • OSS installed atop a piled jacket foundation substructure • Foundation piles to be installed using a pile-driving hammer and drilling techniques • Scour protection installed at foundation locations where required
Offshore Export Cable	Offshore	• Two export cable route corridors: EW 1 and EW 2 • EW 1: Up to two maximum 230-kV export cables up to 40 nm (74 kilometers) long • EW 2: Up to three 230-kV export cables up to 26 nm (48 kilometers) long • Minimum target depth of 6 feet (1.8 meters). In federally maintained areas minimal burial depth would be 15 feet (4.7 meters) below the current or future authorized depth or depth of existing seabed (whichever is greater) • If target depth cannot be achieved, protection measures would be required • Cable lay, installation, and burial: cable burial methods being considered include plowing, jetting, trenching, and dredging
Landfall for the Offshore Export Cable	Onshore	• EW 1: landfall would occur at SBMT • EW 2: up to four export cable landfall options; up to two may be required • Cable landfall at EW 1 is proposed to be installed using trenchless installation (HDD or Direct Pipe) or trenched. Cable landfall at any of the EW 2 landings would use trenchless installation (HDD or Direct Pipe) (COP Section 2.1.4.3; Empire 2022)

Project Component	Location	Project Details & Envelope Characteristic(s)
Onshore Export Cable	Onshore	• All onshore export cables would be buried • The EW 1 submarine export cable would likely connect directly into the onshore substation with no onshore export cable required, due to the short distance from landfall to the onshore substation • For EW 2, multiple onshore export cable route segments are considered • EW 2 onshore export cable would connect with offshore cables at a TJB and carry electricity to the onshore substation • Would be housed in concrete duct banks and buried to a minimum depth of 3 feet (0.9 meter) • EW 2 could require up to a 150-foot (46-meter) construction corridor width and up to a 25-foot (8-meter) operational corridor width • Two circuits for EW 1 and three circuits for EW 2 of three single-core cables with a copper or aluminum conductor and insulation designed for voltage levels of 230 kV • TJBs, splice vaults/grounding link boxes, and fiber optic system, including manholes; open cut or trenchless (e.g., HDD, jack and bore)
Onshore Substations and Interconnector Cable	Onshore	• EW 1: one onshore substation on 4.8 acres in a portion of SBMT. The location is a large, paved terminal used for a variety of uses. Up to a total of 10.8 acres could be disturbed during construction. • EW 2: one onshore substation with two locations being considered. Substation A would be on 6.4 acres on a developed privately owned parcel on the corner of Daly Boulevard and Hampton Road, in Oceanside, New York. Up to 7.8 acres could be disturbed during construction of the substation. Substation C would be on a mostly developed 5.2-acre privately owned parcel that is adjacent to Railroad Place, in Island Park. • The onshore substation would contain enclosed buildings or walled structures that contain various equipment, such as switchgears, control equipment, batteries, reactive compensation equipment, and harmonic filters, and a designated outdoor area to house outdoor equipment like transformers and reactors. • The maximum height of the main building at the EW 1 substation would be 49 feet (15 meters) and the maximum height of the main building at EW 2 Substations A and C would be 60 feet (18 meters) • Interconnector cable to existing substation would be buried and would consist of two circuits with six cables for EW 1 and three circuits with 18 cables for EW 2, with copper or aluminum conductors enclosed in insulation. • EW 1 interconnector cable could require up to a 50-foot (15-meter) construction corridor width and EW 2 could require up to a 100-foot (30-meter) construction corridor width; both EW 1 and EW 2 could require up to a 25-foot (8-meter) operational corridor width.

Source: COP Volume 1, Section 3; Empire 2022.

HAT = highest astronomical tide; HDD = horizontal directional drilling; kV = kilovolts; MSL = mean sea level; TJB = Transition Joint Bay

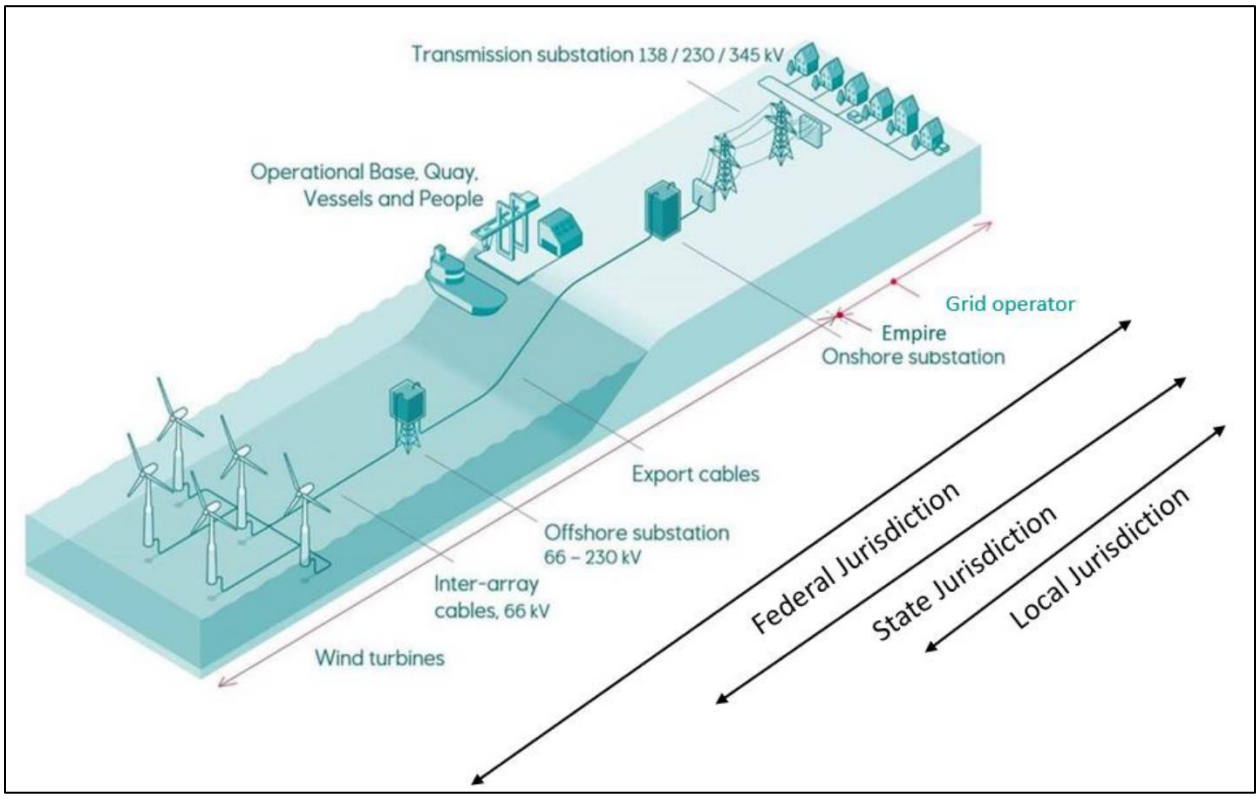


Figure 2 Overall Project Operational Concept

2.1. Construction and Installation

The Proposed Action would include the construction and installation of both onshore and offshore facilities. Empire anticipates beginning land-based construction for the onshore substations prior to construction of the offshore components and onshore export and interconnection cables. The schedule anticipates that construction of EW 1 and EW 2 would be sequential, but there may be overlap during construction of the onshore substations and during installation of the submarine cables. Table 2 summarizes the Project construction and installation schedule. A indicative construction schedule that shows the timeline for construction activities for onshore and offshore Project components for EW 1 and EW 2 is included in COP Volume 1, Chapter 1, Figure 1.2-4 (Empire 2022).

Table 2 Estimated Construction Schedule

Construction Activity	Time Period
Onshore Substation	Q4 2023 to Q4 2025
Onshore Export and Interconnection Cables	Q4 2024 to Q4 2025
Offshore Export Cable Installation	Q3 2024 and Q4 2025
Interarray Cable Installation	Q2 2025 to Q3 2026
OSS Jacket and Topside	Q2 2025 to Q2 2026
WTG Foundations and Installation	Q2 2025 to Q4 2027

Source: COP Volume 1, Figure 1.2-4; Empire 2022.
Q = quarter

2.1.1 Onshore Activities and Facilities

Proposed onshore Project elements include the landfall site for the submarine export cable, onshore export cable route(s), onshore substations, and the interconnection cables linking the onshore substations to the POIs to the existing electrical grid. EIS Appendix E, *Project Design Envelope and Maximum-Case Scenario*, describes the Project Design Envelope (PDE) for onshore activities and facilities, and COP Volume 1, Section 3.4 provides details on construction and installation methods (Empire 2022).

The EW 1 submarine export cable landfall would be at the SBMT site along the Brooklyn Waterfront and adjacent to 1st Avenue/2nd Avenue. The parcel is owned by New York City, leased to the New York City Economic Development Corporation (NYCEDC), and is the same parcel in which the onshore substation would be located. Empire would undertake dredging to install the submarine export cable along the northeastern side of the 35th Street Pier and repair a bulkhead on the substation parcel. The EW 1 submarine export cable would likely connect directly into the onshore substation, with no onshore export cable required, due to the short distance from landfall to the onshore substation. SBMT is a large, paved terminal with a variety of uses. The onshore substation would be constructed within an approximately 4.8-acre (1.9-hectare) portion of the SBMT property, with a maximum main building height of 49 feet (15 meters). An approximately 0.2-mile (0.3-kilometer) length of interconnection cable would then connect the onshore substation to the Gowanus POI owned and operated by Consolidated Edison. Figure 3 shows the proposed locations for the EW 1 landfall, onshore substation, interconnection cable, and connection to the Gowanus POI.

Figure 3 Empire Wind 1 Onshore Cable Routes and Landfall Locations

Empire is evaluating four options for the EW 2 export cable landfall (Figure 4) and up to two export cable landfall locations may be required. The four options for the EW 2 landfall include:

- **EW 2 Landfall A:** This export cable landfall would be within the city of Long Beach public ROW at Riverside Boulevard. Horizontal directional drilling (HDD) or Direct Pipe operations would be staged in a vacant, privately owned parcel adjacent to Riverside Boulevard and East Broadway.
- **EW 2 Landfall B:** This export cable landfall would be at an existing paved parking lot to the north of Shore Road and east of Monroe Boulevard in the city of Long Beach. HDD or Direct Pipe operations would be staged in a vacant, privately owned parcel adjacent to Monroe Boulevard and East Broadway.
- **EW 2 Landfall C:** This export cable landfall would be at an existing paved parking lot at the Lido West Town Park in Lido Beach, Town of Hempstead. The parking lot is owned by the Town of Hempstead.
- **EW Landfall E:** EW 2 Landfall E is in the city of Long Beach and is the farthest west of the export cable landfall sites evaluated along Long Beach. EW 2 Landfall E includes an area within the city of Long Beach public ROW at the intersection of Laurelton Boulevard and West Broadway, as well as a small parcel to the northwest of the intersection. A larger parcel to the southeast of the intersection may be used for staging. Both private parcels are categorized as vacant commercial land. HDD or Direct Pipe operations may be staged in adjacent vacant privately owned parcels.

Based on existing conditions along the export cable landfall and onshore export and interconnection cable routes, both trenchless (e.g., HDD and jack and bore) and trenched (open-cut trench) methods are proposed for installation of onshore and interconnection cables. Open-cut alternatives are currently being considered for the EW 1 landfall and inland waterway crossings for EW 2 due to limitations of HDD methods, like conflicting existing infrastructure, loose soil and sediment, or limited workspace. HDD or Direct Pipe would be used at any of the EW 2 landfall locations, which would avoid beach and dune habitats. Open-cut alternatives require open-cut trenching and dredging or jetting to facilitate installation at target burial for approach to landside. Jetting uses pressurized water jets to create a trench within the seabed, where the export cable then sinks into the seabed or waterway as displaced sediment resettles and naturally backfills the trench. Dredging excavates or removes sediment, creating a channel to allow the cable to make landfall or transit across a waterway or wetland crossing at the target installation depth. Dredging can be completed through clamshell dredging, suction hopper dredging, or hydraulic dredging. No backfilling is proposed for dredging if used for landfall or waterway and wetland crossings.

At some locations, like landfall locations at a developed shoreline such as the EW 1 landfall location, and inland waterway or wetland crossings, additional installation methods are being considered including cofferdams, through bulkheads, and over bulkheads. The cofferdam method would remove a portion of the bulkhead and install cofferdam shoring material. Upland material would then be excavated to develop a grade beneath the mudline at the bulkhead line where the cable would be laid directly. For the through bulkhead method, conduit openings would be installed at the bottom of the bulkhead, approximately 4 feet (1.2 meters) below the mudline. A temporary dredge pit would be created at the base of the bulkhead adjacent to the conduit openings. The export cable would then be laid by pulling the end of each cable from the cable-laying vessel through the conduits created and temporarily anchoring them onshore. The temporary dredge pit would then be backfilled with native dredge material, if suitable. Once the cables are in place, scour protection would be installed at the toe of the bulkhead around the end of the conduit and armored stone and bedding would be placed a minimum of 4 feet above the submarine export cables to approximately 80 feet (24 meters) in front of the cable landfall. The over bulkhead method is similar where the export cable is routed through a mildly sloped steel conduit over the edge of the bulkhead down toward the mudline. The export cables would be supported by a steel structure between the bulkhead and the mudline and could be designed to be structurally independent from the bulkhead.

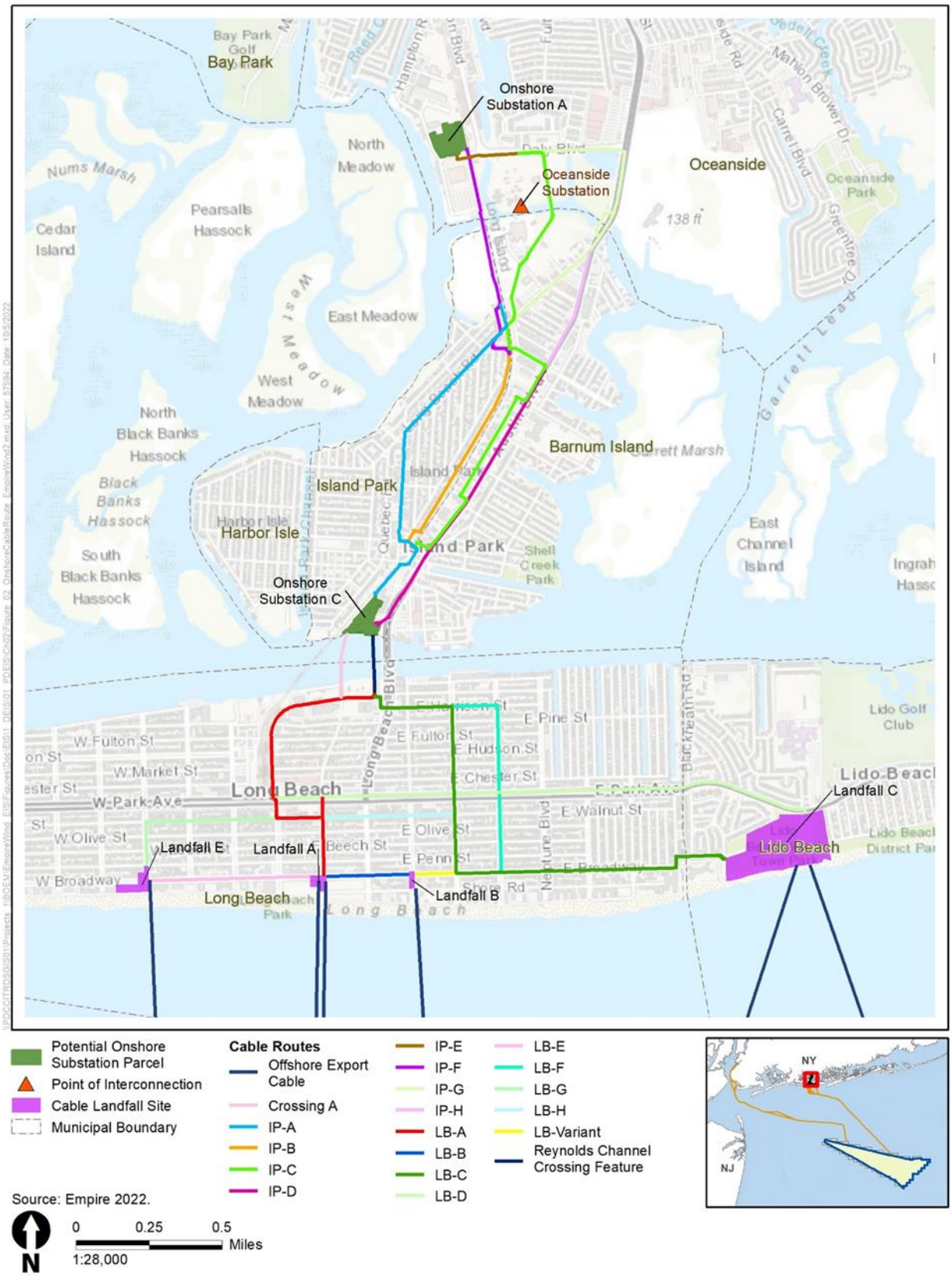


Figure 4 Empire Wind 2 Onshore Cable Routes and Landfall Locations

Once the submarine export cables make landfall, they would then connect to the onshore substation via the onshore cable route options shown on Figure 4. Along the onshore cable route, the onshore export and interconnection cables would be installed using open-cut trench technology, except where trenchless methods, such as HDD, are necessary. Open trenching consists of excavating a trench along the onshore export cable route. During excavation activities, the material is stockpiled next to the trench. The onshore electrical components, such as the duct banks and onshore export cables, are installed within the trench, which is then backfilled, typically using the excavated soil if suitable.

For landfall, inland waterway or wetland crossings, and onshore routing, HDD may be used to install cables under sensitive coastal and nearshore habitats, such as dunes, beaches, waterways, and submerged aquatic vegetation, or major infrastructure such as railroads and highways. For export cable landfalls, the HDD operations typically start from the onshore landfall location and exit offshore. For landfalls, onshore and offshore work areas are required. Target depths of landfall HDD paths vary by the length of the HDD and can be up to approximately 80 feet (24 meters). All EW 2 landfalls would employ HDD or Direct Pipe installation methods. The EW 1 landfall would employ trenchless or trenched installation methods.

Onshore, using a rig that drills, a horizontal borehole is created under the surface and exits onto the seafloor. The submarine cables are floated out to sea, then pulled back onshore within the drilled borehole. Onshore HDD used to avoid sensitive habitats is similar but requires two onshore work areas on either side of the avoided habitat. Starting at one onshore location, a borehole is created under the surface and exits to the other onshore location. The ducts and cables are then pulled back within the drilled borehole.

Direct Pipe® is a trenchless method that can be used when HDD methods present challenges for a particular crossing. The method allows for installing conduits beneath sensitive coastal and nearshore habitats, such as dunes, beaches, waterways, submerged aquatic vegetation, and other critical crossings. Direct Pipe is included as an option in the PDE for EW 2 export cable landfalls. Similar to HDD, Direct Pipe operations would originate from an onshore export cable landfall location and exit offshore, using both onshore and offshore work areas. The onshore work areas are typically within the export cable landfall parcels. Target depths of landfall paths vary by the length of the Direct Pipe and can be up to approximately 80 feet (24 meters). The Direct Pipe method involves using a pipe thruster to grip and push a steel pipe with a microtunnel boring machine. Once the microtunnel boring machine exits onto the seafloor and is removed, the duct used to house the electrical cable can be fabricated into a pipe string one joint at a time within the same onshore entry workspace area and pushed into the casing pipe previously installed using the Direct Pipe method.

The onshore export cables and interconnection cables may also be installed using the jack and bore methodology or other non-HDD trenchless technologies. While jack and bore is not the preferred onshore installation methodology, Empire is proposing it as part of the PDE to be utilized in the event that HDD and open-cut trench methodologies are not technically or commercially feasible to complete installation activities. Jack and bore is completed by installing a steel pipe or casing under existing roads, railways, or other infrastructure. This is completed by excavating a bore (entry) pit and receiving (exit) pit on either side of the crossing. An auger boring machine then jacks a casing pipe through the earth while at the same time removing earth spoil from the casing by means of rotating auger inside the casing. The onshore cable will then be pulled through the crossing.

The EW 2 onshore export cable route includes an inland waterway (Barnums Channel) crossing between Island Park and Oceanside, New York, which may be crossed by an above-water cable bridge. This trenchless crossing would use up to two support columns (pile caps) within the waterway to support the truss system, which would hold the cables above the water. These supports may be installed by hammer or other installation methods, up to 100 feet (30 meters) below the seabed, with final design subject to geotechnical investigation. These supports would include up to six 1.5-foot (0.5-meter)-diameter steel

pipe piles per pile cap, for a total of 12 steel pipe piles within the waterway. The cable bridge would be constructed from a prefabricated steel truss system assembled off site and set in place, and the structure would measure up to 25 feet (7.6 meters) wide and 8 feet (2.4 meters) tall and span a length of approximately 300 feet (91 meters). The crossing would be adjacent to the existing Long Island Railroad railway bridge. The structure is anticipated to have a total height of up to 15 feet (4.6 meters) above mean sea level, with a maximum total height of 30 feet (9.1 meters).

The EW 2 onshore substation would be on one of two possible sites: EW 2 Onshore Substation A in Oceanside or EW 2 Onshore Substation C in Island Park, New York. EW 2 Onshore Substation A would be on 6.4 acres (2.6 hectares) of privately owned property on the corner of Daly Boulevard and Hampton Road in Oceanside that is currently supporting industrial uses. EW 2 Onshore Substation C would be on an approximately 5.2-acre (2.1-hectare) privately owned property adjacent to Railroad Place in Island Park that contains existing commercial uses. The onshore substation (EW 2 Onshore Substation A or EW 2 Onshore Substation C) would connect into the Oceanside 138-kilovolt (kV) Substation (Oceanside POI) owned by National Grid and operated by Public Service Enterprise Group Incorporated Long Island.

2.1.2 Offshore Activities and Facilities

Proposed offshore Project components include WTGs and their foundations, OSS and their foundations, scour protection for foundations, interarray cables, and submarine export cables. The proposed offshore Project elements are on the OCS as defined in the Outer Continental Shelf Lands Act, with the exception that the submarine export cables within 3 nm of the shore would be in state waters (Figure 1). COP Volume 1, Section 3.4 provides additional details on construction and installation methods (Empire 2022).

Empire proposes the installation of up to 57 WTGs for EW 1 and up to 90 WTGs for EW 2 within the 65,458-acre (26,490-hectare) Wind Farm Development Area (Figure 5). WTGs would extend to a height of up to 951 feet (290 meters) above highest astronomical tide with a minimum spacing of no less than 0.65 nm between WTGs in a north-south orientation.

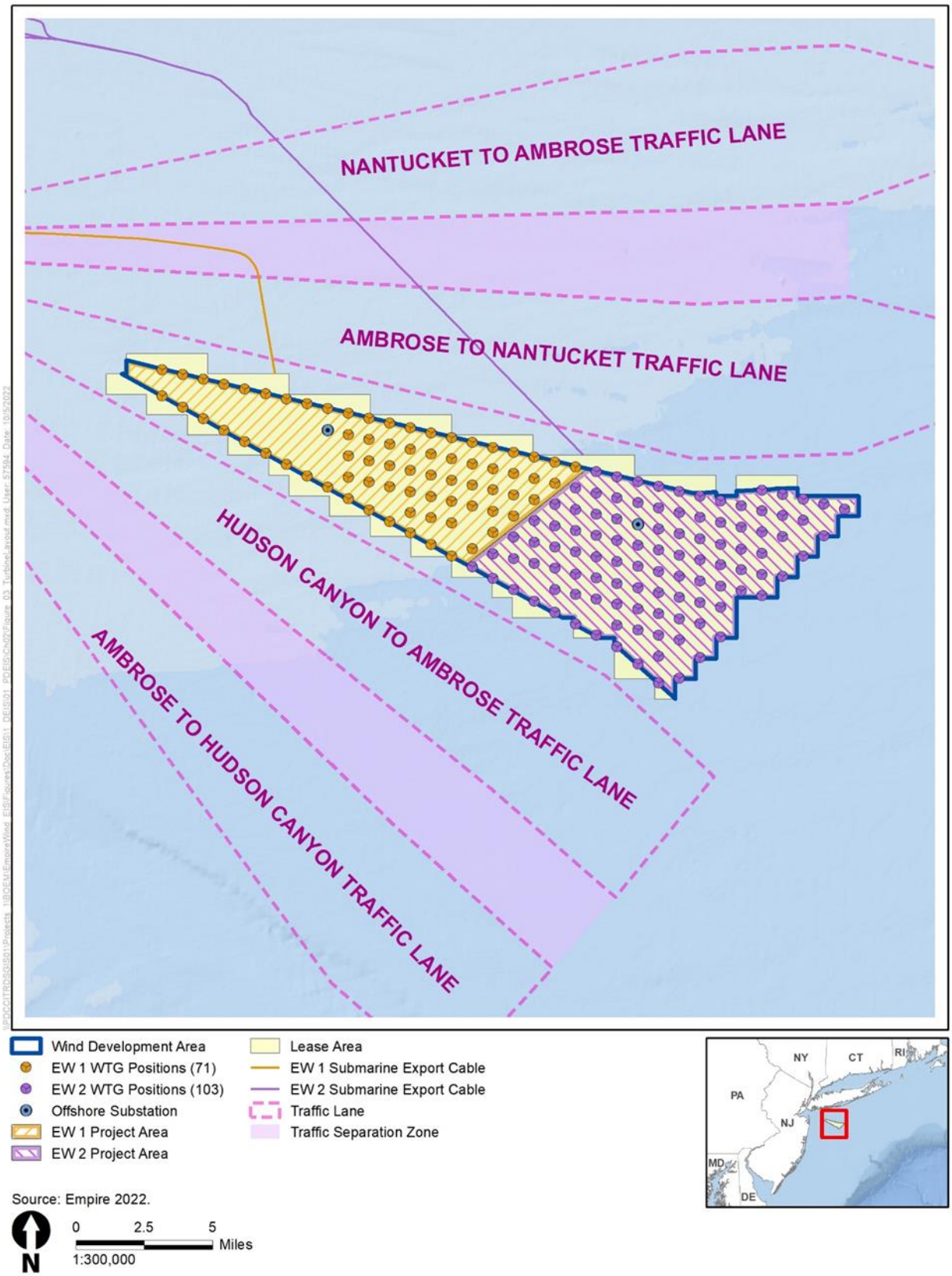


Figure 5 Proposed Action Turbine Array Layout

Empire would mount the WTGs on monopile foundations. A monopile foundation typically consists of a single steel tubular section, made up of sections of rolled steel plate welded together. A transition piece is fitted over the monopile and secured via bolts or grout. OSS would be installed on piled jacket foundations. Piled jacket foundations are formed by a steel lattice construction, composed of tubular steel members and welded joints, and secured to the seabed by hollow steel pin piles attached to each of the jacket feet. Where required, scour protection would be placed around foundations to stabilize the seabed near the foundations. The amount of scour protection necessary would be dependent upon site conditions and the type of foundation used. See Figure 6 for drawings of representative foundation types.

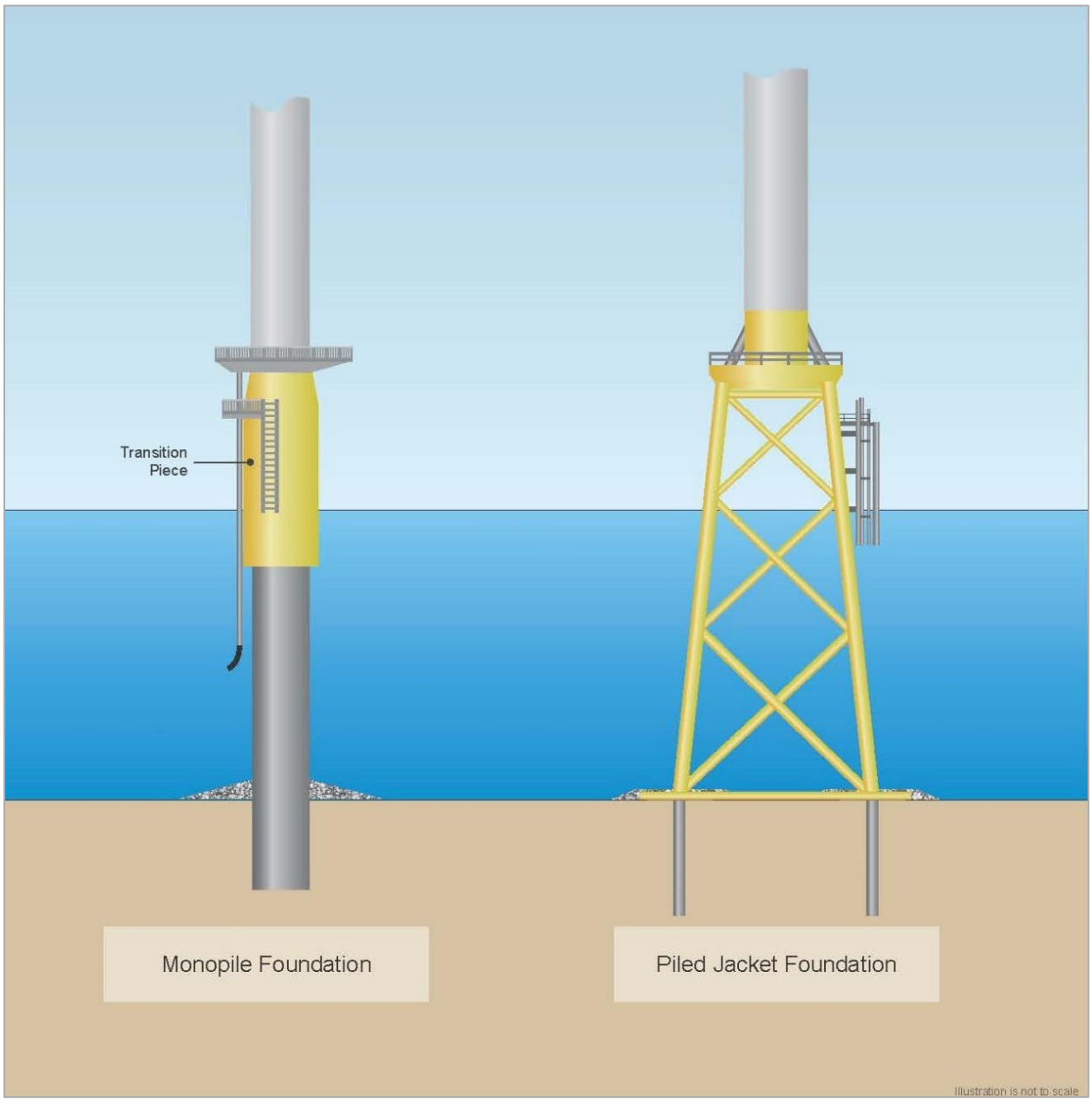


Figure 6 Monopile and Piled Jacket Foundation Types

Empire proposes to install foundations and WTGs using jack-up vessels, as well as other necessary installation vessels and barges. For monopile and piled jacket foundations, once the installation vessel is

in place, Empire would begin pile driving until the target embedment depth is met. Should the pile reach a point of refusal, drilling out some of the sediment inside the pile may be required to reduce piling resistance and achieve the desired penetration depth. Installation of both monopile and piled jacket foundations are similar, although piled jacket foundations will require more seabed preparation for each of the jacket feet. Scour protection, consisting of rock, rock bags, or concrete blocks, would be placed around foundations, if required.

Empire would construct up to two OSS, one for EW 1 and one for EW 2, to receive the electricity generated by WTGs via the interarray cables. Each OSS would include transformers to increase the voltage of the power received from the WTGs so the electricity can be efficiently transmitted onshore through the submarine and onshore export cables. The OSS would consist of a topside structure with one or more decks on a piled jacket foundation. An OSS is generally installed in two phases: first, the foundation substructure would be installed as described above, and then the topside structure would be installed on the foundation structure. More information on OSS installation can be found in COP Volume 1, Section 3.4.1.3 (Empire 2022).

The WTGs and OSS would be lit and marked in accordance with Federal Aviation Administration (FAA) and U.S. Coast Guard (USCG) requirements for aviation and navigation obstruction lighting, respectively, including USCG First District Local Notice to Mariners entry 44-20. In addition to adhering to FAA filing requirements for the WTGs, Empire would light and mark all WTGs in accordance with FAA Advisory Circular 70/7460-1L, BOEM's Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development (2021), and *International Association of Marine Aids (IALA) to Navigation and Lighthouse Authorities Recommendation O-139 on The Marking of Man-Made Offshore Structures* (IALA 2013), as applicable, unless a variance is approved by the applicable agency prior to construction. Empire would paint WTGs no lighter than radar-activated light (RAL) 9010 Pure White and no darker than RAL 7035 Light Grey. Additionally, foundation structures would be painted yellow from the level of highest astronomical tide up to 50 feet (15.3 meters). Empire proposes to implement an Aircraft Detection Lighting System (ADLS) to automatically activate lights when aircraft approach. All WTGs would require mid-level lighting at the halfway point between the top of the nacelle and ground level and WTGs more than 699 feet (213 meters) above ground level would require two additional flashing red lights on the back of the nacelle.

Empire proposes to construct separate submarine export cables for EW 1 and EW 2 within the submarine export cable route corridors identified in the COP and shown on Figure 1. The submarine export cable route for EW 1 would depart the Lease Area along its northern boundary, continue north-northwest across the outbound lane of the Ambrose to Nantucket Traffic Separation Scheme, and then enter the Separation Zone between the traffic lanes before turning to the west. The route would continue through the Traffic Separation Zone toward New York Harbor, reaching a Precautionary Area at the end of the traffic lanes. Prior to reaching the Precautionary Area, the route would enter a charted Danger Area and Empire has proposed an alternate route variant to traverse this section of the route. Approaching Gravesend Bay, Empire has proposed route variants for the EW 1 submarine export cable that would either route the submarine cable within the maintained Ambrose Channel or through the charted Anchorage #25 area. North of the Anchorage #25 area, the EW 1 route would then turn to the northeast and follow the Bay Ridge Channel to the landfall at SBMT (Figure 1 and Figure 2). The EW 2 submarine export cable route corridor would exit the Lease Area from the central north edge and travel in a relatively straight, northwestern direction, then turn west seaward of the New York state water boundary before making landfall in the vicinity of Long Beach or Lido Beach (Figure 1 and Figure 2).

Empire has proposed several cable installation methods for the interarray and submarine export cables. The cable burial methods being considered as part of the PDE are plowing, jetting, and trenching. Plowing creates a small trench by dragging a cable plow along the seabed. The cable is then placed in the trench and displaced sediment is either mechanically returned to the trench or the trench backfills

naturally. Jetting uses pressurized water jets to create a trench within the seabed. As the trench is created, the cable sinks into the seabed and is covered as the displaced sediment resettles. Jetting is considered the most efficient submarine cable installation method. Trenching is used on seabed with hard materials not suitable for plowing or jetting, as the trenching machine is able to cut through the material using a chain or wheel cutter fitted with picks. After the trench is created, the submarine cable is laid into it. The final cable burial method will be selected dependent on seabed conditions and required burial depth, and more than one method maybe selected. The interarray cables have a target burial depth of 6 feet (1.8 meters). The submarine offshore export cables would be buried to a minimum target burial depth of 6 feet (1.8 meters) below the seafloor outside of federally maintained areas (e.g., anchorages and navigation channels). In locations where the cable must cross federally maintained areas, the cable would be buried to a minimum burial depth of 15 feet (4.7 meters) below the authorized depth or depth of existing seabed, whichever is deeper.

While the submarine cables have been sited to avoid crossing existing cables and pipelines, a number of crossings would still be required. Crossing methods are based on a variety of factors including the material of the asset to be crossed, depth of the existing cable or pipeline, and whether the asset is in service. Generally, once the precise location of the existing infrastructure is determined, a layer of protection is installed on the seabed. Localized dredging may be required to minimize shoaling on the seabed before cable protection is installed. The submarine export cable is then laid over the first layer of protection. The submarine export cable may have a casing prior to placement. A second layer of protection is then installed over the submarine export cable. Finally, a final layer of protection may be installed based on the necessary burial depth, for stabilization and additional scour protection.

In the event that cables cannot achieve sufficient burial depths or other infrastructure needs to be crossed, Empire proposes the following protection methods: (1) rock placement, (2) concrete mattress placement, (3) rock bags, or (4) geotextile mattresses. The remedial protection measures described above may be required in places where the target burial depth cannot be met or in areas identified as “exposed” or “at risk” based on geophysical and geotechnical surveys, hydrodynamic modeling, and the Cable Burial Risk Assessment.

Prior to cable installation, survey campaigns would be completed including debris and boulder clearance, unexploded ordnance clearance, pre-lay grapnel run, and pre-installation surveys to ensure the submarine export cable and burial equipment would not be affected by debris or other hazards during the burial process. Portions of the submarine export cable routes would be surveyed for and cleared of unexploded ordnance. Where this is not feasible, the cable would be re-routed slightly within the surveyed corridor to avoid these features. A pre-grapnel run may be completed to remove seabed debris, such as abandoned fishing gear, wires, etc., from the siting corridor. Additionally, pre-sweeping may be required in areas of the submarine export cable corridor with megaripples and sand waves. Pre-sweeping involves smoothing the seafloor by removing ridges and edges using a suction hopper dredge vessel or a mass-flow excavator from a construction vessel to remove the excess sediment. Dredged material generated from pre-sweeping activities may either be sidecast near the installation site or removed for reuse or proper disposal.

Pre-trenching would be required in specific locations along the EW 1 and EW 2 submarine export cable route where deeper burial depths are required or seabed conditions are not suitable for traditional cable burial methods. Pre-trenching includes running the cable burial equipment over portions of the route to soften the seabed prior to cable burial or the use of a suction hopper dredge to excavate additional sediment. Localized dredging may be necessary at locations where the EW 1 submarine export cable crosses existing cables and pipelines or other assets. The dredging would remove approximately 679 cubic yards (519 cubic meters) of sediment at each crossing using a suction hopper dredge or a mass-flow excavator. Local dredging may also be required to meet required burial depth along the EW 1 submarine export cable route within the Bay Ridge Channel and SBMT.

The construction and installation phase of the proposed Projects would make use of both construction and support vessels to complete tasks in the Offshore Project area. Construction vessels would travel between the Offshore Project area and the third-party port facility where equipment and materials would be staged. It is estimated that the Projects would require approximately 18 vessels for construction of EW 1 and approximately 18 vessels for construction of EW 2. COP Volume 1, Table 3.4-1 (Empire 2022) identifies the types of offshore vessels that would be used during construction. Helicopters are also being considered to support the Projects.

Ports under consideration include, but are not limited to, the following:

- **Port of Albany, Albany, New York.** Empire may select Port of Albany as the starting point for transporting WTG components to a local staging area at SBMT.
- **Port of Coeymans, Coeymans, New York.** Port of Coeymans is under consideration as a possible location for loading rock for foundation scour protection, from where it would be transported directly to the installation locations in the Lease Area.
- **Corpus Christi, Texas.** A port in the Corpus Christi, Texas area could be a starting point for transporting the OSS topsides for EW 1 and EW 2.
- **South Brooklyn Marine Terminal, Brooklyn, New York**. Empire proposes to lease portions of SBMT for laydown and staging of WTG blades, turbines, and nacelles; foundation transition pieces; or other facility parts during construction of EW 1 and EW 2. During this time, Empire would receive, store, assemble, and export Project components via marine vessels and onshore cranes and other equipment.

2.2. Operations and Maintenance

The proposed Projects are anticipated to have a commercial lifespan of 35 years.[1] The location of the O&M facility has not been finalized; however, a location at SBMT is under evaluation. The O&M facility would include offices, control rooms, warehouses, workshop space, and pier space. The location of the O&M facility will be selected based on Empire's workforce and equipment needs.

The proposed Projects would include a comprehensive maintenance program, including preventive maintenance based on statutory requirements, original equipment manufacturers' guidelines, and industry best practices. Additionally, Empire would maintain an Oil Spill Response Plan, an Incident Management Plan, and a Safety Management System. These plans would be in place before construction and installation activities begin and would be reviewed and approved by BOEM and the Bureau of Safety and Environmental Enforcement. Empire would inspect WTGs, OSS, foundations, interarray cables, submarine and onshore export cables, and other parts of the proposed Projects using methods appropriate for the location and element.

2.2.1 Onshore Activities and Facilities

The onshore substations would be inspected regularly and may require routine maintenance activities such as replacing or updating electrical components or equipment. The onshore export cables would require periodic testing but should not require maintenance unless there is a failure.

[1] Empire's lease with BOEM (Lease OCS-A 0512) has an operational term of 25 years that commences on the date of COP approval. (See https://www.boem.gov/sites/default/files/renewable-energy-program/State-Activities/NY/OCS-A-0512-Lease.pdf; see also 30 CFR 585.235(a)(3).) Empire would need to request an extension of its operational term from BOEM in order to operate the proposed Projects for 35 years. For the purposes of maximum-case scenario and to ensure National Environmental Policy Act coverage if BOEM grants such an extension, the Draft EIS analyzes a 35-year operational term.

2.2.2 Offshore Activities and Facilities

Routine maintenance is expected for WTGs, foundations, and OSS. Empire would conduct a risk-based approach to offshore O&M, which would allow it to survey the areas of the proposed Projects determined to be at the highest risk at the time. Generally, O&M activities would include inspections for corrosion and wear on the WTG components and replacement of components as needed, foundation scour protection inspections every 3 years starting on year three, and replacement of consumable items such as filters and hydraulic oils. Surveys of the submarine export cable and interarray cables would be completed annually for the first 3 years, then every 2 years to confirm the cables have not become exposed.

Empire would use vessels, vehicles, and aircraft during O&M activities described above. The proposed Projects would use a variety of vessels to support O&M including crew transfer vessels and service operation vessels. Empire is also considering the use of helicopters to support O&M activities.

2.3. Decommissioning

Under 30 CFR 585 and commercial Renewable Energy Lease OCS-A 0512, Empire would be required to remove or decommission all installations and clear the seabed of all obstructions created by the proposed Projects. All foundations would need to be removed 15 feet (4.6 meters) below the mudline (30 CFR 585.910(a)). Absent permission from BOEM, Empire would have to achieve complete decommissioning within 2 years of termination of the lease and either reuse, recycle, or responsibly dispose of all materials removed. Empire has submitted a conceptual decommissioning plan as part of the COP, and the final decommissioning application would outline Empire's process for managing waste and recycling proposed Project components (COP Volume 1, Section 3.6; Empire 2022). Although the proposed Projects are anticipated to have an operational life of 35 years, it is possible that some installations and components may remain fit for continued service after this time. Empire would have to apply for and be granted an extension if it wanted to operate the proposed Projects for more than the 25-year operations term stated in its lease.

BOEM would require Empire to submit a decommissioning application upon the earliest of the following dates: 2 years before the expiration of the lease, 90 days after completion of the commercial activities on the commercial lease, or 90 days after cancellation, relinquishment, or other termination of the lease (see 30 CFR 585.905). Upon completion of the technical and environmental reviews, BOEM may approve, approve with conditions, or disapprove the lessee's decommissioning application. This process would include an opportunity for public comment and consultation with municipal, state, and federal management agencies. Empire would need to obtain separate and subsequent approval from BOEM to retire in place any portion of the proposed Projects. Approval of such activities would require compliance under the National Environmental Policy Act and other federal statutes and implementing regulations.

If the COP is approved or approved with modifications, Empire would have to submit a bond (or another form of financial assurance) prior to installation that would be held by the U.S. government to cover the cost of decommissioning the entire facility in the event that Empire would not be able to decommission the facility.

2.3.1 Onshore Activities and Facilities

At the time of decommissioning, some components of the onshore electrical infrastructure may still have substantial life expectancies. If components of the onshore substation are not suitable for future use, they would be demolished, and materials recycled. The onshore export and interconnection cables and their duct banks would be retired in place.

2.3.2 Offshore Activities and Facilities

For both WTGs and OSS, decommissioning would be a "reverse installation" process, with WTG components or the OSS topside structure removed prior to foundation removal. Monopile and piled jacket foundations would be removed by cutting below the mudline in accordance with standard practices. If necessary, the sediments inside the foundation would be used to backfill the depression once the foundation is removed. The scour protection used around the foundations would be removed unless leaving it in place to preserve established marine conditions is deemed appropriate through consultation with the proper authorities. Offshore cables would be lifted out of the seabed and cut into pieces or reeled in onto barges for transport.

2.4. Connected Action at South Brooklyn Marine Terminal

In addition to serving as the site of cable landfall for EW 1, SBMT is planned to undergo improvements in order to support staging and O&M activities necessary for EW 1 and EW 2. NYCEDC has filed a joint permit application to USACE and the New York State Department of Environmental Conservation (NYSDEC) for planned improvements at SBMT (USACE Pre-Application # NAN-2021-01201-EMI). Planned improvements include dredging to allow vessels laden with WTG components access to piers; bulkhead improvements to support large cranes for handling WTG components; additional wharves to allow mooring and berthing of barges, service operation vessels, and crew transport vessels; and construction of an O&M facility (Figure 7). The purpose of the SBMT port infrastructure improvement project is to upgrade SBMT to enable it to serve as a staging facility and O&M facility to support EW 1 and EW 2. Although it is possible SBMT may support different offshore wind developers and projects in the future, NYCEDC's Environmental Assessment Form (required for New York State Environmental Quality Review Act review) for the project does not identify any other project that will use the SBMT facilities. Because the improvement activities are solely intended to support Empire's use of SBMT for laydown and staging of WTG components, and because the Empire COP does not identify any alternate ports that could be used for laydown and staging of WTG components, this BA analyzes NYCEDC's planned improvements to SBMT as an interdependent action under the ESA.

Planned improvements, including the upland and marine areas in which construction activities would take place, would be within the SBMT facility. As shown on Figure 7, SBMT features existing basins that extend to the federal channel between areas of bulkheaded landfill that resemble and are referred to as piers (despite being landfill instead of pile-supported structures over water). Planned improvements include bulkhead improvements to the 39th Street Pier, 35th Street Pier, and the bulkhead that extends between 32nd and 33rd Street; new pile-supported and floating platforms; new fenders for vessel mooring; upgrades to pier infrastructure; construction of administration facilities and an O&M facility; demolition of existing buildings; and improvements to site utilities.

Infrastructure improvements would provide the necessary structural capacity, berthing facilities, and sufficient water depth to allow SBMT to operate as a hub for offshore wind construction and operation. A major component of the future use of SBMT is marine vessel activity, which would include berthing and transfer of cargo and crew to cargo carrying vessels, barges, service operations vessels, and crew transfer vessels.

The in-water work activities would include dredging and dredged material management of approximately 189,000 cubic yards of sediment, installation of 9,033 cubic yards of sand fill cap, replacement and strengthening of existing bulkheads, removal of existing cofferdam and 5,500 cubic yards of existing fill, regrading of a portion of existing unvegetated riprap slope within the tidal zone (with replacement of identical material), installation of new pile-supported and floating platforms, and installation of new fenders. Dredging of inter-pier channels and basins adjacent to the seaward bulkheads would take place

via a crane on a barge. To minimize the generation of turbidity, dredging would be conducted using a clamshell dredger with an environmental bucket, withdrawn slowly through the water column to minimize turbidity. Dredged sediments would be deposited into scows, allowed to settle for 24 hours prior to onsite dewatering (decanting), adhering to regulations and permit requirements, and then transported to an appropriately permitted upland disposal site. The material may be beneficially reused, depending on its suitability for such uses. It is anticipated that dredging operations would run 24 hours a day for a total of 140 days. Best management practices to control turbidity, such as turbidity curtains, would be employed, consistent with permit requirements. An approximately 5.6-acre areas would receive a 1-foot clean sand cap to address pre-existing contaminant exposure.

Bulkheads would be replaced or improved on the south side of the 39th Street Pier (39S), the west side of the 39th Street Pier (39 W), a portion of the bulkhead line between 32nd and 33rd Streets (32-33), and upland bulkhead on the north side of the 35th Street Pier (35N), and the west side of the 35th Street Pier (35W). Three new wharves would be installed to enable the SBMT to berth and onload/offload specialized vessels. One pile-supported platform would extend off the existing 35th Street Pier (35W) for transport and construction barges. Another pile-supported platform would accommodate berthing of service operation vessels, and one floating platform would accommodate berthing of crew transfer vessels. New fenders would be installed to protect wharves and bulkheads in areas where vessel berthing would occur.

The operational requirements for SBMT would necessitate heavy-lift crane pads with capacity to support cranes and suspended loads for loading barges and cargo-carrying vessels to transport WTG components offshore. To improve the load-bearing capacity for these pads, new pile-supported concrete slabs would be installed to support and distribute the weight of machinery and materials. Piles would be steel pipe piles with concrete caps that would support concrete decks.

Upland work activities would include demolition of existing structures and paving, excavation of fill to install support structures, and installation of new support structures, above-ground structures, utilities, and paving. Planned improvements would include the construction of an approximately 60,000-square-foot O&M facility containing approximately 22,000 square feet of office and support space, and approximately 3,000 square feet of waiting area for employees deploying to offshore work sites, and approximately 35,000 square feet of warehouse facilities. The outside areas around the buildings would be landscaped and include parking.

Existing utilities, including infrastructure that previously served the buildings slated for demolition, would be abandoned in place or removed as necessary to develop the site. Existing utilities include domestic water, fire water, sanitary sewer, electrical and telephone service, and gas lines. The utilities would be capped at suitable locations, determined in coordination with the utility companies. All existing piping to be abandoned that are 12 inches or larger in nominal diameter would be completely filled hydraulically with an excavatable flowable fill. Existing utilities that interfere with the proposed infrastructure would be removed, as needed. New sanitary sewer, potable water, electrical, and telecommunication line connections would be provided to the O&M facility with additional take-off points prepared for temporary facilities to serve offshore wind staging area needs and fire protection systems would be extended as required.

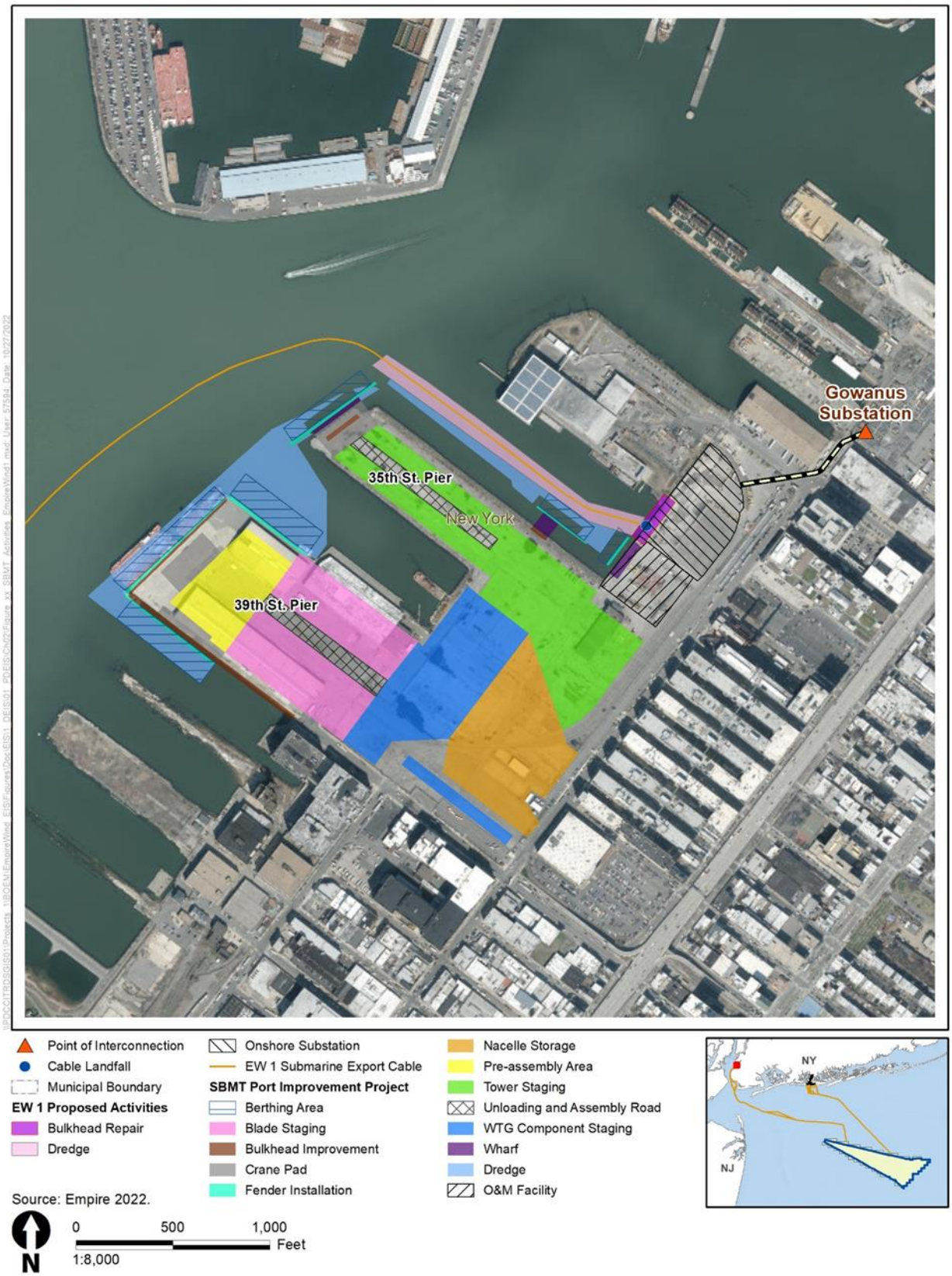


Figure 7 Proposed Activities at the SBMT

2.5. Relevant Alternatives to the Proposed Action

BOEM considered seven relevant alternatives to the Proposed Action (Alternatives B through H in the EIS) (Table 3). Additional information on these alternatives (including figures, where applicable) can be found in EIS Sections 2.1.3 through 2.1.9.

Table 3 Alternatives Considered for Analysis

Alternative	Description
Alternative B: Remove Up to Six WTG Positions from the Northwest End of EW 1	Under Alternative B, Remove Up to Six WTG Positions from the Northwest End of EW 1, the construction, O&M, and conceptual decommissioning of the 816-MW EW 1 Project and the 1,260-MW EW 2 Project within Lease Area OCS-A 0512 and associated export cables would occur within the range of design parameters outlined in the COP, subject to applicable mitigation measures. However, the EW 1 turbine layout would be modified to remove up to six WTG positions from the northwestern end of EW 1 to reduce potential impacts at the edge of Cholera Bank, on scenic resources, and on navigation safety (see EIS Chapter 2, Figure 2-5). Alternative B would also establish a No Surface Occupancy area where WTG positions would be excluded. Submarine export and interarray cables are not excluded from the No Surface Occupancy area.
Alternative C: EW 1 Submarine Export Cable Route	Under Alternative C, EW 1 Submarine Export Cable Route, the construction, O&M, and conceptual decommissioning of the 816-MW EW 1 Project and the 1,260-MW EW 2 Project within Lease Area OCS-A 0512 and associated export cables would occur within the range of design parameters outlined in the COP, subject to applicable mitigation measures. However, BOEM would approve only one of the two EW 1 submarine export cable route options that would traverse either the Gravesend Anchorage Area or the Ambrose Navigation Channel on the approach to SBMT (see EIS Chapter 2, Figure 2-6). Each of the below sub-alternatives may be individually selected or combined with any or all other action alternatives or sub-alternatives. • Alternative C-1: Gravesend Anchorage Area. In the vicinity of Gravesend Bay, the EW 1 submarine export cable route would traverse a charted anchorage area identified on NOAA Chart 12402 for the Port of New York (U.S. Coast Guard Anchorage #25). • Alternative C-2: Ambrose Navigation Channel. In the vicinity of Gravesend Bay, the EW 1 submarine export cable route would traverse the Ambrose Navigation Channel.
Alternative D: EW 2 Submarine Export Cable Route Options to Minimize Impacts on the Sand Borrow Area	Under Alternative D, EW 2 Submarine Export Cable Route Options to Minimize Impacts on the Sand Borrow Area, the construction, O&M, and conceptual decommissioning of the 816-MW EW 1 Project and the 1,260-MW EW 2 Project within Lease Area OCS-A 0512 and associated export cables would occur within the range of design parameters outlined in the COP, subject to applicable mitigation measures. However, BOEM would only approve submarine export cable route options for EW 2 that minimize impacts on the sand borrow area offshore Long Island (see EIS Chapter 2, Figure 2-7).

Alternative	Description
Alternative E: Setback between EW 1 and EW 2	Under Alternative E, Setback between EW 1 and EW 2, the construction, O&M, and conceptual decommissioning of the 816-MW EW 1 Project and the 1,260-MW EW 2 Project within Lease Area OCS-A 0512 and associated export cables would occur within the range of design parameters outlined in the COP, subject to applicable mitigation measures. Alternative E would remove seven WTG positions from EW 2 to create a 1-nm setback between the EW 1 and EW 2 Projects to improve access for fishing (see EIS Chapter 2, Figure 2-8).
Alternative F: Wind Resource Optimization with Modifications for Environmental and Technical Considerations	Under Alternative F, Wind Resource Optimization with Modifications for Environmental and Technical Considerations, the construction, O&M, and conceptual decommissioning of the 816-MW EW 1 Project and the 1,260-MW EW 2 Project within Lease Area OCS-A 0512 and associated export cables would occur within the range of design parameters outlined in the COP, subject to applicable mitigation measures. However, the wind turbine layout would be optimized to maximize annual energy production and minimize wake loss while addressing geotechnical considerations (as shown on EIS Figure 2-10).
Alternative G: Cable Bridge Crossing of Barnums Channel Adjacent to Long Island Railroad Bridge	Under Alternative G, Cable Bridge Crossing of Barnums Channel Adjacent to Long Island Railroad Bridge, the construction, O&M, and conceptual decommissioning of the 816-MW EW 1 Project and the 1,260-MW EW 2 Project within Lease Area OCS-A 0512 and associated export cables would occur within the range of design parameters outlined in the COP, subject to applicable mitigation measures. However, EW 2 would use an above-water cable bridge to construct the onshore export cable crossing at Barnums Channel.
Alternative H: Dredging for EW 1 Export Cable Landfall	Under Alternative H, Dredging for EW 1 Export Cable Landfall, the construction, O&M, and conceptual decommissioning of the 816-MW EW 1 Project and the 1,260-MW EW 2 Project within Lease Area OCS-A 0512 and would occur within the range of design parameters outlined in the COP, subject to applicable mitigation measures. However, construction of the EW 1 export cable landfall would use a method of dredge or fill activities (clamshell dredging with environmental bucket) that would reduce the discharge of dredged material compared to other dredging options considered in the Empire Wind PDE (i.e., open cut trenching/jetting, suction hopper dredging, hydraulic dredging) (COP Section 3.4.2.1; Empire 2022).

3. Action Area

The Action Area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). Therefore, the Action Area for constructing, operating, and decommissioning the proposed Projects includes the onshore and offshore Project elements plus a 1-mile buffer around these elements to account for potential noise, human presence, and visual disturbance associated with constructing, operating, and decommissioning the proposed Projects (see Figure 8). Because some EW 1 and EW 2 Project elements are separated by considerable distance (e.g., EW 1 and EW 2 onshore Project elements separated by 19 miles) and the Lease Area is 14 miles offshore, BOEM split the Action Area into five separate areas for the purpose of generating an accurate threatened and endangered species list (using IPaC) for the different Project elements. The five separate areas include the Lease Area, EW 1 offshore export cable route, EW 1 onshore, EW 2 offshore export cable route, and EW 2 onshore; collectively, these 1-mile buffered areas compose the overall Action Area.

3.1. General Description of the Action Area

The onshore portion of the Action Area is within urbanized landscapes in the New York metropolitan area, and the onshore export and interconnection cables, onshore substations, and O&M facility would be primarily along or within existing roadway corridors. Vegetation almost entirely consists of landscape plants, including trees, shrubs, other ornamental plants, and maintained grass. This includes landscaped areas along roadways, within roadway medians, and in local parks and cemeteries (e.g., Green-Wood Cemetery). Wildlife is expected to be limited to those species adapted to living in urban environments, such as gulls, pigeons, squirrels, and other small rodents or other commensal wildlife. Areas that contain larger expanses of open space and natural land cover, such as parks and riparian areas associated with existing waterbodies, are expected to have higher densities of common wildlife species. In addition, USFWS's Lido Beach Wildlife Management Area is within the Action Area, but is approximately 0.67 mile from the nearest Project component (EW 2 Landfall C). However, due to the urban nature of these terrestrial areas, wildlife species expected to occur are limited to those adapted to living in association with human-influenced landscapes, disturbance, and noise. Shorebirds may forage on the public beaches adjacent to the export cable landfall locations, and marsh islands at the periphery of the Action Area may serve as foraging or nesting habitat. Avian species of conservation concern that use the ocean beaches within the project area include, but are not limited to, clapper rail, American oystercatcher, northern harrier, semi-palmated sandpiper, dunlin, and black-bellied plover. Invasive plant species commonly associated with disturbed and urban areas occur, often at high densities, throughout the Onshore Project area. Due to the high level of development, impervious surfaces, and other such areas devoid of vegetation within the onshore export and interconnection cable construction corridors, onshore substations, and O&M facility, invasive plant species are concentrated within and adjacent to disturbed wetlands and streams as well as along vegetated edges of public roadways.

The offshore portion of the Action Area includes open coastal waters associated with the New York Bight, New York Harbor, and New York Bay.

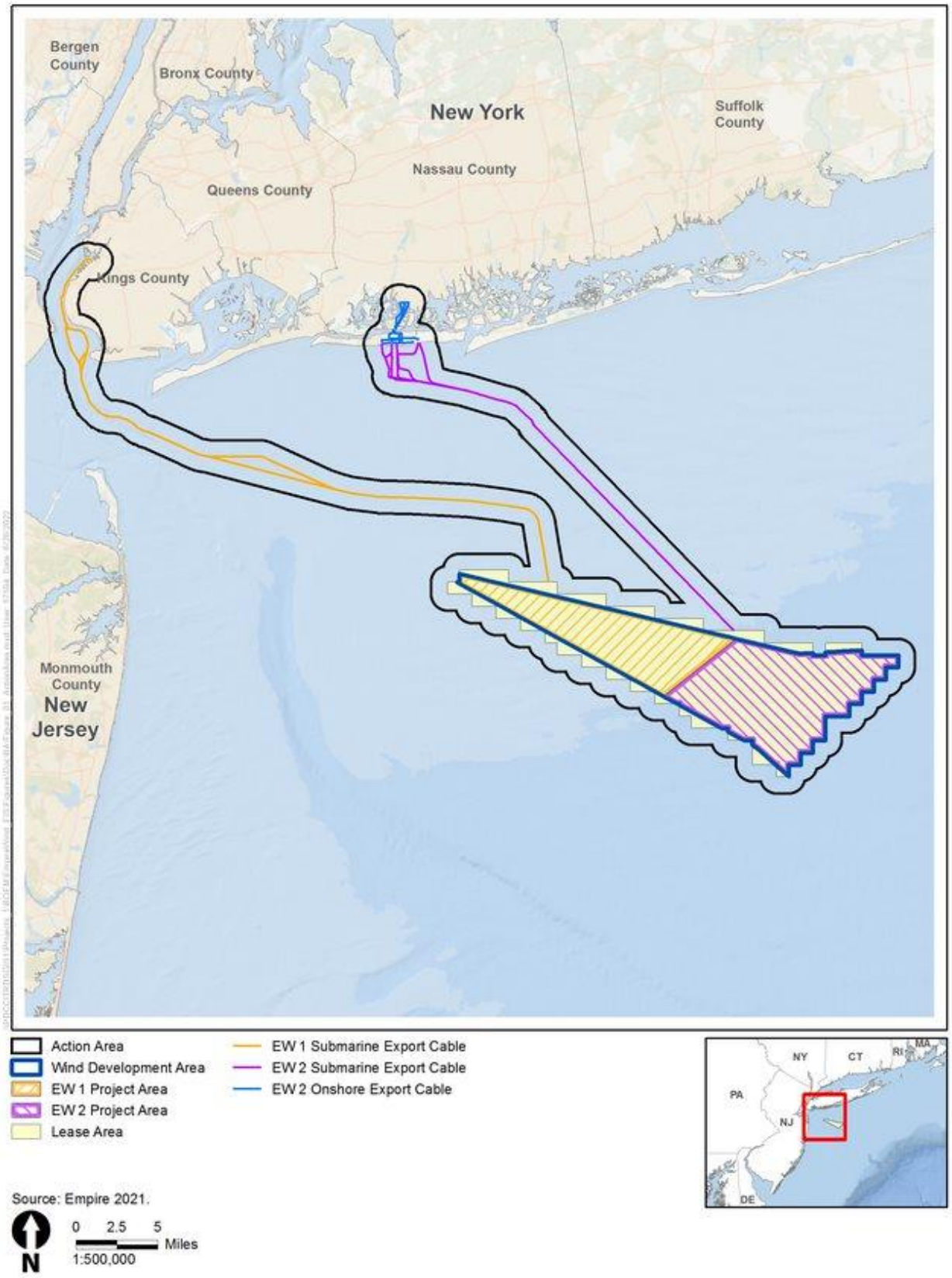


Figure 8 Action Area

4. Covered Species

Three federally listed birds, one federally listed bat, one federally listed plant, and one candidate insect under USFWS jurisdiction occur or potentially occur in all or portions of the Action Area, depending on species and Project element (Table 4). There are no critical habitats for these or any other federally listed species designated within the Action Area. Data sources used for the analysis are discussed in Section 4.1, and a description of each species and the potential occurrence in the Action Area is provided in Sections 4.2 through 4.8. The piping plover, *rufa* red knot, and northern long-eared bat can fly considerable distances and, therefore, BOEM assumes these species potentially could occur within the offshore environment regardless of IPaC results shown in Table 4. For the remaining species (seabeach amaranth), the potential effects within the Action Area would be more localized and restricted to the areas affected by the onshore Project elements.

Table 4 Threatened, Endangered, or Candidate Species that Occur or Potentially Occur in the Action Area Based on IPaC

Species	Lease Area	EW 1 Offshore Export Cable	EW 1 Onshore	EW 2 Offshore Export Cable	EW 2 Onshore	Habitat(s)
Mammals						
Northern Long-eared Bat (T)[1] (*Myotis septentrionalis*)	No	No	No	Yes	Yes	Winter: hibernacula in caves and mines; Summer: roost and maternity trees with loose bark or cavities near wetlands/open water; forages in open forests, edges, and around wetlands or water
Tricolored Bat (*Perimyotis subflavus*)[2]	No	No	No	Yes	Yes	Winter: caves and mines; Spring, Summer, Fall: primarily roost among live and dead leaf clusters of live or recently dead deciduous hardwood trees. May also roost in structures (e.g., barns, bridges). Forages around water and forest edges.
Birds						
Piping Plover (T) (*Charadrius melodus*)	No	Yes	Yes	Yes	Yes	Oceanfront beaches and barrier islands; forages on intertidal beaches, exposed mudflats and sandflats, wrack lines and shorelines
Rufa Red Knot (T) (*Calidris canutus rufa*)	No	Yes	Yes	Yes	Yes	Oceanfront beaches/barrier islands during migration; nests in Canada and migrates to South America
Roseate Tern (E) (*Sterna dougallii dougallii*)	Yes	Yes	Yes	Yes	Yes	Coastal beaches; protected bays and estuaries; offshore ocean
Insects						
Monarch Butterfly (C)[3] (*Danaus plexippus*)	No	Yes	Yes	No	Yes	Anywhere with milkweed and an abundance of native nectar plants
Flowering Plants						
Seabeach Amaranth (T) (*Amaranthus pumilus*)	No	Yes	Yes	Yes	Yes	Sandy beaches, on barrier islands, at the base of dunes

Source: USFWS 2022a; see Appendix A.
[1] On March 23, 2022, USFWS published a proposal to reclassify the northern long-eared bat as endangered. The U.S. District Court for the District of Columbia has order USFWS to complete a new final listing determination by November 2022 (Case 1:15-cv-00477, March 1, 2021).
[2] Tricolored bat does not show up on IPaC, but the species range includes New York and suitable habitat is generally similar to northern long-eared bat.
[3] Candidate species are provided no statutory protection under the ESA.
C = candidate for federal listing; E = federally listed endangered; T = federally listed threatened

4.1. Data Sources for Analysis

Bird data sources that cover the offshore Action Area consist of numerous avian survey efforts by federal and state agencies over many years, as well as surveys conducted by Empire. These surveys are summarized in Table 5, with more detail provided in COP Appendix Q (Empire 2022). Secondary offshore bird data sources include the Northwest Atlantic Seabird Catalog, *Tracking Offshore Occurrence of Common Terns, Endangered Roseate Terns, and Threatened Piping Plovers with VHF Arrays* (Loring et al. 2019), *Tracking Movements of Common Terns, Endangered Roseate Terns, and Threatened Piping Plovers in the Northwest Atlantic: 2017 Annual Report to the Bureau of Ocean Energy Management* (Loring et al. 2017), *Tracking Movements of Migratory Shorebirds in the US Atlantic Outer Continental Shelf Region* (Loring et al. 2020), and *Tracking Movements of Threatened Migratory Rufa Red Knots in U.S. Atlantic Outer Continental Shelf Waters* (Loring et al. 2018).

BOEM also reviewed the U.S. Geological Survey's (USGS) *Gap Analysis Project (GAP) Species Predicted Habitat Maps and Range Maps* to identify potential onshore habitats for (USGS 2018a, 2018b, 2018c), as well as habitat information provided in the COP, publicly available aerial photography, and information in the SBMT State EA (AECOM 2022). USGS GAP predicted habitat models represent the areas where species are predicted to occur based on habitat associations. The models represent the spatial arrangement of environments suitable for occupation by a species. In other words, a species distribution is created using a deductive model to predict areas suitable for occupation within a species range. To represent these suitable environments for each species' habitat distribution model, USGS used the land cover and other ancillary datasets (as listed in the metadata). USGS states that its goal is to build species range maps and distribution models with the best available data for assessing conservation status, conservation planning, and research.

New York Natural Heritage Program information (see COP Appendix N; Empire 2022) and eBird were also reviewed to identify potential presence of piping plover, red knot, and roseate tern in the vicinity of the onshore Project elements. In addition, various literature sources were used to supplement the information BOEM has compiled about potential effects on federally listed species from other offshore wind projects on the OCS, including peer-reviewed literature, USFWS 5-year reviews, USFWS species status assessments, *Federal Register* publications (i.e., listing rules), recovery plans, recent USFWS biological opinions, Natural Heritage Program reports, and various websites.

Table 5 Primary Bird Data Sources Covering the Offshore Action Area

Study	Location	Dates	Methods
NYSERDA Regional Digital Surveys (Empire 2022 citing NYSERDA 2018)	New York Offshore Planning Area	Quarterly surveys: August 2016 through August 2018	Digital aerial survey: transect pattern of sequential images.
NYSERDA New York Wind Energy Area specific digital surveys (Empire 2022 citing NYSERDA 2018)	Lease Area plus a 2.5-mile buffer	Quarterly surveys: August 2016 through August 2018	Digital aerial survey: grid pattern with images evenly spaced across the Lease Area
Empire Lease Area Specific Digital Surveys (Empire 2022 citing Normandeau Associates 2019)	Lease Area plus a 2.5-mile buffer	Monthly surveys: November 2017 to October 2018	Digital aerial surveys

Study	Location	Dates	Methods
MDAT density and distribution models (Curtice et al. 2016; Winship et al. 2018)	Florida to Maine	Integrated survey data from the Atlantic Offshore Seabird Dataset Catalog from 1978 to 2016	Range of survey methods

NYSERDA = New York State Energy Research and Development Authority; MDAT = Marine-Life Data and Analysis Team

Offshore bat data sources that cover the Action Area and broader Atlantic OCS include acoustic bat detector and video aerial surveys, including site-specific acoustic surveys conducted by Empire (COP Appendix R; Empire 2022) (Table 6). Onshore bat information sources include communications with NYSDEC (Table 6). BOEM also reviewed USGS GAP data to identify potential onshore habitats for northern long-eared bat (USGS 2018d) and tricolored bat (USGS 2018e), as well as habitat information in the COP and publicly available aerial photography. New York Natural Heritage Program information (see COP Appendix N; Empire 2022) was also reviewed to identify potential presence of northern long-eared bat in the vicinity of the onshore Project elements.

Table 6 Bat Data Sources Covering the Action Area and Broader Atlantic OCS

Study	Location	Dates	Methods
Offshore			
Tetra Tech Acoustic Surveys (COP Appendix R; Empire 2022)	Lease Area: offshore survey activities aboard a research vessel (RV Ocean Researcher) conducting geophysical and geotechnical surveys within the Lease Area	May through December 2018	One acoustic bat detector operating on ship moving throughout the Lease Area study area
Mid-Atlantic Baseline Surveys (Hatch et al. 2013)	Mid-Atlantic Wind Energy Areas (Delaware, Maryland, Virginia)	2012	Seven high-definition video aerial surveys and eight visual boat-based surveys of wildlife
University of Maryland Center for Environmental Science Acoustic Surveys (Empire 2022 citing Sjollema et al. 2014)	Massachusetts to North Carolina	Spring and fall seasons, 2009 and 2010; 86 nights	Acoustic bat detectors (Anabat II), deployed aboard five ships (research, fishing, and oceanic survey) operating during various time periods along the Mid-Atlantic coast.
Rhode Island Acoustic Studies (Empire 2022 citing Smith and McWilliams 2016)	Atlantic coast of southern New England	Fall (range August–October) 2010–2012	Acoustic bat detectors deployed at seven locations within the Rhode Island National Wildlife Refuge Complex in southern Rhode Island.
Onshore			
Carl Herzog, NYSDEC, email communication, November 18, 2019	Long Island, NY (EW 2)	NA	NA

NA = not applicable

To identify potential habitat and occurrences of seabeach amaranth in the vicinity of the onshore Project elements, BOEM reviewed New York Natural Heritage Program information (see COP Appendix N; Empire 2022) and publicly available aerial photography.

4.2. Northern Long-eared Bat

4.2.1 Species Description

The once common northern long-eared bat is distinguished from other *Myotis* species by its long ears. The species was federally listed as threatened in 2015 (80 *Federal Register* 17974). Concurrently, USFWS issued an ESA §4(d) Rule (81 *Federal Register* 1900) that specifically defines "take" prohibitions and exempts most incidental take for a variety of commercial and industrial projects within the species range, subject to known roost trees and hibernacula within areas affected by white-nose syndrome (WNS). In March 2022, USFWS proposed to reclassify the northern long-eared bat from "Threatened" to "Endangered" (87 *Federal Register* 16442). The 4(d) rule will cease to apply if the 4(d) is finalized.

Northern long-eared bat is insectivorous and typically found in forested habitats, where it forages on moths, flies, leafhoppers, caddisflies, and beetles approximately 3 to 10 feet (1 to 3 meters) above the ground (Brack and Whitaker 2001). It also forages in open forests, edges, and around ponds, streams, and wetlands. The northern long-eared bat overwinters in caves and abandoned mines and spends the remainder of the year in forest areas. It roosts in trees with loose bark or cavities near wetlands/open water. Individuals congregate in the vicinity of their hibernacula in August or September and enter hibernacula in October and November. An individual will use the same hibernaculum for multiple years.

The northern long-eared bat's range includes most of the eastern and midwestern United States and southern Canada. The USGS's NABat Status and Trends data indicate that northern long-eared bat occupancy is lower along the Atlantic coast and higher in interior areas (USGS 2019). Despite severe population declines (prior to 2006), northern long-eared bats have historically been known to occur in forests across all New York state counties, with the exception of the five New York City counties: New York County (Manhattan), Kings County (Brooklyn), Bronx County (the Bronx), Richmond County (Staten Island), and Queens County (Queens) (NYSDEC n.d.[a]). The species has declined by 90 to 100 percent in most locations due to impacts from WNS, a fungal disease, especially in the Northeast; declines are expected to continue as WNS continues to spread (USFWS 2016). Despite severe population declines, northern long-eared bats continue to be found in low numbers in some WNS-affected areas as well as some coastal areas in eastern North America, where they may not be so severely affected by WNS (USFWS 2020a).

The annual life-cycle of the northern long-eared bat includes winter hibernation (caves and mines), spring staging, spring migration, summer birth of young, fall migration, and fall swarming and mating. In spring, the bats leave their hibernacula to roost in trees and forage near the hibernaculum in preparation for migration. Trees used are typically greater than or equal to 3 inches (7.6 centimeters) diameter at breast height, within 1,000 feet (305 meters) of forest. They also roost in cracks, crevices, cavities, and exfoliating bark of trees. Compared to migratory tree-roosting bat species, northern long-eared bats are short-distance migrants. From approximately mid-May through mid-August they occupy summer habitat, where they roost under bark and in cavities or crevices of both live and dead trees (Foster and Kurta 1999; Owen et al. 2002; Perry and Thill 2007). Females roost in small maternity colonies and males roost alone (Amelon and Burhans 2006). Northern long-eared bats also switch roosts frequently, typically every 2 to 3 days (Carter and Feldhamer 2005; Foster and Kurta 1999; Owen et al. 2002). Most foraging is within a few meters above the ground in between the understory and forest canopy (Brack and Whitaker 2001). Northern long-eared bats forage within a few kilometers of their roost sites (Timpone et al. 2010).

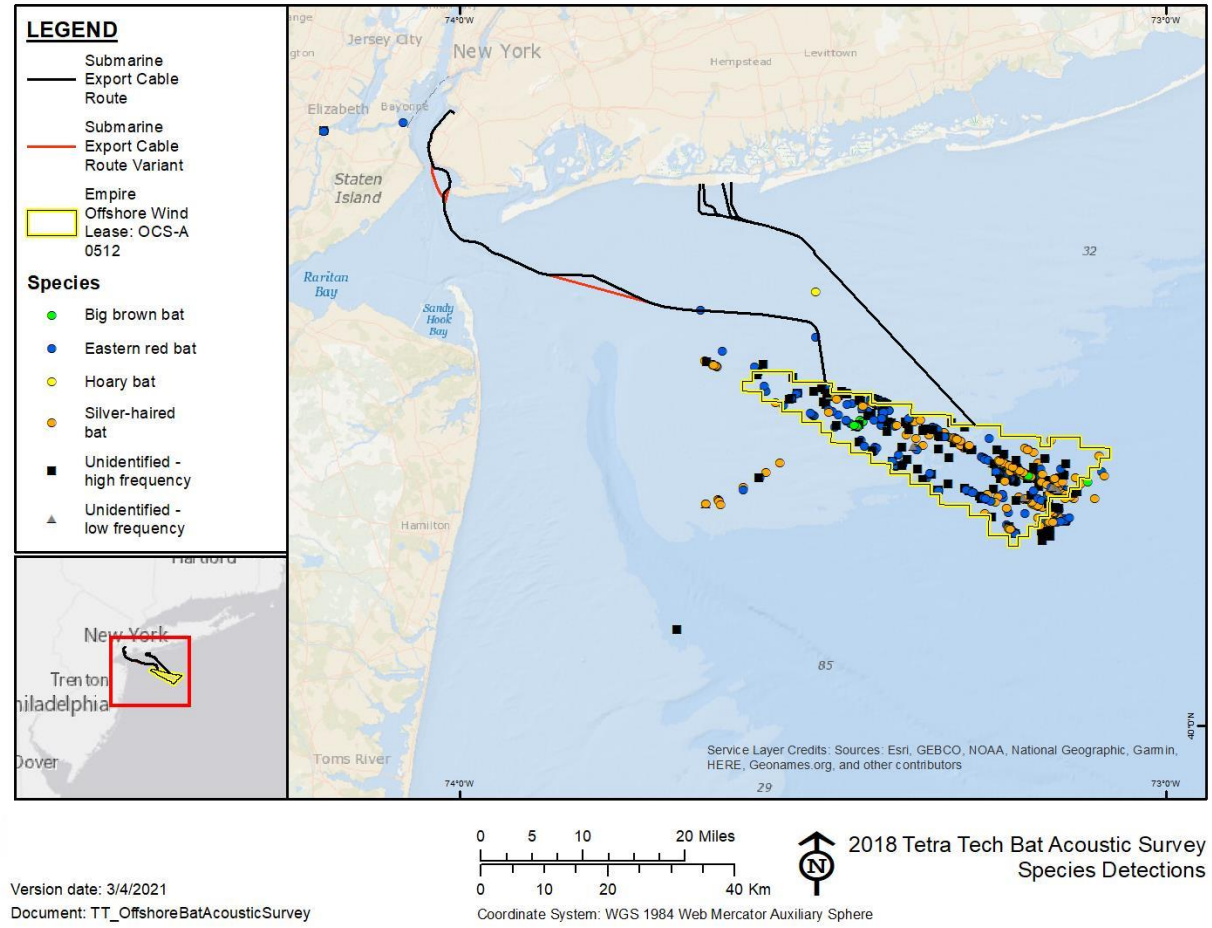
4.2.2 Northern Long-eared Bat in the Action Area

There are no records of northern long-eared bats on the OCS, and the available bat survey data suggest there is little evidence of use of the offshore environment (Pelletier et al. 2013; ESS Group, Inc. 2014; Hatch et al. 2013; Empire 2022 citing Sjollema et al. 2014; Empire 2022 citing Smith and McWilliams 2016; Dowling et al. 2017). Therefore, BOEM does not anticipate the presence of northern long-eared bats in the Lease Area. This is further substantiated by the 2018 acoustic data collected within the Lease Area (COP Appendix R; Empire 2022), which shows that observations were primarily composed of eastern red bats and silver-haired bats, concentrated during fall migration (Figure 9). Big brown bats were documented infrequently within the Lease Area, and hoary bats were also detected in the offshore environment, but closer to shore and not within the Lease Area. These data suggest that tree bats are most likely to pass through the Lease Area, mainly red and silver-haired bats during the migration period (late summer/early fall). Because research on the movements of these bats in the marine environment is limited, there remains uncertainty on if this species travels offshore. If northern long-eared bats were to migrate over water, movements would likely be in close proximity to the mainland.

Outside of the Action Area, a recent tracking study (n = 8; July–October 2016) conducted on Martha's Vineyard did not record any offshore movements of northern long-eared bat (Dowling et al. 2017). Stationary acoustic detectors positioned on two WTGs within the operational Block Island Wind Farm (Rhode Island) did not detect any northern long-eared bat calls (Stantec 2020). In addition, bird and bat monitoring (August 2021 to November 2021) for Dominion Energy's Coastal Virginia Offshore Wind pilot project 27 miles off the coast of Virginia Beach, Virginia, did not detect any northern long-eared bats (Dominion Energy 2022). In conclusion, there is little evidence of northern long-eared bat use of the offshore environment, and this species' presence offshore in the Action Area is not anticipated.

The Action Area covering the onshore Project elements is within urbanized landscapes in the New York City metropolitan area. The EW 1 onshore Action Area consists primarily of highly urbanized environments and existing infrastructure with little natural habitat areas. Because the EW 1 area is highly urbanized, and USFWS (2022a), New York State Natural Heritage Data (see COP Appendix N; Empire 2022), and USGS GAP habitat data do not identify the northern long-eared bat as occurring or potentially occurring, it is not expected to provide northern long-eared bat habitat and is not discussed further.

The EW 2 onshore Action Area around the Project elements generally consists of commercial and residential development. Maternity roosts, active detections (mist net captures and acoustic recordings), and hibernacula have been reported for northern long-eared bats in several areas of Long Island (particularly in the eastern portion), suggesting a year-round presence of northern long-eared bat; however, the nearest known hibernaculum to the Action Area is approximately 75 miles east, and no northern long-eared bats have been detected within approximately 19 miles of the Action Area (Empire 2022 citing Herzog pers. comm.). Furthermore, NYSDEC states that there are no summer or winter occurrences in the Action Area based on NYSDEC's guidance for project developments (NYSDEC 2018). Per NYSDEC's northern long-eared bat project evaluation, if the project is not within an area with summer or winter occurrences, then no further evaluation is needed (NYSDEC n.d.[b]). There are some small, isolated patches of potentially suitable habitat (tree/shrubs) in or around the EW 2 Project elements, specifically Onshore Substation C, onshore export cable segment IP-C between Barnums Channel and Daly Boulevard, and Lido Beach (USGS 2018d), but these areas would not be considered high-quality habitat given the lack of connectivity with contiguous forested habitats and highly developed nature of the area.



Source: COP Appendix R; Empire 2022.

Figure 9 Bat Occurrences in the Lease Area Detected during Offshore Acoustic Surveys Conducted by Tetra Tech in 2018

4.3. Tricolored Bat

4.3.1 Species Description

The tricolored bat is the only member of its genus. It is a small bat, measuring about 2 inches in body length (up to 3.5 inches including the tail) and weighing up to approximately 8 grams (USFWS undated). The tricolored bat is distinguished by its unique tricolored fur that appears dark at the base, lighter in the middle and dark at the tip. They often appear yellowish, varying form pale yellow to nearly orange, but may also appear silvery-gray, chocolate brown or black (USFWS undated). Newly flying young are much darker and grayer than adults. The tricolored bat's range in the United States includes most of the eastern and midwestern United States. The species was once common and has declined by 90 percent to 100 percent in most locations due to impacts from WNS (USFWS undated). On September 13, 2022, USFWS announced a proposal to list the tricolored bat as endangered under ESA.

During the spring, summer and fall—collectively referred to as the non-hibernating seasons—tricolored bats primarily roost among live and dead leaf clusters of live or recently dead deciduous hardwood trees. In the southern and northern portions of the range, tricolored bats will also roost in Spanish moss

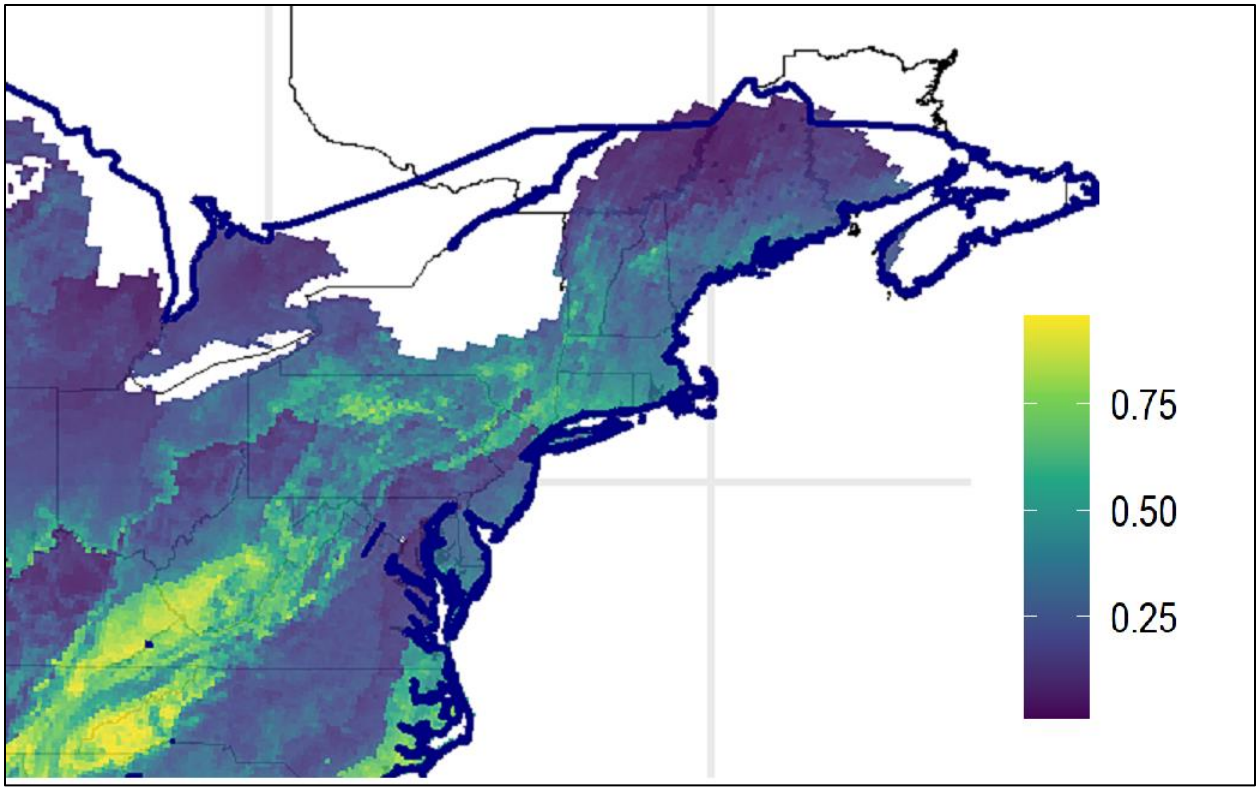
(*Tillandsia usneoides*) and *Usnea trichodea* lichen, respectively. In addition, tricolored bats have been observed roosting during summer among pine needles, eastern red cedar (Juniperus virginiana), within artificial roosts like barns, beneath porch roofs, bridges, concrete bunkers, and rarely within caves. Female tricolored bats exhibit high site fidelity, returning year after year to the same summer roosting locations. Female tricolored bats form maternity colonies and switch roost trees regularly. Males roost singly. During the winter, tricolored bats hibernate in caves and mines; although, in the southern United States, where caves are sparse, tricolored bats often hibernate in road-associated culverts, as well as sometimes in tree cavities and abandoned water wells. Tricolored bats exhibit high site fidelity with many individuals returning year after year to the same hibernaculum. Tricolored bats mate in the fall, hibernate in the winter and emerge in the spring. They then migrate to summer habitat where females form maternity colonies, where young are born. Bats disperse once young can fly, and then return to winter habitats to swarm, mate and hibernate. Tricolored bats exhibit site fidelity to both winter and summer roost habitat. Tricolored bats emerge early in the evening and forage at treetop level or above, but may forage closer to ground later in the evening. This bat species exhibits slow, erratic, fluttery flight, while foraging and are known to forage most commonly over waterways and forest edges.

4.3.2 Tricolored Bat in the Action Area

Tricolored bat habitat is very similar to habitats used by the northern long-eared bat (see Section 4.2). The occurrence of tricolored bat the vicinity of the onshore project area is predicted to be relatively low (Figure 10). The USFWS' Species Status Assessment Report for the tricolored bat indicates that there were no known occupied hibernacula on Long Island prior to WNS in the year 2000 (USFWS 2021a). Tricolored bats were never common in New York; although their northern range extends into Canada, New York is peripheral to the core of their range (New York Natural Heritage Program 2022). The statewide population numbers have decline dramatically since the effects of WNS were first observed in 2006; there were only 118 tricolored bats counted in 2012 compared with 2,285 among the same hibernacula surveyed in 2007 (New York Natural Heritage Program 2022).

The Action Area covering the onshore Project elements is within urbanized landscapes in the New York City metropolitan area. The EW 1 onshore Action Area consists primarily of highly urbanized environments and existing infrastructure with little natural habitat areas. Because the EW 1 area is highly urbanized and USGS GAP habitat data (USGS 2018e) do not identify potential tricolored bat habitat in or around EW 1, it is not expected to provide tricolored bat habitat and is not discussed further.

There are some small, isolated patches of tree/shrub habitat in or around the EW 2 Project elements, specifically Onshore Substation C, onshore export cable segment IP-C between Barnums Channel and Daly Boulevard, and Lido Beach. However, the USGS GAP habitat data (USGS 2018e) does not indicate any predicted suitable habitat in or along any of the EW 2 Project element and the tree/shrub habitat that does exist would not be considered high-quality habitat given the lack of connectivity with contiguous forested habitats and highly developed nature of the area. Based on this information, the presence of tricolored bat in the onshore portion of the Action Area is anticipated to be minimal.



Source: NABat 2019

Figure 10 Tricolored Bat Mean Occupancy Probabilities Predicted in Each North American Bat Monitoring Program Grid Cell in the Eastern Portion of the Modeled Species Range for 2019

The 2018 acoustic data collected within the Lease Area (COP Appendix R; Empire 2022) do not indicate presence of tricolored bats; observations were primarily composed of eastern red bats and silver-haired bats, concentrated during fall migration (Figure 9). Big brown bats were documented infrequently within the Lease Area, and hoary bats were also detected in the offshore environment, but closer to shore and not within the Lease Area. These data suggest that tree bats are most likely to pass through the Lease Area, mainly red and silver-haired bats during the migration period (late summer/early fall). Because research on the movements of these bats in the marine environment is limited, there remains uncertainty on if this species travels offshore. If tricolored bats were to migrate over water, movements would likely be in close proximity to the mainland. Stantec conducted acoustic surveys between 2009 and 2014 at coastal and offshore locations in the Gulf of Maine and mid-Atlantic and found tricolored bats were detected least frequently and only at approximately half of the survey locations (Stantec 2018). There are records of tricolored bat on Nantucket, Massachusetts (Dowling and O'Dell 2018), indicating that some individuals traveled over open water to the islands, but their occurrence over the ocean is rare. During the offshore construction of the Block Island Wind Farm, bats were monitored with acoustic detectors on boats; no tricolored bats were detected among the 1,546 bat passes (Stantec 2018). Preliminary results of the first year of post-construction monitoring at Block Island Wind Farm indicated low number of tricolored bat calls (33 out of 1,086 calls) (Stantec 2018). In addition, recent data from 3 years of post-construction monitoring around Block Island Wind Farm found relatively low numbers of bats present only during the fall (Stantec 2020); although 80 passes were labeled as tricolored bats, none had characteristics that were diagnostic of the species, and these were more likely to be eastern red bats (Stantec 2020). Acoustic detectors on WTGs in the Dominion Energy Coastal Virginia Offshore Wind pilot project off Virginia has not detected tricolored bat (Dominion 2022).

Collectively, this information indicates that tricolored bat could occur in the terrestrial components of the action area during non-hibernation periods, although presence would be extremely limited and in very small numbers. Any occurrence of tricolored bat in the offshore component of the action area would be very rare and in very small numbers.

4.4. Piping Plover

4.4.1 Species Description

The piping plover is a small, migratory shorebird that 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 (Elliott-Smith and Haig 2004; USFWS 1996, 2009). USFWS listed the Atlantic coast breeding population as threatened in 1985 (50 *Federal Register* 50726). Critical habitat for wintering piping plovers has been designated along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas (66 *Federal Register* 36038). Only the Atlantic coast population has the potential to occur within the Action Area during the breeding season, as well as during spring and fall migration.

The breeding range of the Atlantic coast population includes the Atlantic coast of North America from Canada to North Carolina. The piping plover breeding season extends from April through August, with piping plovers arriving at breeding locations in mid-March and into April. Post-breeding staging in preparation for migration extends from late July through September (USFWS 1996). Piping plover breeding habitat consists of generally undisturbed, sparsely vegetated, flat, sand dune–beach habitats such as coastal beaches, gently sloping foredunes, sandflats, and washover areas to which they are restricted (USFWS 1996, 2009). Nest sites are shallow, scraped depressions in a variety of substrates situated above the high-tide line (USFWS 1996). Piping plovers forage in the intertidal zone. Foraging habitat includes intertidal portions of ocean beaches, washover areas, mudflats, and 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).

While the precise migratory pathways along the Atlantic coast and to the Bahamas are not well known (USFWS 2009; Normandeau Associates, Inc. 2011), both spring and fall migration routes are believed to follow a narrow strip along the Atlantic coast. Similar to other shorebirds, piping plovers either make nonstop long-distance migratory flights (Normandeau Associates, Inc. 2011) or offshore migratory "hops" between coastal areas (Loring et al. 2020). Due to the difficulty in detecting piping plovers in the offshore environment during migration, because of the assumed nocturnal and high-elevation migratory flights, there are no definitive observations of this species in offshore environments greater than 3 miles (4.8 kilometers) from the Atlantic coast (Normandeau Associates, Inc. 2011).

The primary anthropogenic threat to piping plovers is coastal development. Other threats include disturbance by humans, dogs, and vehicles on sandy beaches and dune habitats (Elliott-Smith and Haig 2004; USFWS 2009). A recent study that assessed predicted climate change–induced, sea-level rise–driven biogeomorphological changes on Fire Island, New York, found that the dynamic response of beaches, flatter topography, and increased likelihood of overwash could promote suitable habitat conditions for nesting piping plovers (Zeigler et al. 2022). The piping plover is among 72 species (out of 177 species on the Atlantic OCS) that ranked moderate in relative vulnerability to collision with WTGs (Robinson Willmott et al. 2013). Despite population pressures, there is little risk of near-term extinction of the Atlantic coast population of piping plovers (Plissner and Haig 2000) and, since that prediction, the Atlantic coast population has been steadily growing. In fact, the U.S. Atlantic coast population of piping plovers has increased 190 percent from a low of 790 breeding pairs in 1986 to an estimated 2,289 breeding pairs in 2021 (USFWS 2020b, 2022c). The New York population of piping plovers has

increased 314 percent from a low of 106 breeding pairs in 1986 to 439 breeding pairs in 2021 (USFWS 2022c).

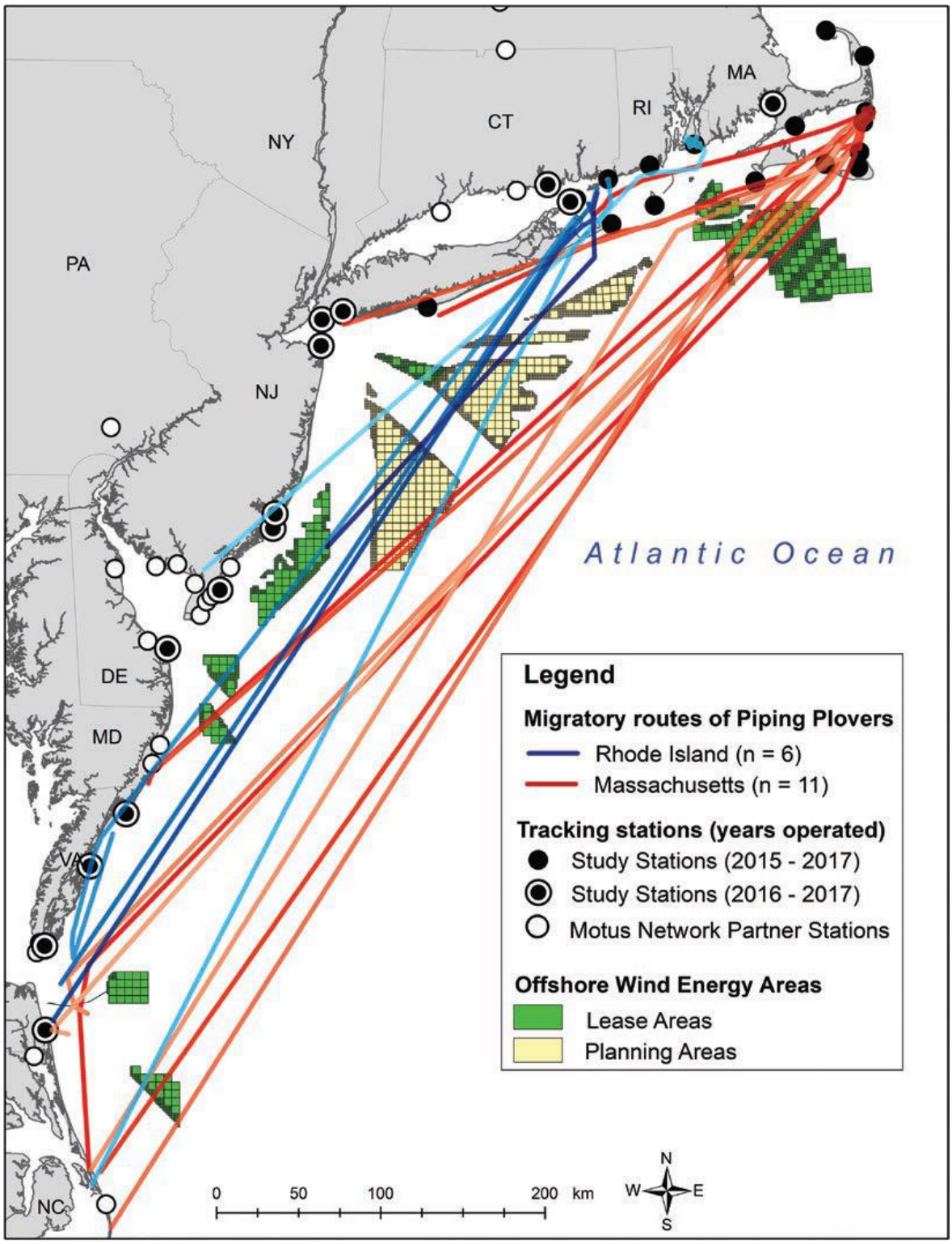
4.4.2 Piping Plover in the Action Area

Piping plovers are present in New York during spring and fall migratory periods and during breeding season (Empire 2022 citing USFWS 2018). Piping plovers breed in New York on Long Island's beaches (from Queens to the Hamptons, including the Action Area), in eastern bays, and in the harbors of northern Suffolk County (NYSDEC n.d.[c]). They breed above the high-tide line along the coast, primarily on sand beaches (Empire 2022 citing USFWS 2018). Non-migratory movements in May through August appear to be exclusively coastal (Burger et al. 2011). Piping plovers make nonstop, long-distance migratory flights (Normandeau Associates, Inc. 2011) or offshore migratory "hops" between coastal areas (Loring et al. 2017). As such, at least some individuals likely traverse the offshore Action Area because the birds favor short, direct ocean crossings rather than following coastal routes (Loring et al. 2019). Migration occurs primarily during nocturnal periods, with the average takeoff time appearing to be around 5–6 p.m. (Loring et al. 2017, 2019). Flight heights during this period occur in the immediate vicinity of the coastline (miles from proposed WTG arrays) and are generally at low elevations (well below rotor-swept zone [RSZ] elevations) (Burger et al. 2011). A recent nanotag study tracked migrating piping plovers captured in Massachusetts and Rhode Island from 2015–2017. The study estimated that one bird (out of 102 tracked) was exposed to the Lease Area. In addition, probability densities developed from the tracking data indicated primarily low to limited-high use of the western portion of the Lease Area (Figure 11) (Loring et al. 2019). Furthermore, there were no records in the Northwest Atlantic Seabird Catalog of piping plovers in the vicinity of the Lease Area (COP Appendix Q, Figure 2-10; Empire 2022). Overall, there is no habitat for piping plovers in the Lease Area, and the expected exposure to individuals is limited to migration.

As previously mentioned, the EW 1 onshore Action Area consists primarily of highly urbanized environments and existing infrastructure with little natural habitat for piping plovers. Not surprisingly, there are no reported sightings of piping plovers (eBird 2022a). Because the EW 1 area is highly urbanized, New York State Natural Heritage Data (see COP Appendix N; Empire 2022) and USGS GAP habitat data do not identify the piping plover as occurring at the SBMT.

Terrestrial habitats in the vicinity of the EW 2 onshore Action Area are significantly altered by human development (Figure 4). Habitats along the shoreline of Long Beach Barrier Island consist of barrier beaches developed for tourism and recreational use. Long Beach is sandy with no vegetation and could provide habitat for common marine bird species, and only one piping plover was sighted in the Long Beach area in 2018 (eBird 2022a). While piping plovers may pass through the area during the migration and post-breeding dispersal, Long Beach is unlikely to provide important breeding habitat for piping plovers because it is highly developed and lacks vegetation. The EW 2 Landfall A and B sites would be in a paved parking area, directly adjacent to commercial areas and existing roadways, and EW 2 Landfall E would be in a previously disturbed vacant lot adjacent to residential areas and existing roads.

In contrast, Lido Beach includes vegetated dunes that provide nesting habitat to various coastal nesting species, including piping plovers (Figure 4); over the last 10 years, there have been numerous piping plover sightings around Lido Beach (eBird 2022a). Piping plovers also nest on Lido Beach and, in 2018, 26 piping plover chicks were fledged from 14 pairs (Dazio 2018); therefore, nesting plovers may be exposed at the EW 2 Landfall C site.



Source: Loring et al. 2020
Figure shows individual Piping Plovers tracked across a broader portion of the mid-Atlantic Bight from breeding areas in in Rhode Island (n = 6) and Massachusetts (n = 11)

Figure 11 Modeled Migratory Tracks and Composite Probability Density of Piping Plovers with WEA Exposure in the Mid-Atlantic Bight, 2015 to 2017

4.5. *Rufa* Red Knot

4.5.1 Species Description

The *rufa* red knot is a medium-sized member of the sandpiper family that breeds in the Canadian Arctic and winters along the northwest coast of the Gulf of Mexico, along the U.S. Atlantic coast from Florida to North Carolina, and along the Atlantic coasts of Argentina and Chile (USFWS 2014). Over the last 20 years, the *rufa* red knot has declined from a population estimated at 100,000 to 150,000 down to 18,000 to 33,000 (Niles et al. 2008). The primary threat to the *rufa* red knot population is the reduced availability of horseshoe crab (*Limulus polyphemus*) eggs in Delaware Bay arising from elevated harvest of adult crabs (Niles et al. 2008). Horseshoe crab eggs are an important dietary component during migration, and reduced availability at key migratory stopover sites may be a likely cause of recent species declines (Niles et al. 2008; USFWS 2014). Due to observed population declines, USFWS listed the *rufa* red knot as threatened under the ESA in 2014 (79 *Federal Register* 73706). USFWS proposed critical habitat for the *rufa* red knot in 2021 (86 *Federal Register* 37410), but not within the Action Area.

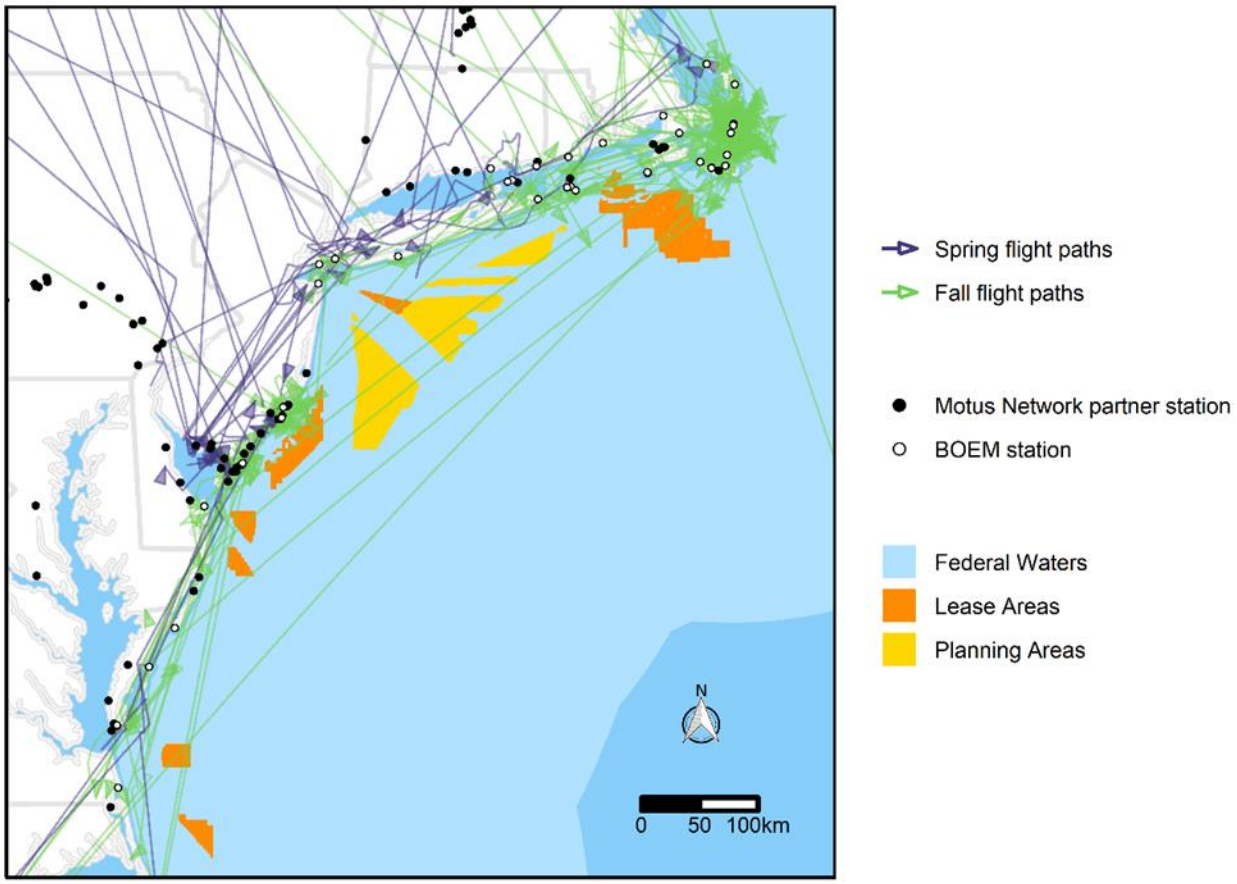
Rufa red knot occurrence on the Atlantic coast is strictly seasonal. Delaware Bay, along the southern border of Cape May County, is a critical stopover area for *rufa* red knots and supports 50 to 80 percent of all *rufa* red knots during spring migration (USFWS 2014). They utilize sandy coastal beaches at or near tidal inlets or the mouths of bays and estuaries, peat banks, salt marshes, brackish lagoons, tidal mudflats, mangroves, and sandy/gravelly beaches where they feed on clams, crustaceans, invertebrates, and the eggs of horseshoe crabs that come ashore to spawn in late May. The spring migration coincides with the spawning season for the horseshoe crab, which is an important food for migrating birds, particularly in Delaware Bay. Mussel beds on the New Jersey coast are also an important food source (USFWS 2021b). After stopping in Delaware Bay, some *rufa* red knots traveled up the coast, but the vast majority directly overland to breeding areas in Hudson Bay, Canada, and do not fly farther east over federal waters on the OCS (Figure 12).

A telemetry study by Loring et al. (2018) found that *rufa* red knots that migrated during early fall departed from the Atlantic coast in a southeasterly direction, likely heading to wintering destinations in South America. Only a small portion of *rufa* red knots use the U.S. Atlantic coast during the southward migration, likely comprising individuals that migrate relatively short distances to wintering destinations in the southeastern United States and Caribbean (Loring et al. 2018). Specifically, of the 388 *rufa* red knots fitted with nanotags, most (254) were tagged at stopover sites in James Bay and Mingan Islands, Canada, and headed directly south over open ocean in fall (Loring et al. 2018). These stopover sites may harbor up to a third of the *rufa* red knot population, but only a small portion used the U.S. Atlantic coast during southbound migration, suggesting that segment of the population has low exposure to WTGs on the OCS.

Recently, Biodiversity Research Institute and Wildlife Restoration Partnerships (2022), on behalf of Ocean Wind, LLC, conducted a study 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. Of the 17 individuals with tags that provided data, five made migratory movements within the life of the tags, including four short-distance migrants and one long-distance migrant. The tracks of one short-distance migrant passed through the offshore wind lease area at 22 meters above the water on its way to Cuba. Overall, the majority of locations collected by satellite tags were associated with relatively low flight height estimates. A wind analysis indicated that the tagged *rufa* red knots generally initiated migration with favorable tailwinds, that the one long-distance migrant had favorable wind support throughout its offshore movements, and that the short-distance migrants flew in more variable wind conditions.

Another GPS telemetry study by Feigin et al. (2022) investigated the southward migration of long-distance migrants captured at a key stopover location at Brigantine Natural Area in Atlantic County. Sixty

rufa red knots were tagged with GPS satellite transmitters and 40 provided reliable locational data. The migration tracks of tagged birds followed the expected migration routes. Some of the birds headed directly offshore from stopover sites in New Jersey on their way to wintering areas in South America (long-distance migrants), and some took a coastal route in which they hugged the shore on their way south to wintering areas in the southeastern United States and Caribbean islands (short-distance migrants). Nearly 38 percent (15 of the 40 birds that provided tracking data) may have crossed the Atlantic Shores lease area. One *rufa* red knot was recorded within the Atlantic Shores lease area flying at 575 meters above the water, while it was assumed that the others crossed the offshore wind lease area based on straight lines drawn between locations or animal movement models that estimate paths between locations. For the 15 birds that may have crossed the New Jersey WEA, the majority departed during the night, with light winds blowing from the north, little to no precipitation, generally good visibility, and warm temperatures.



Source: Loring et al. 2020, Figure 14
Note: Arrows indicate direction and location of the last detection for each individual.

Figure 12 Modeled Flight Paths of *Rufa* Red Knots during Spring Migration (n = 31) and Fall Migration (n = 146) in 2014 to 2017

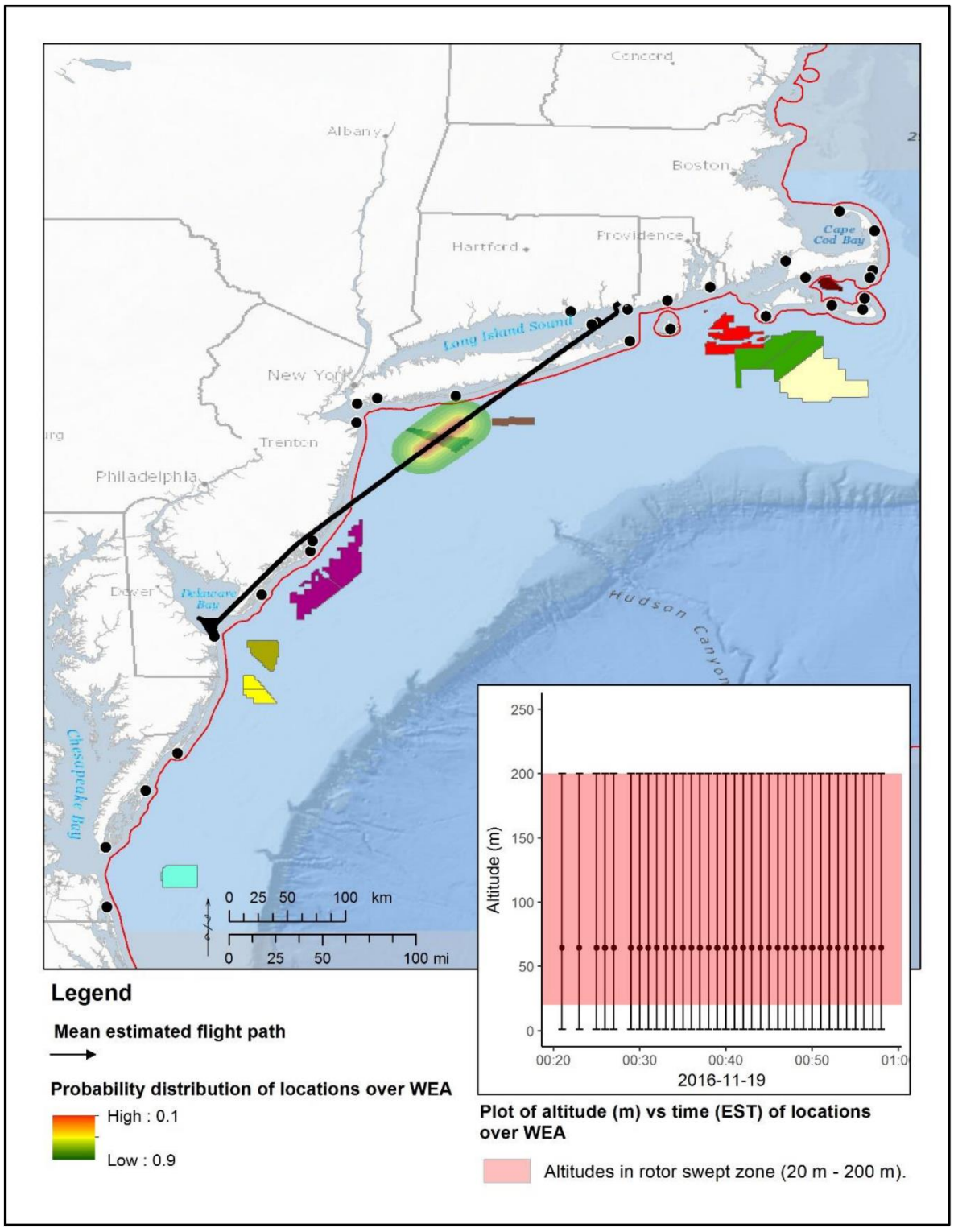
4.5.2 *Rufa* Red Knot in the Action Area

High-definition digital surveys (2016–2019) of the Lease Area conducted by New York State Energy Research and Development Authority (NYSERDA) and Empire did not detect any *rufa* red knots (see

COP Appendix Q, Tables 2-16 and 2-36; Empire 2022) and the Northwest Atlantic Seabird Catalog did not have any records of *rufa* red knots in the vicinity of the Lease Area.

Rufa red knots would be present in the Offshore Project area only during migratory periods (BOEM 2016; Loring et al. 2018). The fall migration period is generally July through October, but birds may pass through as late as November (Loring et al. 2018). Migration routes appear to be highly diverse, with some individuals flying out over the open ocean from the northeastern U.S. directly to stopover/wintering sites in the Caribbean and South America, while others make the ocean "jump" from farther south or follow the U.S. Atlantic coast for the duration of migration (Baker et al. 2013). Of the birds that winter on the southeast U.S. coast or the Caribbean (considered short-distance migrants), a small proportion may pass through the Offshore Action Area during migration, and are thus at a higher likelihood of exposure than the segment of the population wintering in South America, for example, that set out farther north and make longer migration flights (Loring et al. 2018). While at stopover locations, *rufa* red knots make local movements (e.g., commuting flights between foraging locations related to tidal changes) but are thought to remain within 3 miles (5 kilometers) of shore (Burger et al. 2011). In the telemetry study, one bird tagged in the Mingan Islands, Canada (n = 245) was estimated to cross the Lease Area in mid-November (Loring et al. 2018) (Figure 13). The *rufa* red knots that migrated over federal waters flew during evenings with fair weather and a tailwind blowing in their direction of travel. In another telemetry study, a *rufa* red knot was tagged in Lagoa do Peixe National Park in Brazil in late April and was detected at Long Island (Fire Island) in late May among the 11 other red knots that flew directly from South America and made landfall in North America (Motus 2022). The tracking route indicated that the bird flew directly to breeding areas in Canada after spending very little time on Fire Island. From Fire Island the bird flew to Montreal, then along the St. Lawrence River to Quebec City, and then north to the Laurentides Wildlife Reserve. Given the obvious lack of habitat for *rufa* red knots in the Lease Area, the only expected exposure to individuals is limited to migration.

The number of birds passing through the Lease Area can be estimated based on what is known about the *rufa* red knot overwintering populations, how they migrate in spring from nanotag telemetry studies, and how they migrate in fall from GPS telemetry studies. In spring, short-distance migrants overwintering in the Southeast U.S. are joined by others from the Caribbean to travel northward to Delaware Bay. Some birds may take an inland route while others will travel up the coast. After stopping in Delaware Bay, most will travel inland to breeding areas in Canada while some birds may continue to travel up the coast before turning west to head to breeding areas; these birds are not likely to cross the Lease Area during spring migration. After breeding, these birds fly back and stage on Atlantic coast beaches, working their way south down to their overwintering grounds. Birds south of Delaware may continue to fly south near the coast or depart to the Caribbean. None of the birds from the Southeast U.S./Caribbean wintering population are likely to cross the Lease Area during spring and it is unlikely that birds will cross the Lease Area during fall migration.



Source: Loring et al. 2018
Note: Black dots represent BOEM telemetry stations. Probability bands illustrate spatial error around locations during potential exposure to BOEM Lease Area OCS-A 0512.

Figure 13 Estimated Flight Path of a *Rufa* Red Knot Tracked with Nanotags that Was Estimated to Have Passed through Empire's Lease Area on 11/19/2016

A total of 42,600 knots from the South American wintering populations follow similar routes as the Southeast U.S./Caribbean birds, with some notable exceptions. Birds overwintering in the southern part of South America (southern) travel northward and are joined by others from northern Brazil. Birds from both populations then fly offshore heading to North America. Not all birds from these populations fly directly to Delaware Bay, as revealed by recent telemetry studies using nanotags. In fact, red knots fitted with nanotags at Bahia Lomas, Chile (66.7 percent, 8 out of 12 fitted with nanotags, Table 7) first made landfall south of Delaware Bay. These birds then traveled the shortest route northward either inland or along the coast to Delaware Bay. The next largest group (16.6 percent, 2 out of 12, Table 7) first made landfall east of Delaware Bay at Cape May, New Jersey (south of the Action Area). After stopping in Delaware Bay, most traveled inland to breeding areas in Canada and none traveled farther up the coast. Of course, some birds may bypass Delaware Bay. For example, one bird flew west into Pennsylvania and another made landfall at Long Island, New York. No birds were detected at an active station (RTNJ 4233) near the Lease Area capable of detecting birds 10 kilometers offshore. However, it is possible for a small percentage of birds (8.3 percent) to make landfall anywhere north of Cape May from the New Jersey shore to Maine, thus creating a 1,241-kilometer migration front. The wind farm occupies 43 kilometers (3.5 percent) of the migration front. Based on this information, the number of birds potentially passing through the wind farm can be calculated by multiplying the total long-distance migrant population size (42,600 birds) times the proportion that bypass Delaware Bay (0.083) times the proportion of the migration front that overlaps with the wind farm (0.035). A total of 124 birds could pass through the wind farm in spring (= 42,600 total birds * 0.083 proportion bypass Delaware Bay * 0.035 proportion of migration front by lease).

Table 7 Spring Migration Landfall Sites of Nanotagged Red Knots from Bahia Loma Shorebird Project in South America

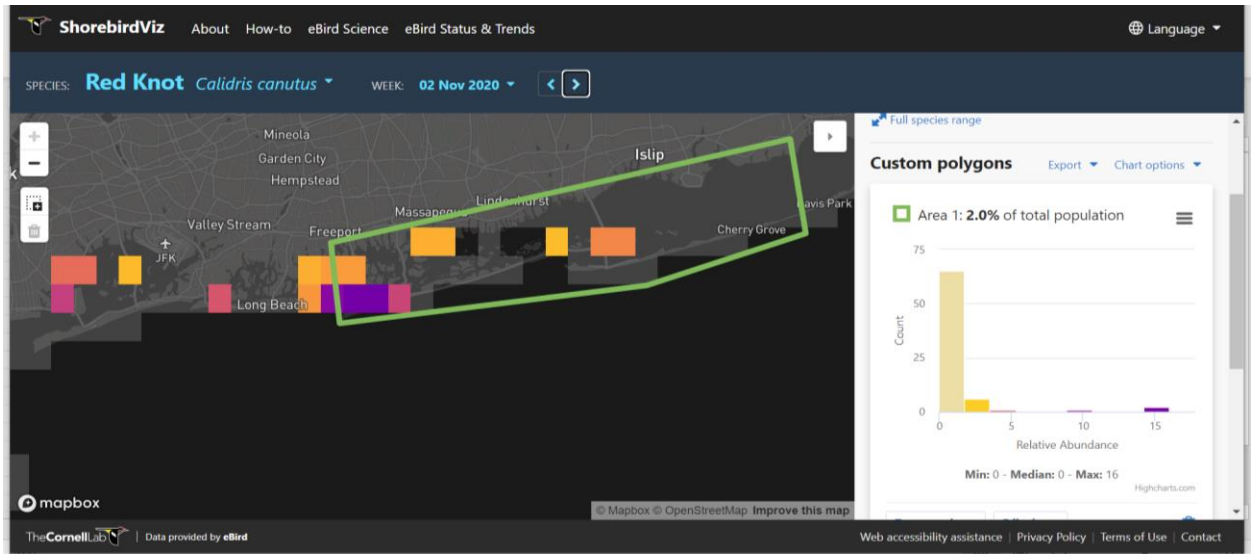
Tag ID	Landfall Date	Location
20914	5/05/19	South Carolina
20908	5/18/19	South Carolina
20866	5/17/19	South Carolina
20878	5/22/19	South Carolina
20953	5/18/19	South Carolina
20948	5/19/19	North Carolina
20959	5/23/19	Maryland
15656	5/18/18	Delaware Bay
20883	5/22/19	Cape May, New Jersey
20912	5/15/19	Cape May, New Jersey
15651	5/29/18	Pennsylvania
20958	5/23/19	Long Island, New York

Source: Bird Studies Canada 2017

In fall, red knots leave their breeding grounds in Canada to return to their overwintering grounds. Birds from the Southeast U.S. and Caribbean populations reach the Atlantic coast and work their way south along the coast to the Southeast U.S. to remain or fly to and overwinter in the Caribbean. In contrast, birds from the southern and northern Brazil populations migrate offshore to their overwintering grounds. The largest staging ground is along the Mingan Archipelago Quebec, Canada, where 9,450 birds use the area (Lyons et al. 2017). A recent telemetry study found that 97 percent (out of 244 tagged birds) departed directly to South America on long-distance migratory routes that would take them beyond U.S. federal waters (Loring et al. 2018). Therefore, out of the 58,100 red knots on the Atlantic, approximately 48,650 (= 58,100 – 9,450) depart to overwintering locations in South America from other locations on the Atlantic coast or work their way down the Atlantic coast (e.g., Cape Cod and areas along the New Jersey

shore being considered for critical habitat by USFWS) and are among the Southeast U.S./Caribbean birds. At a maximum, approximately 2 percent of the red knot population stage in the fall on the shores across from the Project area (Figure 14) or 973 (= 2 percent * 48,650). Recent telemetry work in the area provides estimates of the percentage of birds that may fly offshore and potentially through the Lease Area. For example, 43 percent (15 out of 35) of the birds captured and fitted with nanotags in New Jersey were tracked in federal waters (Loring et al. 2018). Similarly, 38 percent (15 out of 40) of the satellite-tagged birds crossed the Atlantic Shores lease area (Feigin et al. 2022). Based on the GPS telemetry results, approximately 370 (38 percent) of these birds could fly through the Lease Area. More importantly, none of the GPS-tracked birds near the New Jersey lease areas flew within the RSZ; in fact, one bird flew above the RSZ (575 meters) and the rest flew below the RSZ (Feigin et al. 2022; BRI and Wildlife Restoration Partnerships 2022). Therefore, based on *rufa* red knot behavior and assuming that the red knots in New York behave like those tracked in New Jersey, it is unlikely that migrating *rufa* red knots will collide with Empire Wind turbines. *Rufa* red knot habitat is similar to that of piping plover, and the description and conditions of the piping plover habitat in the Action Area for EW 1 and EW 2 in Section 4.4.2 are generally the same as for *rufa* red knot. One difference is that *rufa* red knots do not nest in the Action Area like piping plovers but may stop over during migrations. Based on eBird data (2022b), over the last 10 years numerous *rufa* red knot sightings have been documented around Lido Beach and *rufa* red knots may be exposed at the EW 2 Landfall C site; the species has not been sighted in any other area of the EW 2 Action Area.

As previously mentioned, the EW 1 onshore Action Area consists primarily of highly urbanized environments and existing infrastructure with little natural habitat. Because the EW 1 area is highly urbanized, New York State Natural Heritage Data (see COP Appendix N; Empire 2022) and USGS GAP habitat data do not identify the *rufa* red knot as occurring at the SBMT, and eBird (2022b) has not documented any sightings, it is not expected to provide *rufa* red knot habitat.



Source: Fink et al. 2021

Figure 14 Maximum Relative Abundance of Red Knots During Week of November 2, 2020

4.6. Roseate Tern

4.6.1 Species Description

The roseate tern is a small, colonial tern and is one of several similar-appearing terns found in throughout most of the world. The subspecies of roseate tern found in North America (of five recognized in the world) includes several widely separated breeding populations that breed on the northeastern coast of North America, several islands in the Caribbean Sea, and in northwestern Europe. The Northeastern roseate tern population[2] was listed under the ESA as "Endangered" in 1987, while terns in the Caribbean population are listed as threatened (52 *Federal Register* 42064). The northeast roseate tern population includes birds along the U.S. Atlantic coast south to North Carolina, the Canadian Atlantic coast north to Quebec, and Bermuda.

The Northeastern roseate tern population breeds on small islands or on sand dunes at the ends of barrier beaches along the Atlantic coast, occurring in mixed colonies with common terns (*Sterna hirundo*). The population is currently restricted to a small number of colonies on predator-free islands from Nova Scotia to Long Island, New York, with over 90 percent of remaining individuals breeding at just three colony locations (Bird Island and Ram Island in Buzzards Bay, Massachusetts, and Great Gull Island in Long Island Sound, New York) (Nisbet et al. 2014; Loring et al. 2019; USFWS 2020c). Historically, the Northeastern roseate tern population was known to breed as far south as Virginia, but the species currently does not breed south of Long Island, New York (USFWS 1998). Declines have been attributed largely to low productivity, partially related to predators and habitat loss and degradation, although adult survival is also unusually low for a tern species (USFWS 2010). The historical population size in northeastern North America was estimated at 8,500 pairs in the 1930s, and the most current estimate of 4,274 pairs in 2019 in Canada and the United States represents a 22-percent increase since the population of around 3,500 pairs in 1995 (USFWS 2020c; Nisbet et al. 2014).

Roseate tern foraging behavior and ecology are well described. Roseate terns dive less than 1.6 feet (0.5 meter) into the water to forage primarily for the inshore sand lance (*Ammodytes americanus*) in shallow, warmer waters near shoals, inlets, and rip currents close to shore (Safina 1990; Heinemann 1992; Rock et al. 2007). The sand lance is known to occur off the shore of New York. Roseate tern foraging flights are slow and range from 3 to 12 meters (10 to 39 feet) above the ocean surface. In sharp contrast to common terns, roseate terns are dietary specialists and exhibit strong fidelity to foraging sites and avoidance of clusters of other feeding tern species (Goyert 2015).

The Northeastern roseate tern population generally migrates through the Mid-Atlantic to and from its wintering grounds on the northeastern coast of Brazil, arriving at its northwest Atlantic breeding colonies in late April to late May, with nesting occurring between mid-May and late July. During breeding, roseate terns generally stay within about 6 miles (10 kilometers) of the colony, although they may travel 20 to 30 miles (32 to 48 kilometers) from the colony while feeding chicks (USFWS 2010; Burger et al. 2011; Nisbet et al. 2014; Loring et al. 2019). Following the breeding season, adult and hatch-year roseate terns move to post-breeding coastal staging areas in New England from approximately late July to mid-September (USFWS 2010). Foraging activity during the staging period is known to occur up to 10 miles (16 kilometers) from the coast, although most foraging activity occurs much closer to shore (Burger et al. 2011).

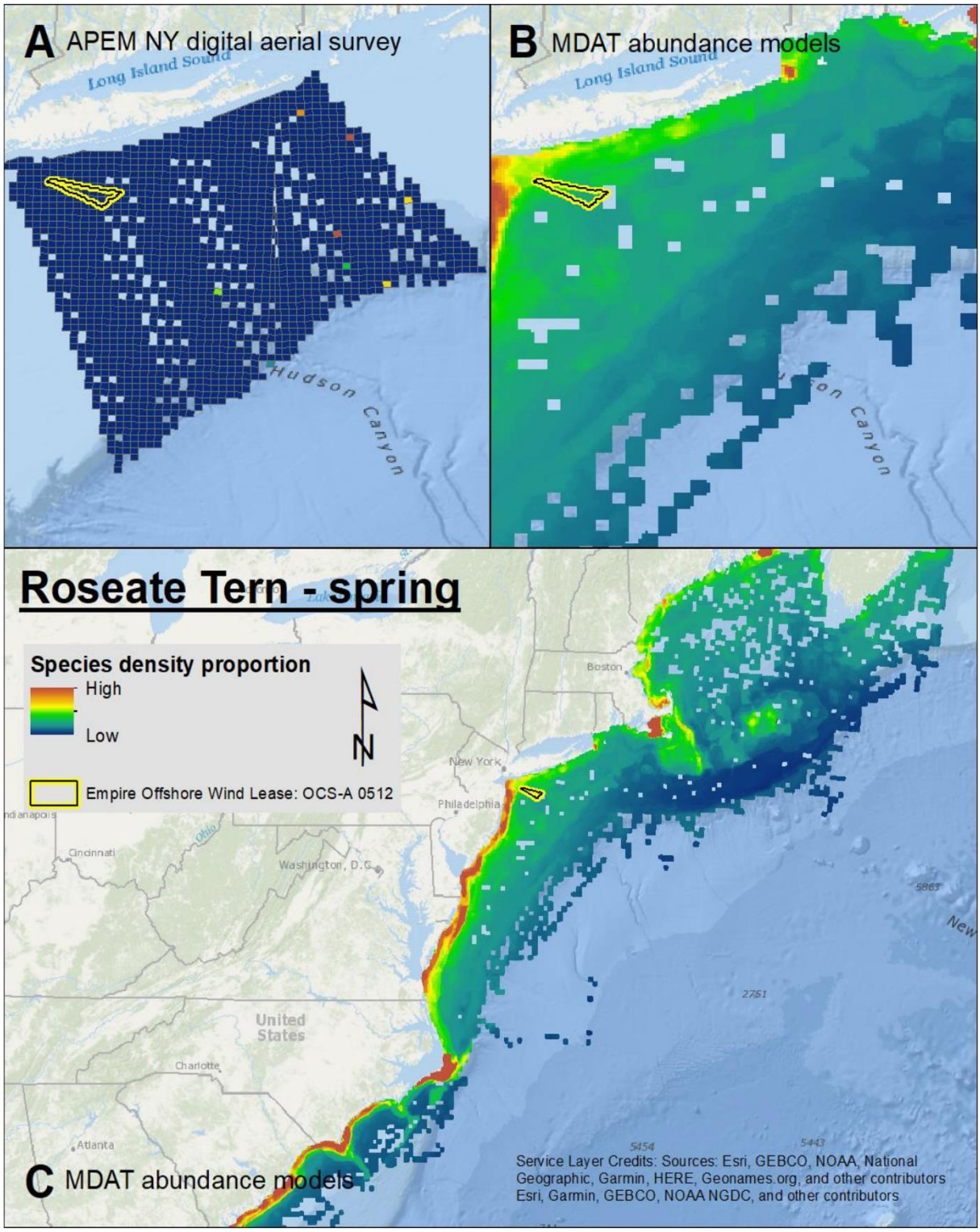
[2] This population is also known as the Northwest Atlantic population of the roseate tern and Northeast Distinct Population Segment of the roseate tern. Herewith, the population will be addressed as the Northeastern roseate tern population to distinguish the population from the Caribbean roseate tern population or the Northeastern Atlantic roseate tern population of Europe.

4.6.2 Roseate Terns in the Action Area

In New York, all roseate tern colonies—historic and current—are on Long Island, with the vast majority of pairs (99 percent) nesting at Great Gull Island, which is outside of the Action Area (NYSDEC 2014; USFWS 2020c). As previously mentioned, the EW 1 onshore Action Area consists primarily of highly urbanized environments and existing infrastructure with little natural habitat. Because the EW 1 area is highly urbanized, New York State Natural Heritage Data (see COP Appendix N) do not identify the roseate tern as occurring at the SBMT, and eBird (2022c) has not documented any sightings (eBird 2022a), it is not expected to provide roseate tern habitat. Over the last 10 years numerous roseate tern sightings have been documented around Lido Beach and roseate tern may be exposed at the EW 2 Landfall C site; the species has not been sighted in any other area of the EW 2 Action Area (eBird 2022c). Between 2010 and 2013, there were a total of 21 breeding pairs along the south Long Island shoreline between Shinnecock Bay and Rockaway Inlet in five specific locations (all outside of the Action Area); no breeding pairs have been documented in these locations after between 2013 and 2019 (USFWS 2020c). Therefore, it is unlikely that breeding roseate terns occur in the Action Area.

Roseate terns generally migrate through the Mid-Atlantic and arrive at their northwest Atlantic breeding colonies in late April to late May, with nesting occurring between roughly mid-May and late July. During breeding, roseate terns generally stay within about 10 kilometers of the colony, though they may travel 30–50 kilometers from the colony while provisioning chicks (USFWS 2010; Burger et al. 2011; Nisbet et al. 2014; Loring et al. 2017). Following the breeding season, adult and hatch-year roseate terns move to post-breeding coastal staging areas in New England from approximately late July to mid-September (USFWS 2010). Foraging activity during the staging period is known to occur up to 16 kilometers from the coast, although most foraging activity occurs much closer to shore (Burger et al. 2011).

Roseate tern migration routes are poorly understood, but they appear to migrate primarily well offshore (Nisbet 1984; USFWS 2010; Burger et al. 2011; Mostello et al. 2014; Nisbet et al. 2014). During migration periods, few roseate terns are predicted to occur within the Lease Area according to the Marine-life Data and Analysis Team (MDAT) models and supported by the NYSERDA and Empire digital aerial surveys, Northwest Atlantic Seabird Catalog data, and satellite telemetry studies (Loring et al. 2019). The regional MDAT models show that roseate terns are generally concentrated closer to shore during spring migration and have low exposure in New York offshore waters during the summer and fall. The NYSERDA and Empire digital aerial surveys had 16 observations of roseate terns in one spring survey, but they were well offshore and to the east of the Lease Area (Figure 15). The Northwest Atlantic Seabird Catalog has historical observations of roseate terns in the region, but not within the Lease Area (Figure 16). A recent roseate tern nanotag tracking study (Figure 17; Loring et al. 2019) estimated that none of the tracked birds flew through the Lease Area; while the estimated track of one bird passed through the Lease Area, the study author did not estimate a roseate tern exposure event in the Lease Area. The available information all indicates minimal presence of roseate terns in the Action Area. Roseate terns have not been confirmed in the Lease Area, and none of the 145 roseate terns tracked with nanotags, from New York and Massachusetts breeding colonies, were estimated to pass through the Lease Area. Therefore, very few roseate terns would migrate through the Action Area; some individuals may occur in the Action Area ephemerally during spring and fall migration.



Note: The scale for the map is representative of relative spatial variation in the sites within the season for each data source.

Figure 15 Spring Roseate Tern Density Proportions in the APEM NY (NYSERDA and Empire) High-Resolution Digital Aerial Survey data (A) and the MDAT Data at Local (B) and Regional Scales (C)

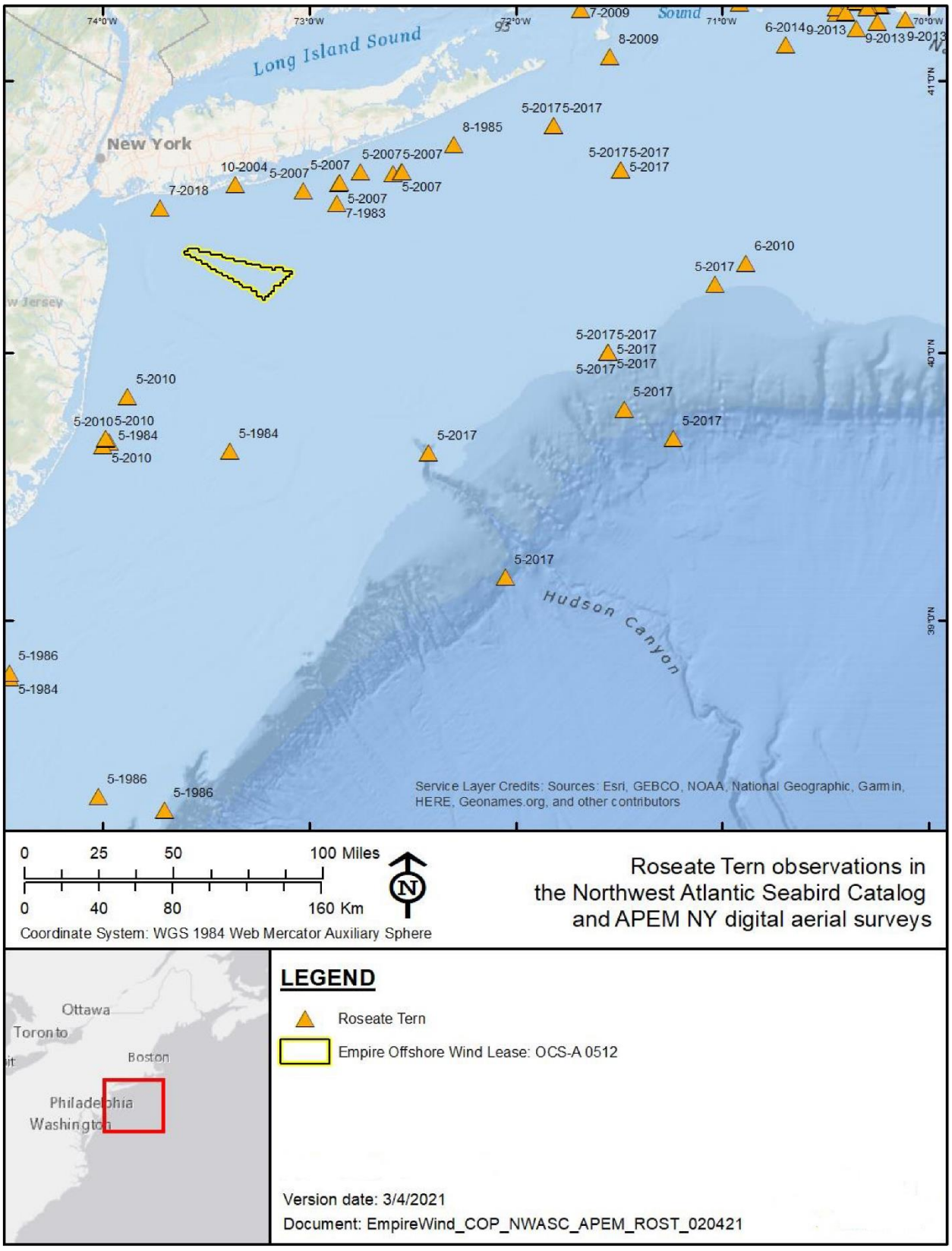
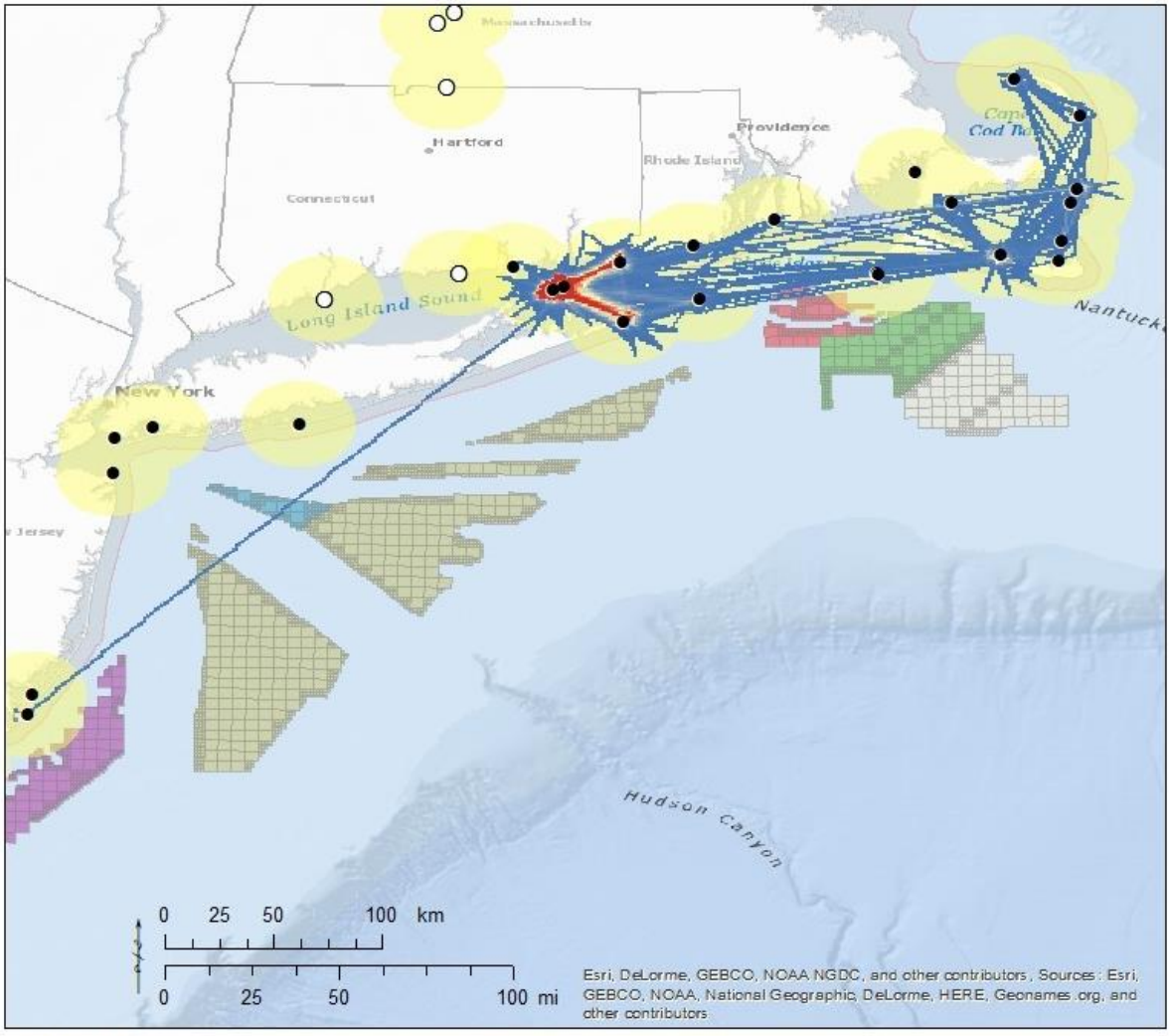


Figure 16 Roseate Tern Observations and Dates from the Northwest Seabird Catalog



Source: Loring et al. 2019.

Figure 17 Track Densities of Roseate Terns (n=90) Tracked with Nanotags from Great Gull Island during the Breeding and Post-Breeding period from 2015–2017

4.7. Monarch Butterfly

4.7.1 Species Description

The monarch butterfly occurs throughout the United States during the summer months and is a candidate species for federal listing. Monarch butterfly populations east of the Rocky Mountains, which are the largest of all populations, have declined by over 90 percent in the last three decades (CBD et al. 2014; Xerces 2020). USFWS (2020d) estimated the eastern North American population's probability of extinction in 60 years under current conditions ranges from 48 percent to 69 percent. USFWS determined in 2020 that listing the monarch butterfly as an endangered or threatened species is warranted but precluded by higher priority actions (85 *Federal Register* 81813). Candidate species are provided no statutory protection under the ESA; therefore, Section 7 consultation is not required. However, the monarch butterfly is evaluated here to streamline consultation should this species become listed in the future. Because the monarch butterfly is not listed under the ESA, no critical habitat is designated for the species.

Monarchs are milkweed (*Asclepias* spp.) specialists. Adults lay eggs, and larvae feed almost exclusively on milkweed while the butterflies feed on nectar from various flowers. East of the Rocky Mountains, most monarch butterflies migrate north in successive generations from overwintering areas in central Mexico to as far north as southern Canada. As they migrate north, monarch butterflies mate and deposit their eggs and die. The offspring typically survive 2 to 5 weeks in the adult stage, moving north generation by generation as temperatures warm and plants flower. After three to four generations, the population reaches the northern United States and southern Canada; the final generation makes the return migration in the fall to overwintering sites. Unlike previous generations, the last generation of each year lives for about 8 months over winter and begins the multi-generational migration the following spring (NJDEP 2017).

Threats identified in the petition to list monarch butterflies include loss and degradation of habitat and loss of milkweed resulting from herbicide application, conversion of grasslands to cropland, loss to development and aggressive roadside management, loss of winter habitats from logging, forest disease, and climate change. The reduced availability, spatial distribution, and quality of milkweed and nectar plants associated with breeding and use of insecticides are most responsible for their decline (85 *Federal Register* 81813).

4.7.2 Monarch Butterfly in the Action Area

Monarch butterflies are found in open meadows and fields that usually contain a variety of wildflowers including milkweed, coastal beaches with dunes, and human-made butterfly gardens (NYSDEC n.d.[d]). While the EW Onshore Project area is heavily developed, habitat could be present in the coastal beach and dune areas around the offshore export cable landings and in any areas with wildflowers, including milkweed. As indicated in Table 4, this species is not anticipated to occur in the offshore environment in the Lease Area.

4.8. Seabeach Amaranth

4.8.1 Species Description

Seabeach amaranth is an annual plant found along Atlantic coast beaches and barrier islands. It was listed under the ESA as threatened in 1993 (58 *Federal Register* 18035). Seabeach amaranth has stems that are fleshy and pinkish-red or red, with small, rounded leaves. Flowers and fruits are relatively inconspicuous, borne in clusters along the stems. Germination occurs over a relatively long period of time, generally

from April to July, and the plant may grow as large 1 or more meters (3.3 feet) in width. Flowering begins as early as June, but more typically in July, and continues until the death of the plant in late fall.

Seabeach amaranth habitat consists of overwash flats at the accreting ends of islands that accumulate more sand, and lower developing dunes and upper strands of non-eroding beaches. The plant grows on a nearly pure sand substrate, occasionally with shell fragments mixed in, above the high-tide line and is intolerant of even occasional flooding during its growing season. It occasionally establishes small, temporary populations in other habitats, including sound-side beaches, overwash areas in developing dunes, and sand and shell material placed as beach replenishment or dredge spoil. Seabeach amaranth appears to be intolerant of competition and does not occur on well-vegetated sites (USFWS 2019a).

Historically, seabeach amaranth occurred in nine states along the northeast and Mid-Atlantic coast from Massachusetts to South Carolina (excluding Connecticut). Natural populations of seabeach amaranth currently occur in New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, and South Carolina. Threats to the species include coastal development, sea level rise, beach stabilization structures, and recreation such as beach driving and pedestrian traffic. Herbivory by webworms, deer, and feral horses may harm seabeach amaranth plants. Tropical storms and nor'easters can inundate or wash away plants before they set seeds (USFWS 2019a).

4.8.2 Seabeach Amaranth in the Action Area

The EW 1 onshore Action Area contains no suitable habitat for the seabeach amaranth. Site visits conducted from August to October 2020 for the SBMT improvement project included vegetation surveys at the SBMT and seabeach amaranth and associated habitat were not observed (AECOM 2022). Potentially suitable habitat for the seabeach amaranth occurs at Long Beach and Lido Beach at the EW 2 offshore cable landfall locations. New York Natural Heritage Program information (see COP Appendix N; Empire 2022) states the seabeach amaranth has been documented at the EW 2 Landfall C location. After making landfall at Long Beach and Lido Beach, the onshore export cable route would contain no supporting beach habitat for seabeach amaranth.

5. Effects of Proposed Action

This section analyzes the potential effects of the Proposed Action on the federally listed species that occur or potentially occur in the Action Area. This BA incorporates information by reference found in previous assessments of project-related impacts on these same species resulting from actions associated with the construction, O&M, and eventual decommissioning of offshore wind facilities that have been completed by BOEM (see Section 1.2). This effects analysis uses the following definitions to conclude effects determinations stated in Section 6:

- *No effect:* A listed resource is not exposed to the Proposed Action; therefore, no impacts (positive or negative) would occur.
- *May affect, not likely to adversely affect:* This is the appropriate determination if effects on listed species are either:
    - Beneficial, meaning entirely positive, with no adverse effects;
    - Insignificant, which are related to the size of the impact and include effects that are too small to be measured, evaluated, or are otherwise undetectable; or
    - Discountable, which are effects that are extremely unlikely to occur.
- *May affect, likely to adversely affect:* This is the appropriate determination if any direct or indirect adverse effects on listed species that are not entirely beneficial, insignificant, or discountable would occur as a result of the Proposed Action.

The impact-producing factors (IPF) of Project construction, operation, and decommissioning that have the potential to affect federally listed species under USFWS jurisdiction are summarized in Table 8.

Table 8 Impact-Producing Factors for Empire Wind Project Construction, O&M, and Decommissioning on ESA-Listed Species

Impact-Producing Factor	Potentially Affected Species	Potential Type of Exposure
Presence of structures	Northern long-eared bat Tricolored bat Piping plover Roseate tern *Rufa* red knot	injury and mortality behavioral
Accidental releases	Roseate tern	injury and mortality behavioral
Noise	Northern long-eared bat Tricolored bat Piping plover Roseate tern *Rufa* red knot	behavioral
Cable emplacement and maintenance	Roseate tern	prey availability
Traffic (aircraft)	Piping plover Roseate tern *Rufa* red knot	injury and mortality behavioral

Impact-Producing Factor	Potentially Affected Species	Potential Type of Exposure
Land disturbance	Northern long-eared bat Tricolored bat Monarch butterfly Seabeach amaranth Piping plover Roseate tern *Rufa* red knot	habitat modification Injury and mortality behavioral
Lighting	Piping plover Roseate tern *Rufa* red knot	behavioral

5.1. Northern Long-eared Bat and Tricolored Bat

Potential IPFs from the construction, operation, and decommissioning of the proposed Projects on northern long-eared bat include presence of structures, noise, and land disturbance.

5.1.1 Presence of Structures

The primary potential impact of the operational component of the Projects on the northern long-eared bat and tricolored bat is mortality or injury resulting from collision with WTGs. Bat mortality has occurred from collisions at most onshore wind farms in North America (Empire 2022 citing Cryan and Barclay 2009; Empire 2022 citing Hayes 2013; Empire 2022 citing Smallwood 2013; Empire 2022 citing Martin et al. 2017; Empire 2022 citing Pettit and O'Keefe 2017), including northern long-eared bats and tricolored bats, which suggests that the Projects pose potential risk due to collision or barotrauma. However, cave-hibernating bats such as the northern long-eared bat and tricolored bat are less likely to be killed by WTGs than are migratory tree bats (AWWI 2018; Empire 2022 citing Kunz et al. 2007), and they are unlikely to occur over the open ocean. Although some records suggest that northern long-eared bats and tricolored bats may be found offshore along New England and Long Island, there are no records of the species from offshore surveys in the Lease Area (see Section 4.2.2). There have been limited studies of the movements of northern long-eared bat near the ocean, but all evidence to date suggests that the species does not forage offshore (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 or tricolored bats were detected among the 1,546 passes of bats (Stantec 2018). During post-construction monitoring from August 2017 to February 2020, no northern long-eared bats were detected out of the 2,294 passes recorded by bat acoustic detectors mounted on two WTGs, and although 80 passes were labeled as tricolored bats, none had characteristics that were diagnostic of the species and were more likely to be eastern red bats (Stantec 2020). As previously mentioned in Section 4.2.2, bird and bat monitoring (August 2021 to November 2021) for Dominion Energy's Coastal Virginia Offshore Wind pilot project 27 miles off the coast of Virginia Beach, Virginia, did not detect any northern long-eared bats or tricolored bats (Dominion Energy 2022).

Collectively, this information indicates that occurrence of northern long-eared bats and tricolored bats in the offshore portions of the Action Area is very rare and in very small numbers; therefore, exposure would be minimal and would only occur on rare occasions during migration. If northern long-eared bats and tricolored bats were to migrate over water, movements would likely occur close to the mainland and not approximately 14 miles offshore where the WTGs are proposed. Also, bats are agile fliers, so collisions associated with other Project-related structures (i.e., the OSS, stationary construction vessels, and moving Project vessels) are not anticipated. The species' exposure to vessels during construction,

maintenance activities, or decommissioning, or to operating WTGs is expected to be insignificant if exposure were to occur at all. Therefore, because few, if any, northern long-eared bats and tricolored bats are expected to be in the offshore Action Area and because bats are agile flyers, collisions are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*).

5.1.2 Noise

Anthropogenic noise, including construction noise (e.g., pile-driving), maintenance activities, and decommissioning, has the potential to affect bats in the onshore and offshore Action Area. BOEM anticipates that these impacts would be temporary and highly localized, and that the low potential presence of northern long-eared bat and tricolored bat in the offshore and onshore Action Area would result in minimal, if any, exposure to these potential impacts.

Pile-driving noise and onshore and offshore construction noise associated with the Proposed Action alone are expected to result in temporary and highly localized impacts on northern long-eared bats and tricolored bats should they be present at the time noise is generated. Auditory impacts are not expected to occur, as recent research has shown that bats may be less sensitive to temporary threshold shifts than other terrestrial mammals (Simmons et al. 2016). Impacts, if any, are expected to be limited to behavioral avoidance of pile-driving or construction activity, and no temporary or permanent hearing loss would be expected (Simmons et al. 2016).

The construction of offshore structures would create noise and may temporarily affect some migrating northern long-eared bats and tricolored bats, if conducted at night during spring or fall migration. The greatest impact of noise is likely to be caused by pile-driving activities during construction. Noise from pile driving would occur during installation of foundations for offshore structures at a frequency of 5 hours at a time and would cease after piles are installed. Construction activity would be temporary and highly localized. Auditory impacts are not expected to occur, as recent research has shown that bats may be less sensitive to temporary threshold shifts than other terrestrial mammals (Simmons et al. 2016). Habitat-related impacts (i.e., displacement from potentially suitable habitats) could occur as a result of construction activities, which could generate noise sufficient to cause avoidance behavior by individual migrating tree bats (Schaub et al. 2008). These impacts would likely be limited to behavioral avoidance of pile-driving or construction activity, and no temporary or permanent hearing loss would be expected (Simmons et al. 2016). However, these impacts are highly unlikely to occur, as northern long-eared bat and tricolored bat seldom use the offshore Action Area, and only during spring and fall migration (see Section 4.2.2).

Some potential for temporary, localized habitat impacts arising from onshore construction noise exists; however, as described in Section 4.2.2, there is no suitable habitat in the EW 1 onshore area. The presence of northern long-eared bats in the EW 2 onshore area is not anticipated due to the absence of documented individuals in the Action Area (Empire 2022 citing Herzog pers. comm.), the highly developed nature of the EW 2 area, and the lack of quality habitat. Similarly, BOEM does not anticipate the presence of tricolored bats in the EW 2 project area due to the highly developed natures of the area and lack of habitat. Onshore construction would produce noise in excess of ambient conditions due to vehicles and heavy equipment used to construct the cable landfall adjacent to the nearshore zone, the onshore export cables, and the substations. If northern long-eared bats or tricolored bats were present, no auditory impacts on bats would be expected to occur. Recent literature suggests that bats are less susceptible to temporary or permanent hearing loss from exposure to intense sounds (Simmons et al. 2016). Nighttime work may be required on an as-needed basis. Some temporary displacement or avoidance of potentially suitable foraging habitat could occur, but these impacts would not be expected to be significant. Some bats roosting in the vicinity of construction activities may be disturbed during construction but would be expected to move to a different roost farther from construction noise. This

would not be expected to result in any impacts, as frequent roost switching is common among bats (Hann et al. 2017; Whitaker 1998).

Collectively, this information indicates that occurrence of northern long-eared bats and tricolored bats in the onshore and offshore portions of the Action Area is very rare and in very small numbers; therefore, exposure to noise would be minimal. Given the lack of suitable northern long-eared bat and tricolored bat habitat, the temporary and localized nature of potential noise impacts, and the expected insignificant response to those impacts, no individual fitness or population-level impacts would be expected to occur as a result of onshore or offshore noise associated with construction, O&M, and decommissioning. Furthermore, Empire would implement measures to avoid and minimize bat impacts, including time-of-year clearing restrictions (COP Volume 2f, Table 9-1, Applicant-proposed measures [APM] 78 and 79; Empire 2022). Any trees greater than 3 inches diameter at breast height, and identified as suitable habitat, will not be cleared from June 1 to July 31 (APM 79). In addition, tree and vegetation clearing within the Onshore Substation C site will occur between October and March; for any clearing activities outside this window, an acoustic survey and visual roosting tree survey plan will be developed and will include emergence counts within 24 hours of tree removal to confirm absence of roosting northern long-eared bats (APM 78). Therefore, because few, if any, northern long-eared bats or tricolored bats are expected to be in the Action Area and time-of-year clearing restrictions would be implemented, potential effects from noise are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*).

5.1.3 Land Disturbance

Land disturbance activities including construction (e.g., onshore substation construction), maintenance, and decommissioning have the potential to affect bats in the onshore Action Area. BOEM anticipates that these activities would result in minimal exposure given the low potential presence of northern long-eared bat and tricolored bat and lack of suitable habitat in the onshore Action Area.

Impacts associated with construction of onshore elements of the Proposed Action could occur if construction activities take place during the active season (generally April through October) and may result in injury to or mortality of individuals, particularly juveniles who are unable to flush from a roost, if occupied by bats at the time of removal. The primary potential effect on northern long-eared bats and tricolored bats from the onshore components would be localized and minor habitat modification. The majority of the proposed onshore export and interconnection cable routes would be in already-disturbed urban areas (e.g., roadways). No tree clearing is anticipated to be required at the EW 2 Onshore Substation A site or the O&M facility. While habitats in the EW 2 Onshore Project area have also been significantly altered by human development, there are some small areas of tree and shrub habitat that could be affected, depending on the substation and onshore cable route; however, these more natural areas are isolated and surrounded by developed and urbanized areas and disconnected from larger forested areas and would not be considered important northern long-eared bat habitat. Construction of onshore export cable segment IP-C would require vegetation removal in three small, isolated areas between Long Beach Road and Daly Boulevard (6.44 acre herbaceous, 1.99 acres forest/wooded vegetation, and 0.41 acre scrub/shrub). Construction of EW 2 Onshore Substation C would require the removal of approximately 0.55 acre of tree/shrub habitat along the existing railroad corridor. Clearing and grading during construction within temporary workspaces could result in short-term loss of bat habitat within the area. Construction of Onshore Substation C would result in long-term impacts on habitat from construction of the permanent substation facilities and short-term impacts for temporary construction workspaces. Any remnant habitat within the permanent substation site would be converted to developed land with landscaping for the duration of the Projects' operational lifetime. Tree and shrub removal for onshore export cable installation would likely result in a maintained ROW of herbaceous/low shrub vegetation, which would be a long-term impact for tree removal.

New York State restricts tree clearing between March through November on Long Island; however, as the northern long-eared bat has not been documented at the EW 2 onshore substation sites, Empire intends to work with the applicable agencies to minimize this restriction, as appropriate. Furthermore, Empire would implement measures to avoid and minimize bat and northern long-eared bat impacts, including time-of-year clearing restrictions (COP Volume 2f, Table 9-1, APMs 78 and 79; Empire 2022), siting onshore Project components in disturbed areas as much as practicable (APM 76), and revegetating disturbed areas (APM 87). With the lack of suitable habitat in most of the onshore area and with Empire's commitment to implement measures to avoid and minimize bat impacts, BOEM anticipates that land disturbance would not result in individual fitness or population-level effects on bats. If the 4(d) rule is finalized as part of the recently proposed uplisting of the northern long-eared bat to "Endangered," BOEM would arrive at the same conclusion given the general lack of potentially habitat that could be affected (see previous paragraphs) and implementation of the aforementioned APMs and New York State seasonal restriction on tree clearing.

Collectively, this information indicates that occurrence of northern long-eared bats and tricolored bats in the onshore Action Area is very rare and that the potential habitat present is low in quality, small in area, and isolated from larger forested areas by surrounding human development. Given the lack of high-quality northern long-eared bat and tricolored bat habitat, and minimal habitat impacts, no individual fitness or population-level impacts would be expected to occur as a result of land disturbance associated with construction, O&M, and decommissioning. Furthermore, Empire would implement the aforementioned measures to avoid and minimize bat impacts. Therefore, because few, if any, northern long-eared bats or tricolored bats are expected to be in the Action Area and habitat is generally lacking, potential effects from land disturbance are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*).

5.1.4 Avoidance, Minimization, and Mitigation Measures

The COP, Volume 2f, Table 9-1 (Empire 2022) provides a list of APMs to avoid, minimize, or mitigate impacts and to perform monitoring of potential impacts. Six of the various bat APMs identified would be beneficial to northern long-eared bat and tricolored bat:

- 76: Onshore components will be sited in previously disturbed areas, existing roadways, or otherwise unsuitable avian habitat or ROWs to the extent practicable.
- 78: Tree and vegetation clearing within the Oceanside POI parcel and the EW 2 Onshore Substation C site will occur between October and March. For any proposed clearing activities outside this window, an acoustic and visual roosting tree survey plan will be developed, which includes emergence counts within 24 hours of tree removal to confirm absence of roosting northern long-eared bats. The surveys will be consistent with USFWS's *Range-Wide Indiana Bat & Northern Long-eared Bat Survey Guidelines* (USFWS 2022b), and survey data will be submitted to the North American Bat Monitoring Program (https://www.nabatmonitoring.org/).
- 79: Trees greater than 3 inches diameter at breast height, and identified as suitable bat habitat, will not be cleared from June 1 to July 31.
- 83: An annual report will be submitted to the Department of the Interior and USFWS on January 31, accounting for any dead or injured birds or bats found on vessels or Project structures during construction, O&M, and decommissioning. The following information will be included: species name, date found, location, photo (if available), and other relevant information. Any carcasses that have federal or research bands will be reported to the USGS Bird Band Laboratory, BOEM, and USFWS.
- 86: A monitoring program will be developed to answer specific questions, including identifying key species of interest, and, when possible, to contribute to the understanding of long-term, Project-

specific impacts and larger-scale efforts to understand cumulative impacts. Empire has developed and proposed a Bird and Bat Monitoring Framework for the Lease Area (Appendix C).

- 87: Temporarily disturbed areas will be revegetated with appropriate native species at EW 2, as appropriate.

Empire has proposed numerous other APMs for terrestrial vegetation and wildlife (APMs 43 through 57), several of which could also serve to conserve northern long-eared bats and their habitat. These APMs are identified in COP, Volume 2f, Table 9-1 (Empire 2022).

5.2. Birds (Piping Plover, *Rufa* Red Knot, Roseate Tern)

Potential IPFs from the construction, operation, and decommissioning of the proposed Projects on federally listed birds include presence of structures, noise, land disturbance, cable emplacement and maintenance, lighting, traffic (aircraft), and accidental releases.

5.2.1 Presence of Structures

This section discusses the potential for impacts on federally listed species resulting from collisions with WTGs, offshore substations, and construction and maintenance vessels, OSS, 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 and OSS foundations, and vessels. As such, the likelihood of collisions with fixed structures or vessels associated with the Proposed Action to be insignificant and discountable.

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. 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. However, because relatively few individuals from each of these species are likely (if at all) to enter into the proposed Lease Area (see Sections 4.4.2, 4.5.2, and 4.6.2), collision risk is analyzed qualitatively below.

5.2.1.1. Piping Plover

The piping plover is among 72 species populations (out of 177 on the Atlantic OCS) that is ranked "medium" in its relative vulnerability to collision with WTGs (Robinson Willmott et al. 2013). The distance from shore to the Project WTGs precludes the occurrence of nesting and foraging piping plovers in the vicinity of the Projects' WTGs, and non-migratory movements in May through August appear to be exclusively coastal (Burger et al. 2011). Flight heights during this non-migratory period are generally well below the RSZ and occur in the immediate vicinity of the coastline (USFWS 2008; Burger et al. 2011). Piping plovers' exposure to the Projects would be limited, as one tracking study estimated that one piping plover (out of 102 tracked) could cross through the Lease Area during migration (Loring et al. 2019) and recent offshore high-definition digital surveys (2016–2019) of the Lease Area conducted by NYSERDA and Empire did not detect any piping plovers (see COP Appendix Q, Tables 2-16 and 2-36; Empire

2022). In addition, it is very unlikely that the approximately 200 breeding pairs plus their fledglings in the New York population would pass through the Lease Area during fall migration. The total number of plovers passing through the Lease Area during spring and fall migration are likely be fewer than the estimated 178 in spring and 200 in fall through the Vineyard Wind 1 100-turbine project (BOEM 2020). As such, there would be limited overall exposure risk for piping plovers.

Loring et al. (2017) estimated that offshore flight altitudes of 70 migrating piping plovers tracked with nanotags over federal waters primarily occurred above the RSZ, defined in the study as 82 to 820 feet (25 to 250 meters) above the ocean, with 15.2 percent of birds flying through the RSZ within offshore wind lease areas. This is consistent with other offshore radar studies that show migrating shorebirds generally fly at high altitudes well above the RSZ, while nearshore radar studies report lower flight heights (Williams and Williams 1990). Evidence from a recent tracking study suggests the potential for high-altitude migratory flights in at least some individuals (Paton 2016). Low cloud ceiling conditions could bring migrating piping plovers to lower elevations into the RSZ (see Hüppop et al. 2006); however, Loring et al. (2017) found that migration typically occurs during favorable weather conditions with high visibility, little to no precipitation, and high atmospheric pressure. Piping plovers also have good visual acuity and maneuverability in the air (Burger et al. 2011).

Although "take" (a fatality due to colliding with a moving turbine blade) is unlikely due to the 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 following quantitative analyses were conducted.

BOEM used the Band Model (Band 2012) to estimate the risk of piping plover collision with the proposed WTGs in the Lease Area. 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). A snapshot of the model input parameters used to estimate piping plover collision risk for the Projects are presented in Appendix B.

Radio telemetry studies of piping plover migratory behavior in the vicinity of the Action Area indicate that piping plover could fly through the Projects. Loring et al. (2020) found that 5.9 percent (1 out of 17) of tagged plovers leaving breeding areas in Massachusetts and Rhode Island during fall migration flew through the Empire Wind Lease Area. Extrapolating that percentage to recent population size,[3] an estimated 574 piping plovers could have migrated through the Lease Area in 2021: 222 adults in spring and 352 adults and subadults in fall.

Turbine avoidance rate of 95.01 percent was used for piping plover (Cook 2021). A total of 147 operating turbines each with a 36 m airgap between blade and water were used in the model. Developer provided turbine data including monthly wind availability, average revolutions per minute (rpm) for a turbine operating at the site, and pitch. 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. 2019). Given that the flight height distribution is known for this species, fatalities estimated are based on calculations from the extended model (Option 3). 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. 2018). Given that the flight height distribution is known for this species, fatalities estimated are based on calculations from the extended model (Option 3).

[3] Based on a breeding population abundance of 1,883 pairs in Canada, Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, and New York, an abundance-weighted mean productivity of 1.17 chicks fledged per pair (USFWS 2022c), equating to 3,766 adults in spring and 5,969 adults and subadults in fall.

To further inform this ESA consultation, BOEM used SCRAM 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 also provided estimates of wind speed and monthly turbine down time. 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.

The estimated annual mortality using the Band model was zero (Appendix B). The probability of at least one take from the SCRAM model for both scenarios was < 0.001, thus a single collision during fall migration is extremely unlikely—in other words, a once in a thousand-year event (Appendix D). The probability of a collision event during the 35-year operational period is also very small 0.034 (= 1- (1-0.001)$^{35\ years}$).

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

5.2.1.2. Roseate Tern

The roseate tern is one among 61 species populations (out of 177 on the Atlantic OCS) that was ranked "higher" in its relative vulnerability to collision with WTGs (Robinson Willmott et al. 2013). This high ranking is partially driven by the amount of time the species spends foraging on the ocean; if time on the ocean was restricted to migration, the population would be ranked "medium." However, roseate terns are unlikely to experience adverse effects from the Proposed Action for several reasons. First, there are no known nesting roseate terns in the Action Area. Second, the MDAT model results (Figure 15), recent offshore high-definition digital surveys (2016–2019) of the Lease Area conducted by NYSERDA and Empire, and Northwest Atlantic Seabird Catalog data (Figure 16) show very few over the ocean during the non-migratory periods. Third, even during migration periods, very few roseate terns are predicted to occur near the Projects' WTGs (Figure 17). Fourth, the species typically migrates under high-visibility conditions, mostly below WTG cut-in speed, and would be able to see and avoid the WTGs from a considerable distance without significantly modifying their flight path.

Based on recent studies, roseate terns tend to fly below the RSZ of offshore WTGs. One study found that common terns and roseate terns tended to avoid the airspace around a 660-kilowatt WTG when it was rotating and usually avoided the RSZ (Vlietstra 2007). This finding is corroborated by mortality monitoring of small to medium WTGs (200 and 600 kilowatts) in Europe, where mortality rates rapidly declined with distance from the colony (Everaert and Stienen 2007). Most observed tern mortalities in Europe have occurred at WTGs within about 100 feet (30 meters) from nests (Burger et al. 2011). Also, flight heights of all tern species recorded in offshore baseline surveys (NJDEP 2010) indicate that they fly almost exclusively below the potential RSZ. This is corroborated by a recent nanotag study by Loring et al. (2019) that found both common terns and roseate terns generally flew below the RSZ of offshore WTGs and that roseate terns flying offshore only occasionally flew within the lower portion of the RSZ. An estimated 4.3 percent of common tern flights and 6.4 percent of roseate tern flights occurred within the RSZ when transiting over the Atlantic OCS. In addition, estimated exposure of roseate terns to offshore wind lease areas occurred during favorable weather conditions, with high visibility, no

precipitation, mild air temperatures, and high atmospheric pressure, and during northeast winds with a mean speed of 5.28 meters per second (Loring et al. 2019). The estimated exposure of roseate terns to offshore wind lease areas peaked during mid-July and August and primarily occurred during morning hours with fair weather conditions (Loring et al. 2019). Based on the evidence above, the risk of roseate terns colliding with WTGs is considered extremely unlikely. Some individuals may have to alter their migratory flight path to avoid a WTG, but terns are agile fliers and can easily avoid WTGs and fly below the RSZ of offshore WTGs in the region.

To further inform this ESA consultation, BOEM used SCRAM 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 also provided estimates of wind speed and monthly turbine down time. 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.

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

Based above information and the results from SCRAM, 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.

5.2.1.3. *Rufa* Red Knot

The *rufa* red knot is one of 72 species populations (out of 177 on the Atlantic OCS) that was ranked "medium" in its relative vulnerability to collision with WTGs (Robinson Willmott et al. 2013). Despite the presence of many onshore WTGs along the *rufa* red knot's overland migration route (Diffendorfer et al. 2017), there are no records of *rufa* red knots colliding with WTGs (78 *Federal Register* 60024). As stated previously, red knots nest in Canada, and some red knots may stop on Long Island during migration and feed on shore. Similar to piping plover above, *rufa* red knot exposure to the Projects' WTGs would be limited to migrating individuals.

Proportionally few *rufa* red knots are likely to cross the offshore Action Area; in fact, only one out of the 245 *rufa* red knots fitted with tracking devices in Mingan Islands, Canada crossed the Lease Area (in mid-November) (Loring et al. 2018). Although there is anecdotal evidence of *rufa* red knots flying at great heights during migration in the range of 3,281 to 9,843 feet (1,000 to 3,000 meters) (78 *Federal Register* 60024; Burger et al. 2011; USFWS 2014), recent telemetry studies suggest that red knots fly much lower (Loring et al. 2018; BRI and Wildlife Restoration Partnerships 2022; Feigin et al. 2022). Loring et al. (2018) derived flight height estimates using data collected from red knots fitted with nanotags; these estimates were subject to large error bounds (typically 328 to 656 feet [100 to 200 meters]) and should be interpreted with caution. However, more recent telemetry studies near the Projects using GPS satellite tags yielded more precise results and found that none of the red knots near the Lease Area flew within the RSZ, but instead mostly flew below the RSZ (BRI and Wildlife Restoration Partnerships 2022; Feigin et

al. 2022). Therefore, the flight height data suggest that it is unlikely that migrating *rufa* red knots would collide with operating WTGs based on how high *rufa* red knots fly with respect to the Projects' spinning turbine blades. Regardless, the vast majority undertakes flights to and from areas farther south and transits offshore beyond offshore wind leases on the Atlantic OCS (Loring et al. 2018). In addition, red knots migrate through federal waters of the Atlantic OCS primarily during clear skies with little to no precipitation and a tailwind blowing in their direction of travel (Loring et al. 2018; BRI and Wildlife Restoration Partnerships 2022; Feigin et al. 2022) and thus can easily see and avoid the turbines. Based on the best available information on *rufa* red knot migration (see Section 4.4.2), 124 *rufa* red knots could pass through the Offshore Project area during spring migration and 370 *rufa* red knots could pass through during fall migration.

Although take (a fatality due to colliding with a turbine) 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, quantitative analyses were conducted.

BOEM used the Band Model (Band 2012) to estimate the risk of *rufa* red knot collision with operating WTGs in the Lease Area. The input parameters and results are presented in Appendix B. A total of 147 operating turbines each with a 36 m airgap between blade and water were used in the model. The flight height distribution was derived from the midpoints of 379 10-minute observations of 51 *rufa* red knots flying nonstop over federal waters (Loring et al. 2018); approximately 50 percent flew within the rotor RSZ (as mentioned above, the estimated error is large, ranging from 100 to 200 meters).[4] Turbine avoidance rate was 95.01 percent (Cook 2021). Given that the flight height distribution is known for this species, fatalities estimated are based on calculations from the extended model (Option 3).

To further inform this ESA consultation, BOEM used SCRAM 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 also provided estimates of wind speed and monthly turbine down time. 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.

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

Based on the results from both models, the chance of a fatality due to collision is extremely unlikely, and thus the estimated annual number of fatalities for migrating red knot 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 red knots and is well below the less than 1-percent chance of a red knot population decline that was used by FWS to conclude that take as defined under the Endangered Species Act as killing or injuring, of red knots is not likely resulting from permitted fishing activities (e.g., U.S.

[4] The flight height distribution derived from GPS tracked red knots from the Biodiversity Research Institute and Wildlife Restoration Partnerships (2022) and Feigin et al. (2022) studies was not available at this time.

Fish and Wildlife Service Evaluation of the Atlantic States Marine Fisheries Commission Horseshoe Crab-Red Knot Adaptive Resource Management Revision | FWS.gov).

5.2.2 Noise

Federally listed bird species present within the Action Area may be exposed to periodic construction noise exceeding ambient levels due to construction of offshore wind structure foundations, construction of onshore Project elements, and use of construction vessels/vehicles. Combined with the visual disturbance created by construction activity, this exposure could theoretically lead to behavioral effects, including potential species avoidance of the affected area. There are currently no established in-air noise exposure thresholds for the federally listed birds analyzed in this BA, so potential species effects are evaluated based on extent and magnitude of effects relative to baseline ambient conditions and the likelihood of species exposure.

Project construction vehicle use would not significantly alter baseline noise levels because the Onshore Project area is highly developed. ESA-listed birds in proximity to the offshore export cable landfall sites may be able to detect noise and visual disturbance created by construction and maintenance vehicles and associated activity, but that disturbance likely would be insignificant relative to existing baseline conditions. Species responses may range from escape behavior to mild annoyance. Offshore pile-driving noise impacts would be temporary (5 hours per pile). Vessel and construction noise could disturb offshore bird species, but they would likely acclimate to the noise or move away, potentially resulting in a temporary loss of habitat (BOEM 2012a). Construction and maintenance vehicle activity would also not significantly increase or alter the existing levels of disturbance within onshore areas; therefore, any noise-related effects on federally listed bird species in the vicinity would be temporary and localized.

Installation of offshore WTG and OSS foundations using an impact pile driver would produce the loudest airborne noise effects associated with the proposed Projects. The area potentially affected by pile driving at any given time would be limited to the effect radius around the pile being installed. The effect radius depends on the sea-surface and atmospheric parameters and mitigation to attenuate the noise. *Rufa* red knot and piping plover would only be exposed to impact hammer noise if monopile installation occurs during the migratory period and if the species happened to be present as far offshore as the Lease Area when pile driving is occurring. Roseate terns are most likely to be exposed during the summer post-breeding foraging period and fall migration. Based on observed flight behavior, migrating birds would be able to detect and avoid noise-producing activities at a considerable distance with a minimal shift in flight path. Individual birds may hear Project construction noise, including pile driving, but would be able to limit exposure without significantly altering behavior. This conclusion is supported by the fact that these species are periodically exposed to elevated baseline noise levels from sources like large ships without apparent harm. Once construction is completed, the WTGs would produce operational airborne noise in the offshore marine environment, which also would have no impacts on federally listed birds.

It is expected that noise levels associated with 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 temporary, lasting only for the duration of structure removal. If these activities were to occur during the migration period, most *rufa* red knots and piping plovers, if even present in the area, would be flying well above the Action Area. However, should any federally listed birds occur in the area, they would simply fly around the noise source; therefore, the noise generated is not anticipated to affect bird movement or behavior through the Action Area.

Collectively, this information indicates that occurrence of federally listed birds in the offshore portions of the Action Area is very rare and in very small numbers; therefore, exposure to noise would be minimal. In the onshore Action Area, federally listed birds could be present primarily in the offshore export cable

landing areas. Onshore noise would be temporary, lasting only the duration of construction, maintenance, or decommissioning, and any noise related to the Projects would not be anticipated to affect baseline noise conditions given the developed condition of the onshore Action Area. Furthermore, Empire would implement measures to avoid and minimize bird impacts, including time-of-year clearing restrictions (COP Volume 2f, Table 9-1, APMs 77, 78, and 79; Empire 2022). Therefore, potential effects from noise are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*).

5.2.3 Land Disturbance

The EW 1 Onshore Project area (which also includes the O&M facility) lacks natural bird habitat (i.e., significantly altered by human development and primarily used for industrial and commercial operations) and does not support native species or sensitive species. Therefore, BOEM does not anticipate any impacts on federally listed birds from construction and operations of EW 1 onshore components and the O&M facility.

Land disturbance could affect federally listed birds if they were to occur in the vicinity of the onshore Project elements during construction, maintenance, and decommissioning, specifically around the offshore export cable Landfall C site because this is where federally listed birds have been primarily documented. As previously described, the beach and dune habitats around the EW 2 C Landfall site are occupied by nesting or migrating piping plover, migrating *rufa* red knots, and migrating roseate terns. Habitat disturbance with construction at the landfall sites could adversely affect habitats and disturb individuals of any three species if performed at times of year that the birds are typically present. Piping plovers, which could nest in the area, would be especially sensitive to disturbance. The presence of humans is stressful for adults and chicks, forcing them to spend significantly less time foraging, which may result in decreased overall reproductive success. Excessive disturbance may cause piping plovers to desert the nest, exposing eggs or chicks to the summer sun and predators. Interrupted feedings may stress juvenile birds during critical periods in their development, and foot and vehicle traffic may crush eggs or chicks (USFWS 1996). USFWS (2019b) reports that activities within 1 mile (1.6 kilometers) of a beach, dune, or intertidal area may affect piping plovers. These activities include any permanent or temporary increases in disturbance between March 15 and August 31, including but not limited to major construction work. To avoid and minimize potential impacts on federally listed birds, Empire would use trenchless technology (e.g., HDD or Direct Pipe) for the EW 2 offshore export cable landing to go under beaches and vegetated dunes, which would avoid beach habitat for nesting shorebirds (COP Volume 2f, Table 9-1, APMs 85 and 96; Empire 2022), and seasonal restrictions in sensitive onshore bird habitat, where feasible and required (COP Volume 2f, Table 9-1, APM 77; Empire 2022). As such, impacts on federally listed birds resulting from the landfall location would be avoided and minimized. Therefore, because beach and dune habitat would be avoided and seasonal construction restrictions would be implemented, potential effects from land disturbance for EW 2 are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*).

5.2.4 Cable Emplacement and Maintenance

Roseate tern is the only federally listed species considered in this BA with the potential to be indirectly affected by cable emplacement and maintenance. The potential impacts relate to temporary seabed and water column disturbance that could alter forage fish behavior and potentially affect foraging efficiency. Seafloor and benthic habitat disturbance resulting from the installation of the offshore export cables would not affect piping plovers or *rufa* red knots, as these species are strictly terrestrial foragers and do not use aquatic habitats for foraging.

Disturbance to foraging roseate terns during their migration from July to mid-September could occur as a result of offshore export cable installation. The installation of array cables and offshore export cables would include site preparation activities (e.g., boulder removal) and cable installation via jetting (primary method), plowing, trenching, and dredging, which can cause temporary increases in turbidity and sediment resuspension. Other projects using similar installation methods have been characterized as having minor impacts on water quality due to the temporary and localized nature of the disturbance (Latham et al. 2017). As described below, a sediment transport analysis model (see COP Appendix J for more detailed information; Empire 2022) was conducted for the Proposed Action that showed the displacement of sediments would be low, and that sediments would remain suspended for a short period of time (4 hours) and typically dissipate to background levels very close to the trench.

The model simulated jet plowing, the primary installation method to be utilized for the Proposed Action and the method that causes more sediment disturbance than other installation methods that could be utilized (e.g., plowing, trenching). Therefore, jet plowing provides the maximum expected disturbance of seabed sediment in the Project area. The sediment transport model predicted that the sediment plume would typically travel between 328 feet (100 meters) and 1,640 feet (500 meters) during flood and ebb conditions. In some areas with stronger currents, the plume could travel more than 3,280 feet (1,000 meters). The plume was expected to stay near the substrate layer and not reach the surface. Maximum plume concentrations at 3,280 feet (1,000 meters) would be below 30 milligrams per liter at most locations. Coarse particles (medium sand and larger) would not be suspended in the water column from jet plow activities. Fine sand would settle to the bed in less than 1 minute and within 3 feet (1 meter) to 16 feet (5 meters) of the trench centerline, depending on current velocities. The fine and very fine sand particles accounted for over 40 percent of the sediment particles resuspended in the water column due to jet plowing in most of the modeling study area. Silts and clays would remain suspended for approximately 4 hours and would be transported farther from the trench. Within 492 feet (150 meters) of the trench, deposition thicknesses would be negligible, at less than 0.04 inch (0.1 centimeter) in most areas.

Impacts on benthic habitats and increased turbidity during cable-laying activities have the potential to affect sand lance, an important prey resource for roseate terns (USFWS 2008). Given the nature of the construction techniques, indirect impacts such as increased turbidity would be temporary in duration and localized in nature and would not directly affect terns because the activity would be underwater. It is estimated that water turbidity conditions would return to normal within a few hours of cable installation. Also, this disturbance is not expected to be different from typical construction equipment (barges or dredges) and cable installation, which are not believed to adversely affect roseate terns (USFWS 2008). Furthermore, as previously described in this BA, few (if any) roseate terns would be expected in the offshore Action Area. Therefore, because turbidity impacts would be temporary and last only a few hours, and because few, if any, roseate terns are expected to be in the offshore Action Area, potential effects on prey resources that relate to cable emplacement and maintenance are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*).

5.2.5 Lighting

Under the Proposed Action, WTGs and OSS would be lit with USCG navigational and FAA hazard lighting; these lights have some potential to attract birds and result in increased collision risk (Hüppop et al. 2006). 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. In accordance with BOEM lighting guidelines (2021) and as outlined in the COP (Volume 1, Section 3.5.2; Empire 2022), all WTGs in excess of 699 feet about ground level would be lit with two synchronized red flashing obstruction lights (with medium-

intensity FAA model L-864 and light-emitting diode color between 800 and 900 nanometers) placed on the back of the nacelle on opposite sides, and up to three FAA model L-810 red flashing lights at mid-mast level, adding up to 870 new red flashing lights to the offshore environment where none currently exist. Red flashing aviation obstruction lights are commonly used at land-based wind facilities without any observed increase in avian mortality compared with unlit WTG towers (Kerlinger et al. 2010; Orr et al. 2013). Marine navigation lighting would consist of multiple types of flashing yellow lights on corner WTGs/significant peripheral structures, outer boundary WTGs, and interior WTGs.

Empire has committed to using an FAA-approved ADLS (COP Volume 2f, Table 9-1, APM 88; Empire 2022), which is a lighting system that would only activate WTG lighting when aircraft enter a predefined airspace. For the Proposed Action, based on historical air traffic data, obstruction light activation under ADLS was estimated to occur 30 hours per month over the course of 1 year, which equals just 7.5 percent of the time that full-time obstruction lights would be active (COP Volume 2, Section 8.6; Empire 2022). To further reduce impacts on birds, Empire would limit, where practicable, lighting (not required by FAA and USCG) during offshore construction to reduce attraction of birds (COP Volume 2f, Table 9-1, APM 82; Empire 2022).

As previously described in this BA, the occurrence of federally listed birds in the offshore portions of the Action Area is very rare and in very small numbers; therefore, exposure to lighting would be minimal. In addition, Empire's lighting mitigation measures would further minimize potential exposure to lighting. Therefore, because few, if any, federally listed birds are expected to be in the offshore Action Area and Empire has committed to lighting reduction measures, potential effects from lighting-related collision are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*).

5.2.6 Traffic (Aircraft)

The use of aircraft (e.g., helicopters) during construction, O&M, and decommissioning could pose a collision threat to federally listed birds that may be in the area of aircraft use. However, general aviation traffic accounts for approximately two bird strikes per 100,000 flights (Dolbeer et al. 2019). Because aircraft flights associated with the Projects are expected to be minimal in comparison to baseline conditions, aircraft strikes with federally listed birds are highly unlikely to occur. In addition, as previously described in this BA, the occurrence of federally listed birds in the offshore portions of the Action Area is very rare and in very small numbers. Therefore, potential effects from aircraft-related collisions are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*).

5.2.7 Accidental Releases

Roseate tern is the only federally listed species considered in this BA with the potential to be affected by accidental releases in the offshore environment. Accidental releases would not affect piping plovers or *rufa* red knots, as these species are strictly terrestrial foragers and do not use aquatic habitats for foraging.

Some potential exists for bird mortality, decreased fitness, and health effects due to the accidental release of fuel, hazardous materials, and trash and debris from vessels associated with construction, O&M, and decommissioning of the offshore Project elements. Ingestion of fuel and other hazardous contaminants has the potential to result in lethal and sublethal impacts on birds, including decreased hematological function, dehydration, drowning, hypothermia, starvation, and weight loss (Briggs et al. 1997; Haney et al. 2017; Paruk et al. 2016). Additionally, even small exposures that result in oiling of feathers can lead to sublethal effects that include changes in flight efficiencies and result in increased energy expenditure during daily and seasonal activities, including chick provisioning, commuting, courtship, foraging, long-distance migration, predator evasion, and territory defense (Maggini et al. 2017). Vessels associated with

the Proposed Action may potentially generate operational waste, including bilge and ballast water, sanitary and domestic wastes, and trash and debris. BOEM expects accidental trash releases from offshore vessels to be rare and localized in nature. In the unlikely event of a release, lethal and sublethal impacts on individuals could occur as a result of blockages caused by both hard and soft plastic debris (Roman et al. 2019).

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

As previously described in this BA, the occurrence of roseate terns in the offshore portions of the Action Area is very rare and in very small numbers; therefore, exposure to accidental releases would be minimal. In addition, any release is anticipated to be rare and localized, and USCG regulations and Empire's Oil Spill Response Plan would further minimize potential exposure to accidental releases. Therefore, potential effects of accidental releases are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*).

5.2.8 Avoidance, Minimization, and Mitigation Measures

The COP, Volume 2f, Table 9-1 (Empire 2022) provides a list of APMs to avoid, minimize, or mitigate impacts and to perform monitoring of potential impacts. Several APMs identified for birds would be beneficial to federally listed birds:

- 76: Onshore components will be sited in previously disturbed areas, existing roadways, or otherwise unsuitable avian habitat or ROWs to the extent practicable.
- 77: Adherence to time-of-year restrictions, as necessary, at EW 2 in sensitive onshore bird habitats, where feasible and required, unless otherwise determined acceptable by the applicable agencies.
- 80: Lighting not required during onshore construction will be limited to the minimum required by regulation and for safety, to reduce attraction of avian and bat species.
- 82: Lighting not required by FAA and USCG and for safety during offshore construction will be limited to reduce attraction of birds and bats, where practicable.
- 83: An annual report will be submitted to the Department of the Interior and USFWS on January 31, accounting for any dead or injured birds or bats found on vessels or Project structures during construction, O&M, and decommissioning. The following information will be included: species name, date found, location, photo (if available), and other relevant information. Any carcasses that have federal or research bands will be reported to the USGS Bird Band Laboratory, BOEM, and USFWS.
- 84: The development and enforcement of an Oil Spill Response Plan (COP Appendix F; Empire 2022).
- 85 and 96: The use of HDD or other trenchless technologies for installation of the export cable landfalls at EW 2 to avoid surficial disturbances.
- 86: A monitoring program will be developed to answer specific questions, including identifying key species of interest, and, when possible, to contribute to the understanding of long-term, Project-specific impacts and larger-scale efforts to understand cumulative impacts. Empire has developed and proposed a Bird and Bat Monitoring Framework for the Lease Area (Appendix C).
- 87: Temporarily disturbed areas will be revegetated with appropriate native species at EW 2, as appropriate.

- 88: Lessee will use an FAA-approved ADLS, which will only activate the FAA hazard lighting when an aircraft is in the vicinity of the wind facility, to reduce the visibility of nighttime lighting and nighttime visual impacts.

Empire has proposed numerous other APMs for Terrestrial Vegetation and Wildlife (APMs 43 through 57), several of which could also serve to conserve birds and their habitat. These APMs are identified in the COP, Volume 2f, Table 9-1 (Empire 2022).

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 9. 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 9 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 9 Additional Measures Proposed to Avoid and Minimize Potential Effects of the Proposed Action

No.	Description
1.a.	To minimize attracting birds to operating turbines, Empire Wind must install bird perching-deterrent devices on WTGs and OSSs. The location of bird-deterrent devices must be proposed by Empire Wind based on best management practices applicable to the appropriate operation and safe installation of the devices. Empire Wind must confirm the locations of bird perching-deterrent devices as part of the as-built documentation it must submit with the FDR.
1.b.	Empire Wind must use an FAA-approved vendor for the Aircraft Detection Lighting System (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. Empire Wind must confirm the use of an FAA-approved vendor for ADLS on WTGs and OSSs in the FDR.
1.c.	Empire 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 USCG approval).
2	BOEM will require that Empire Wind develops and implements a Post-Construction Monitoring [PCM] plan based on the "Empire Offshore Wind Projects (EW 1 and EW 2): Proposed Bird and Bat Monitoring Framework" in 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, Empire Wind must submit the PCM for BOEM and USFWS review. BOEM and USFWS will review the PCM and provide any comments on the plan within 30 calendar days of its submittal. Empire Wind must resolve all comments on the PCM to BOEM and USFWS's satisfaction before implementing the plan. a. Monitoring. Empire Wind must conduct monitoring as outlined in "Empire Offshore Wind Projects (EW 1 and EW 2): Proposed Bird and Bat Monitoring Framework, which will include acoustic monitoring of bat and bird presence, the use of motus receivers and tags to monitor bird and bat movements, and conducting digital aerial surveys to monitor avoidance behavior and densities. b. Annual Monitoring Reports. Empire 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,

No.	Description
	and BSEE will use the annual monitoring reports to assess the need for reasonable revisions (based on subject matter expert analysis) to the PCM. BOEM, BSEE, and USFWS reserve the right to require reasonable revisions to the PCM and may require new technologies as they become available for use in offshore environments. c. Post-Construction Quarterly Progress Reports. Empire Wind must submit quarterly progress reports during the implementation of the PCM 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, Empire Wind must meet with BOEM and USFWS to discuss the following: the monitoring results; the potential need for revisions to the PCM, 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 PCM are necessary, BOEM may require Empire Wind to modify the PCM. If the reported monitoring results deviate substantially from the impact analysis included in the Final BA, Empire Wind must transmit to BOEM recommendations for new mitigation measures and/or monitoring methods. e. Operational Reporting (Operations). Empire 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 SCADA data for all turbines together in tabular format: the proportion of time the turbines were operational (spinning at >x rpm) each month, the average rotor speed (monthly revolutions per minute (rpm)) 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.
3	Empire 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.

BOEM = Bureau of Ocean Energy Management; BSEE = Bureau of Safety and Environmental Enforcement; ESA = Endangered Species Act; FDR = Facility Design Report; USFWS = U.S. Fish and Wildlife Service

5.3. Monarch Butterfly

Potential IPFs from the construction, operation, and decommissioning of the proposed Projects on monarch butterfly include presence of structures and land disturbance.

5.3.1 Land Disturbance

Potential effects on the monarch butterfly would only occur during facility construction in the vicinity of undeveloped lands where milkweed and other native nectar plants are present. While adult monarch butterflies have the mobility to avoid construction equipment, larval stages could be vulnerable to being crushed by construction equipment, particularly during land clearing and ground excavation. Some adult monarch butterflies could also be affected by vehicle collisions (McKenna et al. 2001; Kantola et al. 2019). Also, there is limited evidence that monarch caterpillars exposed to highway noise for short periods had elevated heart rates, a sign that they may experience stress along loud roadsides (Davis et al. 2018).

Although Project construction, operation, and decommissioning could potentially affect a small number of monarch butterflies, impacts are anticipated to be limited to behavioral avoidance of construction activity. Collision with Project vehicles and equipment is unlikely because the Projects would not cause a noticeable increase in traffic. Suitable habitat is not widespread in the Action Area due to the developed nature of the EW 1 and EW 2 Project area and the Projects would not cause an increase in noise to the extent that they would adversely affect monarch butterflies. If any adult butterflies were disturbed by Project activities, they would likely utilize adjacent habitat and repopulate these areas once construction ceases. Temporarily disturbed habitat would be restored to pre-existing conditions with appropriate native vegetation, including nectar plants, following completion of construction, which would benefit the monarch butterfly if suitable habitat is affected (COP Volume 2f, Table 9-1, APM 49; Empire 2022). If suitable monarch butterfly habitat is present where EW 2 Substation C construction would occur, the small permanent loss of habitat would be considered insignificant and population-level effects are unlikely to occur. Additionally, construction of the onshore export cable route could convert some shrub or forested areas to herbaceous areas, potentially resulting in a beneficial effect on monarch butterfly by creating suitable habitat. Based on this information, potential effects on monarch butterflies from land disturbance and related activities (e.g., construction vehicle use) would be unlikely to occur (*discountable*), and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*).

5.3.2 Avoidance, Minimization, and Mitigation Measures

No APMs are specifically focused on the monarch butterfly in the COP (Volume 2f, Table 9-1; Empire 2022), but APM 49 and several of the other APMs identified for terrestrial vegetation and wildlife (APMs 43 through 57) could serve to reduce potential Project effects on the species.

5.4. Seabeach Amaranth

The potential IPF from the construction, operation, and decommissioning of the proposed Projects on seabeach amaranth includes land disturbance.

5.4.1 Land Disturbance

Land disturbance could affect seabeach amaranth if plants were to occur in the vicinity of the onshore Project elements during construction, maintenance, and decommissioning, specifically around the offshore export cable Landfall C site because this is where the species has been primarily documented. As previously described, potentially suitable habitat for the seabeach amaranth occurs at Long Beach and Lido Beach at the EW 2 offshore cable landfall locations. New York Natural Heritage Program information (see COP Appendix N; Empire 2022) states the seabeach amaranth has been documented at the EW 2 Landfall C location. Habitat disturbance with construction at the landfall sites could adversely affect habitats and disturb plants (damage or crushing) if performed at times of year they are present. After making landfall at Long Beach and Lido Beach, the onshore export cable route would contain no

seabeach amaranth habitat. The EW 1 onshore Action Area contains no suitable habitat for the seabeach amaranth.

Empire would use trenchless technology (e.g., HDD or Direct Pipe) for the EW 2 offshore export cable landing, which would avoid open beach and dune habitat for seabeach amaranth (COP Volume 2f, Table 9-1, APMs 85 and 96; Empire 2022); as such, impacts on seabeach amaranth resulting from the landfall location would be avoided and minimized. Therefore, because beach and dune habitat would be avoided, potential effects from land disturbance are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*).

5.4.2 Avoidance, Minimization, and Mitigation Measures

The COP, Volume 2f, Table 9-1 provides a list of APMs to avoid, minimize, or mitigate potential impacts (Empire 2022). While no APMs are specifically focused on the seabeach amaranth, several of the APMs identified for terrestrial vegetation and wildlife (APMs 43 through 57) could serve to reduce potential Project effects on the species. Also, as previously mentioned, Empire would use trenchless technology (e.g., HDD or Direct Pipe) for the EW 2 offshore export cable landing, which would avoid open beach and dune habitat for seabeach amaranth (COP Volume 2f, Table 9-1, APMs 85 and 96; Empire 2022). Project implementation would be conditioned upon issuance of applicable federal and state permits and performed in accordance with federal and state permit conditions. It is anticipated that permit conditions may include best management practices such as seasonal work restrictions to avoid and minimize potential adverse effects on seabeach amaranth, clearly demarcating areas where the plant occurs to avoid disturbance during construction, and controlling runoff and stabilizing soils to minimize the potential for soil erosion and sedimentation in wetland habitats during construction.

6. Determination of Effect

6.1. Proposed Action

6.1.1 Northern Long-eared Bat and Tricolored Bat

Given that the northern long-eared bat occurs or potentially occurs in portions of the Action Area and, as described in Section 5, there is potential risk to the species during construction, O&M, and decommissioning, the proposed Projects **may affect** the northern long-eared bat. However, because few (if any) northern long-eared bats are expected in the onshore and offshore Action Areas, habitat is generally lacking onshore, and Empire's APMs would further avoid and minimize any impacts, the potential effects related to collisions from the presence of structures, noise, and land disturbance are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*). For these reasons, BOEM anticipates that the Proposed Action is **not likely to adversely affect** the northern long-eared bat.

For the proposed tricolored bat, Section 7 requires BOEM to consult under a conference consultation if the proposed action would likely jeopardize the continued existence of the species. Based on the analysis, the proposed action would not jeopardize the continued existence of the species. Should the tricolored bat get listed at some point during the consultation process, BOEM would make a *not likely to adversely affect* determination for the tricolored bat for the same reasons described for the northern long-eared bat.

6.1.2 Birds (Piping Plover, *Rufa* Red Knot, Roseate Tern)

Given that the piping plover, *rufa* red knot, and roseate tern occur or potentially occur in portions of the Action Area and, as described in Section 5, there is potential risk to the species during construction, O&M, and decommissioning, the proposed Projects **may affect** these birds. However, the occurrence of these birds in the offshore portions of the Action Area is very rare and in very small numbers; therefore, exposure to the IPFs in the offshore environment would be minimal. Furthermore, these species do not have a high risk of collision with offshore WTGs and are rarely expected to occur within the RSZ, and any noise, accidental releases, traffic (aircraft), and cable emplacement and maintenance effects (roseate tern only) would be temporary and localized. The impacts from structure lighting would also be significantly minimized with Empire's proposed installation of an FAA-approved ADLS. Potential onshore impacts on birds would be limited to the offshore export cable landfall locations where beach/dune habitat is present. To avoid and minimize potential impacts on the birds' habitat, Empire would use trenchless technology (e.g., HDD or Direct Pipe) for the EW 2 offshore export cable landing to go under beaches, which would avoid beach habitat for nesting shorebirds (COP Volume 2f, Table 9-1, APMs 85 and 96; Empire 2022), and seasonal restrictions in sensitive onshore bird habitat, where feasible and required (COP Volume 2f, Table 9-1, APM 77; Empire 2022); as such, impacts on these birds resulting from the landfall location would be avoided and minimized. Therefore, potential effects from the IPFs are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*). For these reasons, BOEM anticipates that the Proposed Action is **not likely to adversely affect** the piping plover, *rufa* red knot, and roseate tern.

6.1.3 Monarch Butterfly

Given that the monarch butterfly occurs or potentially occurs in portions of the Action Area and, as described in Section 5, there is potential risk to the species during construction, O&M, and decommissioning, the proposed Projects **may affect** the monarch butterfly. However, based on the highly

developed urban character of the majority of the onshore Action Area and the monarch butterfly's specific habitat preferences, and considering avoidance measures and post-construction habitat restoration, any potential impacts, were they to occur, on the monarch butterfly would temporary and localized. Therefore, the potential effects from the IPFs are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (*insignificant*). Therefore, if USFWS were to list the monarch butterfly as threatened or endangered in the future, BOEM anticipates the Proposed Action is **not likely to adversely affect** the species.

6.1.4 Plants (Seabeach Amaranth)

Given that the seabeach amaranth has been documented in the Action Area and potentially suitable habitat exists at the landfall, the Projects **may affect** the species because there is potential risk during construction, O&M, and decommissioning. However, Empire would use trenchless technology (e.g., HDD or Direct Pipe) for the EW 2 offshore export cable landing, which would avoid open beach and dune habitat for seabeach amaranth (COP Volume 2f, Table 9-1, APMs 85 and 96; Empire 2022); as such, impacts on seabeach amaranth resulting from the landfall location would be avoided and minimized. Therefore, because beach and dune habitat would be avoided, potential effects from land disturbance are extremely unlikely to occur (*discountable*) and the size of any impact, were it to occur, would be too small to be measured or evaluated (insignificant). For these reasons, BOEM anticipates that the Proposed Action is **not likely to adversely affect** the seabeach amaranth.

6.2. Other Relevant Action Alternatives

BOEM considered seven relevant action alternatives to the Proposed Action (Alternatives B through H in the EIS) (Table 3). The impact analyses, effects determinations, and conclusions for each of the seven action alternatives would not be materially different from those of the Proposed Action for the following reasons:

Alternatives B, E, and F: The impacts associated with construction and installation, O&M, and decommissioning of the Projects under Alternatives B, E, and F would be the same as those described under the Proposed Action because the same number of WTGs would be constructed throughout the Lease Area. While the WTGs may move to a different position in the Lease Area under Alternatives B, E, and F, impacts on birds, bats, and monarch butterflies would not materially change compared to those of the Proposed Action; therefore, the effects determination for these alternatives would not change: *Not Likely to Adversely Affect* (i.e., the effects determinations would not be reduced to *No Effect* or be elevated to *Likely to Adversely Affect*). All other offshore and onshore Project components of Alternatives B, E, and F would be the same as under the Proposed Action.

Alternatives C, D, and G: The impacts associated with construction and installation, O&M, and decommissioning of the Projects under Alternative C, D, or G would be the same those described under the Proposed Action. Submarine and onshore cable route options around the Gravesend Anchorage (Alternative C-1) and the Ambrose Navigation Channel (Alternative C-2), to avoid the sand borrow area (Alternative D), or to reduce impacts on Barnums Channel (Alternative G) are already covered under the Proposed Action as part of the PDE approach and narrowing the submarine and onshore cable route options under Alternative C, D, or G would not materially change the analyses (i.e., the effects determinations would remain *Not Likely to Adversely Affect*). All other offshore and onshore Project components would be the same as under the Proposed Action.

Alternative H: The impacts associated with construction and installation, O&M, and decommissioning of the Projects under Alternative H would be the same those described under the Proposed Action (i.e., the effects determinations would remain *Not Likely to Adversely Affect*). An alternate method of dredge

and fill activity at the SBMT would not materially change the analysis, as the Onshore Project area is heavily developed with little or no bird/bat/butterfly habitat and no seabeach amaranth habitat. BOEM does not anticipate that any change in dredge and fill activity would affect undisturbed or natural areas. All other offshore and onshore Project components of Alternative H would be the same as under the Proposed Action.

7. References

AECOM. 2022. *Environmental Assessment Form, Supplemental Analysis, South Brooklyn Marine Terminal Port Infrastructure Improvement Project*. Prepared for the New York City Economic Development Corporation (NYCEDC) on behalf of the City of New York. May.

Amelon, S., and D. Burhans. 2006. Conservation Assessment: *Myotis septentrionalis* (northern long-eared bat) in the Eastern United States. In Thompson, F. R. III, ed. 2006. *Conservation Assessments for Five Forest Bat Species in the Eastern United States.* General Technical Report NC-260. U.S. Forest Service, North Central Research Station. St. Paul, MN. 82 p.

American Wind Wildlife Institute (AWWI). 2018. *Bats and Wind Energy: Impacts, Mitigation, and Tradeoffs.* Washington, DC. Available: https://awwi.org/wp-content/uploads/2018/11/AWWI-Bats-and-Wind-Energy-White-Paper-FINAL.pdf. Accessed: November 19, 2021.

Baker, A., P. Gonzalez, R. I. G. Morrison, and B. A. Harrington. 2013. Red Knot (*Calidris canutus*). In *The Birds of North America* (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, New York. DOI: 10.2173/bna.563.

Band, B. 2012. Using a collision risk model to assess bird collision risks for offshore wind farms (with extended method) Report to Strategic Ornithological Support Services. Available: https://www.bto.org/sites/default/files/u28/downloads/Projects/Final_Report_SOSS02_Band1ModelGuidance.pdf. Accessed: January 19, 2022.

Biodiversity Research Institute (BRI) and Wildlife Restoration Partnerships. 2022. *Ocean Wind 1 (OCW01) Tagging Short-Distance Migrant Red Knots in Coastal New Jersey*. Prepared for Ørsted. April.

Bird Studies Canada. 2017. Bahia Lomas Shorebirds (#174). Data accessed from Motus Wildlife Tracking System, Bird Studies Canada. Available: http://motus-wts.org/. Accessed: August 5, 2022.

Brack, V., Jr., and J. O. Whitaker, Jr. 2001. Foods of the northern Myotis, *Myotis septentrionalis*, from Missouri and Indiana, with notes on foraging. *Acta Chiropterologica* 3(2):203–210.

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

Bureau of Ocean Energy Management (BOEM). 2012a. *Commercial Wind Lease Issuance and Site Characterization Activities on the Atlantic Outer Continental Shelf Offshore New Jersey, Delaware, Maryland, and Virginia Draft Environmental Assessment*.

Bureau of Ocean Energy Management (BOEM). 2012b. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Massachusetts: Environmental Assessment*. OCS EIS/EA BOEM 2012-087. Available: https://www.boem.gov/sites/default/files/uploadedFiles/BOEM/BOEM_Newsroom/Library/Publications/2012/BOEM-2012-087.pdf. Accessed: October 13, 2021.

Bureau of Ocean Energy Management (BOEM). 2016. *Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore New York*. Available: https://www.boem.gov/sites/default/files/renewable-energy-program/StateActivities/NY/NY_Revised_EA_FONSI.pdf.

Bureau of Ocean Energy Management (BOEM). 2020. *Vineyard Wind Offshore Wind Energy Project Biological Assessment: Final*.

Bureau of Ocean Energy Management (BOEM). 2021. *Guidelines for Lighting and Marking of Structures Supporting Renewable Energy Development*. April 2021.

Burger, J., C. Gordon, J. Lawrence, J. Newman, G. Forcey, and L. Vlietstra. 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* 36:338–351. doi: 10.1016/j.renene.2010.06.048.

Carter, T. C., and G. A. Feldhamer. 2005. Roost tree use by maternity colonies of Indiana bats and northern long-eared bats in Southern Illinois. *Forest Ecology and Management* 219:259–268.

Center for Biological Diversity (CBD), Center for Food Safety (CFS), The Xerces Society, and Dr. L. Brower. 2014. Petition to Protect the Monarch Butterfly (*Danaus plexippus plexippus*) Under the Endangered Species Act. Available: https://ecos.fws.gov/docs/tess/petition/814.pdf. Accessed: November 5, 2021.

Curtice, C., J. Cleary, E. Shumchenia, and P. Halpin. 2016. *Marine-life Data and Analysis Team (MDAT) Technical Report on the Methods and Development of Marine-life Data to Support Regional Ocean Planning and Management*. Prepared on behalf of the MDAT. Available: https://seamap.env.duke.edu/models/mdat/MDAT-Technical-Report.pdf. Accessed: November 19, 2019.

Davis, A. K., H. Schroeder, I. Yeager, and J. Pearce. 2018. Effects of simulated highway noise on heart rates of larval monarch butterflies, *Danaus plexippus*: Implications for roadside habitat suitability. *Biology Letters* 14(5). May 2018. Available: https://doi.org/10.1098/rsbl.2018.0018. Accessed: November 30, 2021.

Dazio, Stefanie. 2018. "Hempstead Town's efforts to protect piping plovers pay off, officials say." *Newsday*. August 9. Available: https://www.newsday.com/long-island/nassau/hempstead-piping-plover-1.20360473. Accessed: March 14, 2022.

Diffendorfer, J. E., R. Compton, L. Kramer, Z. Ancona, and D. Norton. 2017. *Onshore Industrial Wind Turbine Locations for the United States* (ver. 1.2, January 2017): U.S. Geological Survey Data Series 817. Available: https://doi.org/10.3133/ds817.

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

Dominion Energy. 2022. *Dominion Energy Coastal Virginia Offshore Wind Pilot Project Avian and Bat Protection Progress Report*. March 29.

Dowling, Z., P. R. Sievert, E. Baldwin, L. Johnson, S. von Oettingen, and J. Reichard. 2017. *Flight Activity and Offshore Movements of Nano-Tagged Bats on Martha's Vineyard, MA*. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Sterling, Virginia. OCS Study BOEM 2017-054. frontmatter. Available: https://www.boem.gov/Flight-Activity-and-Offshore-Movements-of-Nano-Tagged-Bats-on-Marthas-Vineyard/. Accessed: March 14, 2022.

eBird. 2022a. Piping Plover. eBird: An Online Database of Bird Distribution and Abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: http://www.ebird.org. Accessed: March 14, 2022.

eBird. 2022b. Red Knot. eBird: An Online Database of Bird Distribution and Abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: http://www.ebird.org. Accessed: March 14, 2022.

eBird. 2022c. Roseate Tern. eBird: An Online Database of Bird Distribution and Abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: http://www.ebird.org. Accessed: March 14, 2022.

Elliott-Smith, E., and S. M. Haig. 2004. Piping plover (*Charadrius melodus*). *The Birds of North America Online* (A. Poole, ed.). Ithaca: Cornell Lab of Ornithology.

Empire Offshore Wind, LLC (Empire). 2022. *Empire Offshore Wind: Empire Wind Project (EW1 and EW2), Construction and Operations Plan*. May. Available: https://www.boem.gov/renewable-energy/empire-wind-construction-and-operations-plan.

Empire Offshore Wind, LLC (Empire). 2022. Citing Cryan, P. M., and R. M. R. Barclay. 2009. Causes of bat fatalities at wind turbines: hypotheses and predictions. *Journal of Mammalogy* 90:1330–1340.

Empire Offshore Wind, LLC (Empire). 2022. Citing Hayes, M. A. 2013. Bats killed in large numbers at United States wind energy facilities. *BioScience* 63:975–979.

Empire Offshore Wind, LLC (Empire). 2022. Citing Herzog, C., New York State Department of Environmental Conservation (NYSDEC), email communication, November 18, 2019.

Empire Offshore Wind, LLC (Empire). 2022. Citing Kunz, T. H., E. B. Arnett, B. M. Cooper, W. P, R. P. Larkin, T. Mabee, M. L. Morrison, M. D. Strickland, and J. M. Szewczak. 2007. Assessing impacts of wind-energy development on nocturnally active birds and bats: A guidance document. *Journal of Wildlife Management* 71:2449–2486.

Empire Offshore Wind, LLC (Empire). 2022. Citing Martin, C. M., E. B. Arnett, R. D. Stevens, and M. C. Wallace. 2017. Reducing bat fatalities at wind facilities while improving the economic efficiency of operational mitigation. *Journal of Mammalogy* 98:378–385.

Empire Offshore Wind, LLC (Empire). 2022. Citing New York State Energy Research Development Authority (NYSERDA). 2018. *Digital aerial baseline survey of marine wildlife in support of offshore wind energy: Summer 2016 through spring 2017 annual report*. Report prepared for New York State Energy Research and Development Authority by Normandeau Associates, Inc. and APEM Ltd. October 2018. 133 pp.

Empire Offshore Wind, LLC (Empire). 2022. Citing Normandeau Associates Inc. 2019. *Digital Aerial Baseline Survey of Marine Wildlife in Support of Offshore Wind Energy Summer 2016 through Fall 2017 Third Interim Report*.

Empire Offshore Wind, LLC (Empire). 2022. Citing Pettit, J. L., and J. M. O'Keefe. 2017. Day of year, temperature, wind, and precipitation predict timing of bat migration. *Journal of Mammalogy* 98:1236–1248.

Empire Offshore Wind, LLC (Empire). 2022. Citing Sjollema, A. L., J. E. Gates, R. H. Hilderbrand, and J. Sherwell. 2014. Offshore Activity of Bats Along the Mid-Atlantic Coast. *Northeastern Naturalist* 21:154–163.

Empire Offshore Wind, LLC (Empire). 2022. Citing Smallwood, K. S. 2013. Comparing bird and bat fatality-rate estimates among North American wind-energy projects. *Wildlife Society Bulletin* 37:19–33.

Empire Offshore Wind, LLC (Empire). 2022. Citing Smith, A. D., and S. R. McWilliams. 2016. Bat activity during autumn relates to atmospheric conditions: Implications for coastal wind energy development. *Journal of Mammalogy* 97:1565–1577.

Empire Offshore Wind, LLC (Empire). 2022. Citing U.S. Fish and Wildlife Service (USFWS). 2018. "Piping Plover. New Jersey Field Office." 2018. Available: https://www.fws.gov/northeast/njfieldoffice/Endangered/plover.html. Accessed: December 18, 2019.

ESS Group, Inc. 2014. Cape *Wind Avian & Bat Pre-Construction Monitoring Report: 2013–2014*. Prepared for Cape Wind Associates.

Everaert, J., and E. Stienen. 2007. Impact of wind turbines on birds in Zeebrugge (Belgium). Significant effect on breeding tern colony due to collisions. *Biodiversity and Conservation* 16(12): 3345–3359.

Feigin, S., L. Niles, D. Mizrahi, S. Dodgin, A. Gilbert, W. Goodale, J. Gulka, and I. Stenhouse. 2022. *Tracking Movements of Red Knots in the U.S. Atlantic Using Satellite Telemetry, 2020-2021*.

Fink, D., T. Auer, A. Johnston, M. Strimas-Mackey, O. Robinson, S. Ligocki, W. Hochachka, L. Jaromczyk, C. Wood, I. Davies, M. Iliff, and L. Seitz. 2021. eBird Status and Trends, Data Version: 2020; Released: 2021. Cornell Lab of Ornithology, Ithaca, New York. Available: https://doi.org/10.2173/ebirdst.2020. Accessed: August 5, 2022.

Foster, R. W., and A. Kurta. 1999. Roosting ecology of the northern bat (*Myotis septentrionalis*) and comparisons with the endangered Indiana bat (*Myotis sodalis*). *Journal of Mammalogy* 80(2):659–672.

Furness, R. W., H. M. Wade, and E. Masden. 2013. Assessing vulnerability of marine bird populations to offshore wind farms. *Journal of Environmental Management* 119:56–66.

Gilbert, A. T., Adams, E. M., Loring, P., Williams, K. A. 2022. User documentation for the Stochastic Collision Risk Assessment for Movement (SCRAM). Available: https://briloon.shinyapps.io/SCRAM/. 37 pp

Goyert, H. F. 2015. Foraging specificity and prey utilization: Evaluating social and memory-based strategies in seabirds. *Behaviour* 152(7/8):861–895.

Haney, J. C., P. G. R. Jodice, W. A. Montevecchi, and D. C. Evers. 2017. Challenges to Oil Spill Assessments for Seabirds in the Deep Ocean. Archives of *Environmental Contamination and Toxicology* 73:33–39.

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

Hatch, J. J., and S. Brault. 2007. *Collision Mortalities at Horseshoe Shoal of Bird Species of Special Concern. Final Draft*. Cape Wind Report No. 5.3.2-1. January 2007.

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. Available: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0083803. Accessed: March 14, 2022.

Heinemann, D. 1992. *Foraging Ecology of Roseate Terns Breeding on Bird Island, Buzzards Bay, Massachusetts*. USFWS, Manomet.

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

International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA). 2013. IALA Recommendation O-139 on The Marking of Man-Made Offshore Structures. December. Available: https://vasab.org/wp-content/uploads/2018/06/2013_IALA_Marking-of-Man-Made-Offshore-Structures.pdf. Accessed: August 4, 2022.

Kantola, T., J. L. Tracy, K. A. Baum, M. A. Quinn, and R. N. Coulson. 2019. Spatial risk assessment of eastern monarch butterfly road mortality during autumn migration within the southern corridor. *Biological Conservation* 231:150–160. Available: https://www.sciencedirect.com/science/article/abs/pii/S0006320718310772. Accessed: November 30, 2021.

Kerlinger, P., J. L. Gehring, W. P. Erickson, R. Curry, A. Jain, and J. Guarnaccia. 2010. Night migrant fatalities and obstruction lighting at wind turbines in North America. *The Wilson Journal of Ornithology* 122(4):744–754.

Latham, Pam, Whitney Fiore, Michael Bauman, and Jennifer Weaver. 2017. *Effects Matrix for Evaluating Potential Impacts of Offshore Wind Energy Development on U.S. Atlantic Coastal Habitats*. Final Report to the U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. OCS Study BOEM 2017-014. Available: https://www.boem.gov/Effects-Matrix-Evaluating-Potential-Impacts-of-Offshore-Wind-Energy-Development-on-US-Atlantic-Coastal-Habitats/. Accessed: March 15, 2022.

Loring, P. H., A. K. Lenske, J. D. McLaren, M. Aikens, A. M. Anderson, Y. Aubrey, E. Dalton, A. Dey, C. Friis, D. Hamilton, B. Holberton, D. Kriensky, D. Mizrahi, L. Niles, K. L. Parkins, J. Paquet, F. Sanders, A. Smith, Y. Turcotte, A. Vitz, and P. A. Smith. 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. Available: https://www.boem.gov/sites/default/files/documents/renewable-energy/studies/Tracking-Migratory-Shorebirds-Atlantic-OCS.pdf.

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*. Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2019-017. Available: https://espis.boem.gov/final reports/BOEM_2019-017.pdf. Accessed: March 14, 2022.

Loring, P., H. Goyert, C. Griffin, P. Sievert, and P. Paton. 2017. *Tracking Movements of Common Terns, Endangered Roseate Terns, and Threatened Piping Plovers in the Northwest Atlantic: 2017 Annual Report to the Bureau of Ocean Energy Management (BOEM)*. In Interagency Agreement No. M13PG00012 to U.S. Fish and Wildlife Service Northeast Region Division of Migratory Birds, Hadley, Massachusetts.

Loring, P., J. McLaren, P. Smith, L. Niles, S. Koch, H. Goyert, and H. Bai. 2018. *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. OCS Study BOEM 2018-046. Available: https://espis.boem.gov/Final%20Reports/BOEM_2018-046.pdf. Accessed: March 14, 2022.

Loring, P. H., J. D. McLaren, H. F. Goyert, and P. W. C. Paton. 2020. Supportive wind conditions influence offshore movements of Atlantic Coast Piping Plovers during fall migration. *The Condor* 122:1–16. Available: https://doi.org/10.1093/condor/duaa028.

Lyons, J. E., A. J. Baker, P. M. González, Y. Aubry, C. Buidin, and Y. Rochepault. 2017. Migration ecology and stopover population size of Red Knots Calidris *canutus rufa* at Mingan Archipelago after exiting the breeding grounds. *Wader Study* 124(3):197–205.

Maggini, I., L. V. Kennedy, A. Macmillan, K. H. Elliot, K. Dean, and C. G. Guglielmo. 2017. Light Oiling of Feathers Increases Flight Energy Expenditure in a Migratory Shorebird. *Journal of Experimental Biology* 220:2372–2379.

McKenna, D. D., K. M. McKenna, S. B. Malcom, and M. Barenbaum. 2001. Mortality of *Lepidoptera* along roadways in Central Illinois. *Journal of the Lepidopterists' Society* 55(2):63–68. Available: https://images.peabody.yale.edu/lepsoc/jls/2000s/2001/2001-55(2)63-McKenna.pdf. Accessed: November 30, 2021.

Mostello, C. S., I. C. T. Nisbet, S. A. Oswald, and J. W. Fox. 2014. Non-breeding season movements of six North American roseate terns *Sterna dougallii* tracked with geolocators. *Seabird* 27:1–21. Available: http://www.seabirdgroup.org.uk/journals/seabird-27/seabird-27-1.pdf. Accessed: January 18, 2022.

Motus. 2022. Motus Wildlife Tracking System, Bahia Lomas Shorebirds (#174) Project. Red Knot ID#20958. Available: https://motus.org/data/track?tagDeploymentId=20958. Accessed: May 23, 2022.

New Jersey Department of Environmental Protection (NJDEP). 2010. *Ocean/Wind Power Ecological Baseline Studies January 2008–December 2009*. Final Report. July 2010. Prepared for New Jersey Department of Environmental Protection Office of Science by Geo-Marine, Inc., Plano, Texas. Available: https://www.nj.gov/dep/dsr/ocean-wind/. Accessed: November 17, 2021.

New Jersey Department of Environmental Protection (NJDEP). 2017. *New Jersey Monarch Butterfly Conservation Guide.* Available: https://www.nj.gov/dep/docs/monarch-guide.pdf. Accessed: November 3, 2021.

New York Natural Heritage Program. 2022. Online Conservation Guide for Perimyotis subflavus. Available: https://guides.nynhp.org/tri-colored-bat/. Accessed: November 15, 2022.

New York State Department of Environmental Conservation (NYSDEC). No date [a]. Northern Long-eared Bat. Available: https://www.dec.ny.gov/animals/106713.html. Accessed: March 14, 2022.

New York State Department of Environmental Conservation (NYSDEC). No date [b]. Protection of Northern Long-eared Bats: Protective Measures Required for Northern Long-eared Bats When Projects Occur within Occupied Habitat. Available: https://www.dec.ny.gov/animals/106090.html. Accessed: March 14, 2022.

New York State Department of Environmental Conservation (NYSDEC). No date [c]. Piping Plover. Available: https://www.dec.ny.gov/animals/7086.html. Accessed: March 14, 2022.

New York State Department of Environmental Conservation (NYSDEC). No date [d]. Watchable Wildlife: Monarch Butterfly. Available: https://www.dec.ny.gov/animals/60392.html. Accessed: March 14, 2022.

New York State Department of Environmental Conservation (NYSDEC). 2014. Species Status Assessment: Roseate Tern. January 28. Available: https://www.dec.ny.gov/docs/wildlife_pdf/sgcnroseatetern.pdf. Accessed: March 14, 2022.

New York State Department of Environmental Conservation (NYSDEC). 2018. Northern Long-eared Bat Occurrences by Town. June 28. Available: https://www.dec.ny.gov/docs/wildlife_pdf/nlebtowns.pdf. Accessed: March 14, 2022.

Niles, L. J., H. P. Sitters, A. D. Dey, P. W. Atkinson, A. J. Baker, K. A. Bennett, R. Carmona, K. E. Clark, N. A. Clark, C. Espoz, P. Gonzalez, B. A. Harrington, D. E. Hernandez, K. S. Kalasz, R. G. Lathrop, R. N. Matus, C. D. T. Minton, R. I. G. Morrison, M. K. Peck, W. Pitts, R. A. Robinson, and I. L. Serrano. 2008. Status of the red knot (*Caladris canutus rufa*) in the Western Hemisphere. *Studies in Avian Biology* No 36.

Nisbet, I. C. T. 1984. Migration and winter quarters of North American Roseate Terns as shown by banding recoveries. *Journal of Field Ornithology* 55:1–17.

Nisbet, I. C. T., M. Gochfeld, and J. Burger. 2014. Roseate tern (*Sterna dougallii*). *The Birds of North America Online*. doi: 10.2173/bna.370.

Normandeau Associates, Inc. 2011. *New Insights and New Tools Regarding Risk to Roseate Terns, Piping Plovers, and Red Knots from Wind Facility Operations on the Atlantic Outer Continental Shelf*. Final Report Prepared under BOEMRE Contract M08PC20060 by Normandeau Associates, Inc U.S. Department of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement. Caleb Gordon (principal author). OCS Study, BOEMRE 2011-048. Available: https://espis.boem.gov/final%20reports/5119.pdf. Accessed: March 14, 2022.

Orr, Terry L., Susan M. Herz, and Darrell L. Oakley. 2013. *Evaluation of Lighting Schemes for Offshore Wind Facilities and Impacts to Local Environments*. Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Herndon, VA. OCS Study BOEM 2013-0116. Available: https://espis.boem.gov/final%20reports/5298.pdf. Accessed: September 1, 2020.

Owen, S. F., M. A. Menzel, W. M. Ford, J. W. Edwards, B. R. Chapman, K. V. Miller, and P. B. Wood. 2002. *Roost Tree Selection by Maternal Colonies of Northern Long-eared Myotis in an Intensively Managed Forest*. General Technical Report NE-292. U.S. Forest Service, Newton Square, PA.

Paruk, J. D., E. M. Adams, H. Uher-Koch, K .A. Kovach, D. Long, IV, C. Perkins, N. Schoch, and D. C. Evers. 2016. Polycyclic Aromatic Hydrocarbons in Blood Related to Lower Body Mass in Common Loons. *Science of the Total Environment* 565:360–368.

Paton, P. 2016. Assessing nearshore and offshore movements of piping plovers in southern New England. In *Presentation at the 2016 North American Ornithological Conference (NAOC).* Washington, D. C.

Pelletier, S. K., K. Omland, K. S. Watrous, and T. S. Peterson. 2013. *Information Synthesis on the Potential for Bat Interactions with Offshore Wind Facilities – Final Report*. Herndon, VA: U.S. Department of the Interior, Bureau of Ocean Energy Management, Headquarters. OCS Study BOEM No. 2013-01163.

Perry, R. W., and R. E. Thill. 2007. Roost selection by male and female northern long-eared bats in a pine-dominated landscape. *Forest Ecology and Management* 247:220–226.

Plissner, J. H., and S. M. Haig. 2000. Viability of piping plover *Charadrius melodus* metapopulations. *Biological Conservation* 92:163–173.

Robinson Willmott, J. C., G. Forcey, and A. Kent. 2013. *The Relative Vulnerability of Migratory Bird Species to Offshore Wind Energy Projects on the Atlantic Outer Continental Shelf: An Assessment Method and Database*. Final Report to the U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. OCS Study BOEM 2013-207. Available: https://tethys.pnnl.gov/sites/default/files/publications/Willmott_et_al_2013.pdf. Accessed: March 14, 2022.

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

Roman, L., B. D. Hardesty, M. A. Hindell, and C. Wilcox. 2019. A Quantitative Analysis Linking Seabird Mortality and Marine Debris Ingestion. *Scientific Reports* 9(1):1–7.

Safina, C. 1990. Foraging habitat partitioning in roseate and common terns. *Auk* 107:351–358.

Schaub, A., J. Ostwald, and B. M. Siemers. 2008. Foraging Bats Avoid Noise. *Journal of Experimental Biology* 211:3147–3180.

Scottish Natural Heritage. 2018. Avoidance Rates for the Onshore SNH Wind Farm Collision Risk Model. Version 2. September. Available: https://www.nature.scot/sites/default/files/2018-09/Wind%20farm%20impacts%20on%20birds%20-%20Use%20of%20Avoidance%20Rates%20in%20the%20SNH%20Wind%20Farm%20Collision%20Risk%20Model.pdf. Accessed: August 5, 2022.

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

Stantec. 2018. 2017 *Acoustic Monitoring Block Island Wind Farm, Rhode Island*. Prepared for Deepwater Wind Block Island, LLC. Stantec Consulting Services Inc., Topsham, ME.

Stantec. 2020. 2017–2020 *Acoustic Monitoring Block Island Wind Farm, Rhode Island*. Prepared for Deepwater Wind Block Island, LLC. Stantec Consulting Services Inc., Topsham, ME.

Stantial, M. L. 2014. Flight behavior of breeding Piping Plovers: implications for risk of collision with wind turbines. M.S. Thesis, State University of New York, Syracuse. Available: https://njfishandwildlife.com/ensp/pdf/plover-turbine_stantialthesis14.pdf. Accessed: August 5, 2022.

Timpone, J. C., J. G. Boyles, K. L. Murray, D. P. Aubrey, and L. W. Robbins. 2010. Overlap in roosting habitats of Indiana bats (*Myotis sodalis*) and northern long-eared bats (*Myotis septentrionalis*). *American Midland Naturalist* 163:115–123.

U.S. Fish and Wildlife Service (USFWS). 1996. *Piping Plover* (Charadrius melodus) *Atlantic Coast Population Revised Recovery Plan.* Hadley, MA. Available https://ecos.fws.gov/docs/recovery_plan/960502.pdf. Accessed: March 14, 2022.

U.S. Fish and Wildlife Service (USFWS). 1998. *Roseate Tern Recovery Plan – Northeast Population, First Update*. Hadley, MA. 75 pp. Available: https://ecos.fws.gov/docs/recovery_plan/981105.pdf. Accessed: November 17, 2021.

U.S. Fish and Wildlife Service (USFWS). 2008. *Biological Opinion for the Cape Wind Energy Project, Nantucket Sound, Massachusetts*. Concord, New Hampshire. Available: https://www.fws.gov/Northeast/endangered/tebo/PDFs/CapeWind-BO-21November2008_withCovLttr.pdf. Accessed: November 3, 2021.

U.S. Fish and Wildlife Service (USFWS). 2009. Piping Plover (*Charadrius melodus*) 5 Year Review: Summary and Evaluation. Hadley, MA. 206 pp.

U.S. Fish and Wildlife Service (USFWS). 2010. *Caribbean and Roseate Tern (Sterna dougallii dougallii). 5 Year Review: Summary and Evaluation.* Available: https://www.fws.gov/northeast/EcologicalServices/pdf/endangered/ROST%205-year%20final.pdf. Accessed: November 17, 2021.

U.S. Fish and Wildlife Service (USFWS). 2014. Rufa Red Knot Background Information and Threats Assessment. Supplement to Endangered and Threatened Wildlife and Plants; Final Threatened Status for the Rufa Red Knot (*Calidris canutus rufa*). [Docket No. FWS-R5-ES-2013-0097; RIN AY17]. November 2014. Available: https://www.fws.gov/northeast/redknot/pdf/20141125_REKN_FL_supplemental_doc_FINAL.pdf. Accessed: January 18, 2022.

U.S. Fish and Wildlife Service (USFWS). 2016. *Programmatic Biological Opinion on Final 4(d) Rule for Northern Long-Eared Bat and Activities Exempted from Take Prohibitions. USFWS Regions 2, 3, 4, 5, and 6.* Prepared by USFWS Midwest Regional Office. Bloomington, MN. January 6, 2016.

U.S. Fish and Wildlife Service (USFWS). 2019a. Seabeach Amaranth (A*maranthus pumilus*). USFWS Southeast Region [online]. Last updated March 25, 2019. Available: https://www.fws.gov/southeast/wildlife/plants/seabeach-amaranth/. Accessed: November 17, 2021.

U.S. Fish and Wildlife Service (USFWS). 2019b. Piping Plover. Prepared by the New Jersey Field Office. Last updated February 19, 2019. Available: https://www.fws.gov/northeast/njfieldoffice/endangered/plover.html. Accessed: November 17, 2021.

U.S. Fish and Wildlife Service (USFWS). 2020a. Northern Long-eared Bat, Listing the Northern Long-eared Bat as Threatened, Questions and Answers.

U.S. Fish and Wildlife Service (USFWS). 2020b. *Piping Plover* (Charadrius melodus) *5 Year Review: Summary and Evaluation.* East Lansing, MI, and Hadley, MA. Available: https://ecos.fws.gov/docs/tess/species_nonpublish/3383.pdf. Accessed: March 14, 2022.

U.S. Fish and Wildlife Service (USFWS). 2020c. *Roseate Tern Northeastern North American Population* (*Sterna dougallii dougallii*) *5-Year Review: Summary and Evaluation*. USFWS New England Field Office. Concord, NH. Available: https://ecos.fws.gov/docs/tess/species_nonpublish/3063.pdf. Accessed: November 17, 2021.

U.S. Fish and Wildlife Service (USFWS). 2020d. *Monarch (Danaus plexippus) Species Status Assessment Report, version 2.1*. September 2020. Available: https://www.fws.gov/savethemonarch/pdfs/Monarch-SSA-report.pdf. Accessed: November 3, 2021.

U.S. Fish and Wildlife Service (USFWS). 2021a. Species Status Assessment (SSA) Report for the Tricolored Bat (*Perimyotis subflavus*). December. Available: https://ecos.fws.gov/ServCat/DownloadFile/221212. Accessed: November 15, 2022.

U.S. Fish and Wildlife Service (USFWS). 2021b. Rufa Red Knot (*Calidris canutus rufa*) [threatened]. USFWS New Jersey Field Office [online]. Last updated: February 19, 2021. Available: https://www.fws.gov/northeast/njfieldoffice/endangered/redknot.html. Accessed: November 5, 2021.

U.S. Fish and Wildlife Service (USFWS). 2022a. Information for Planning and Consultation (IPaC). List of Federally Listed Species for the Empire Wind Project Action Area. February 16.

U.S. Fish and Wildlife Service (USFWS). 2022b. *Range-wide Indiana Bat & Northern Long-eared Bat Survey Guidelines*. March. Available: https://www.fws.gov/sites/default/files/documents/USFWS_Range-wide_IBat_%26_NLEB_Survey_Guidelines_2022.03.29.pdf. Accessed: May 12, 2022.

U.S. Fish and Wildlife Service (USFWS). 2022c. *Abundance and Productivity Estimates – 2021 update: Atlantic Coast piping plover population*. Hadley, Massachusetts.

U.S. Geological Survey (USGS). 2018a. Gap Analysis Project (GAP) Species Predicted Habitat Maps and Range Maps: Piping Plover.

U.S. Geological Survey (USGS). 2018b. Gap Analysis Project (GAP) Species Predicted Habitat Maps and Range Maps: Red Knot.

U.S. Geological Survey (USGS). 2018c. Gap Analysis Project (GAP) Species Predicted Habitat Maps and Range Maps: Roseate Tern.

U.S. Geological Survey (USGS). 2018d. Gap Analysis Project (GAP) Species Predicted Habitat Maps and Range Maps: Northern Long-eared Bat.

U.S. Geological Survey (USGS). 2019. North American Bat Monitoring Program – NABat Status and Trends: Northern long-eared bat 2019 Occupancy Map. Available: https://sciencebase.usgs.gov/nabat/#/results. Accessed: June 29, 2022.

Vlietstra, L. S. 2007. Potential impact of the Massachusetts Maritime Academy Wind Turbine on Common (*Sterna hirundo*) and Roseate (S. dougallii) Terns. Marine Safety & Environmental Protection, Massachusetts Maritime Academy. Online slide presentation. Available: https://www.umass.edu/windenergy/sites/default/files/downloads/pdfs/L_Vlietstra.pdf. Accessed: December 3, 2021.

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

Williams T. C., and J. M. Williams. 1990. Open ocean bird migration. *IEEE Proceedings F - Radar and Signal Processing* 137:133–137.

Winship, A. J., B. P. Kinlan, T. P. White, J. B. Leirness, and J. Christensen. 2018. *Modeling At-sea Density of Marine Birds to Support Atlantic Marine Renewable Energy Planning*: *Final Report*. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Sterling, VA. OCS Study BOEM 2018-010. x+67 pp. Available: https://espis.boem.gov/final%20reports/BOEM_2018-010.pdf.

Xerces Society for Invertebrate Conservation (Xerces). 2020. The Xerces Society Western Monarch Thanksgiving Count 1997–2019 [online]. Available: https://www.westernmonarchcount.org/wpcontent/uploads/2020/01/WMTC-Data-1997-2019_1.14.2020_v1.pdf. Accessed: November 3, 2021.

Zeigler, S. L., B. T. Gutierrez, E. E. Lentz, N. G. Plant, E. J. Sturdivant, and K.S. Doran. 2022. Predicted sea-level rise-driven biogeomorphological changes on Fire Island, New York; Implications for people and plovers. *Earth's Future* 10, e2021EF002436.

This page intentionally left blank.

Appendix A. USFWS Information for Planning and Consultation (IPaC) Results

This page intentionally left blank.

Empire Wind Development Area/Lease Area Action Area

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Local office

Long Island Ecological Services Field Office

(631) 286-0485
(631) 286-4003

340 Smith Road
Shirley, NY 11967-2258

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. 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.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Roseate Tern Sterna dougallii dougallii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2083	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

MIGRATORY BIRD INFORMATION IS NOT AVAILABLE AT THIS TIME

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to

occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

THERE ARE NO KNOWN WETLANDS AT THIS LOCATION.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Empire EW 1 Offshore Export Cable Action Area

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

New Jersey and New York

Local offices

New Jersey Ecological Services Field Office

(609) 646-9310
(609) 646-0352

4 E. Jimmie Leeds Road, Suite 4
Galloway, NJ 08205

http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

Long Island Ecological Services Field Office

(631) 286-0485
(631) 286-4003

340 Smith Road
Shirley, NY 11967-2258

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. 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.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot Calidris canutus rufa Wherever found There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/1864	Threatened
Roseate Tern Sterna dougallii dougallii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2083	Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Seabeach Amaranth Amaranthus pumilus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8549	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

MIGRATORY BIRD INFORMATION IS NOT AVAILABLE AT THIS TIME

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

ESTUARINE AND MARINE DEEPWATER

- M1UBL
- E1UBL
- E1UBLx

ESTUARINE AND MARINE WETLAND

- E2US2P
- E2US2N
- E2USM
- E2AB1N
- M2USM
- E2USN
- E2US2M

FRESHWATER EMERGENT WETLAND

- PEM5F

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1E
- PSS1E

FRESHWATER POND

- PUBHx
- PUBHh
- PUBH
- PUBV

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Empire EW 1 Onshore Action Area

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Kings County, New York

Local office

Long Island Ecological Services Field Office

(631) 286-0485
(631) 286-4003

340 Smith Road
Shirley, NY 11967-2258

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. 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.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot Calidris canutus rufa Wherever found There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/1864	Threatened
Roseate Tern Sterna dougallii dougallii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2083	Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Seabeach Amaranth Amaranthus pumilus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8549	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

MIGRATORY BIRD INFORMATION IS NOT AVAILABLE AT THIS TIME

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

ESTUARINE AND MARINE DEEPWATER

E1UBL

E1UBLx

FRESHWATER POND

PUBHx

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Empire EW 2 Offshore Export Cable Action Area

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Nassau County, New York

Local office

Long Island Ecological Services Field Office

(631) 286-0485
(631) 286-4003

340 Smith Road
Shirley, NY 11967-2258

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. 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.

The following species are potentially affected by activities in this location:

Mammals

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

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot Calidris canutus rufa Wherever found There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/1864	Threatened
Roseate Tern Sterna dougallii dougallii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2083	Endangered

Flowering Plants

NAME	STATUS
Seabeach Amaranth Amaranthus pumilus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8549	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

MIGRATORY BIRD INFORMATION IS NOT AVAILABLE AT THIS TIME

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES
LIDO BEACH WILDLIFE MANAGEMENT AREA	22.5 acres

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

ESTUARINE AND MARINE DEEPWATER

- M1UBL
- E1UBL
- E1AB1L
- E1UBLx
- E1UB4L

ESTUARINE AND MARINE WETLAND

- M2US2P
- E2EM1Pd
- M2US2N
- E2US2P
- E2US2M
- E2EM1P
- E2EM1N
- E2US2N
- E2AB1N

FRESHWATER EMERGENT WETLAND

- PEM1C

FRESHWATER FORESTED/SHRUB WETLAND

- PSS1C

FRESHWATER POND

- PUBHx

RIVERINE

- R2UBHx
- R2UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error

is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Empire EW 2 Onshore Action Area

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Nassau County, New York

Local office

Long Island Ecological Services Field Office

(631) 286-0485
(631) 286-4003

340 Smith Road
Shirley, NY 11967-2258

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. 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.

The following species are potentially affected by activities in this location:

Mammals

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

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot Calidris canutus rufa Wherever found There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/1864	Threatened
Roseate Tern Sterna dougallii dougallii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2083	Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Seabeach Amaranth Amaranthus pumilus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8549	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

MIGRATORY BIRD INFORMATION IS NOT AVAILABLE AT THIS TIME

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES
LIDO BEACH WILDLIFE MANAGEMENT AREA	22.5 acres

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.

ESTUARINE AND MARINE DEEPWATER

- E1UBLx
- E1AB1L
- E1UBL
- E1UB4L
- E1ABL

ESTUARINE AND MARINE WETLAND

- E2EM1Pd
- E2EM1P
- E2US2M
- E2EM1N
- E2AB1N
- E2US1N
- E2AB1M
- E2SS1/EM1P
- E2EM5Pd
- E2US1P
- E2SS1P
- E2EM5P
- E2FO1P

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix B. Collision Risk Modeling Inputs/Outputs for Piping Plover, Red Knot, and Roseate Tern

This page intentionally left blank.

COLLISION RISK ASSESSMENT (Band Model)
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

	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		

			Data sources
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%											

			Data sources	Source
Birds on migration data				
Migration passages	birds		74	74	74	352							Adult & fledgings derived from USFWS 2022, P.Loring et al 2019
Width of migration corridor	km	190											Length of Long Island, NY
Proportion at rotor height	%	15%											Loring et al 2019, Table 26
Proportion of flights upwind	%	8.6%											Loring et al 2019, Fig 72

	Units	Value	Data sources	Source
Windfarm data				
Name of windfarm site		**Empire wind**		
Latitude	degrees	40.00		
Number of turbines		138		Empire Wind selects turbine supplier - Empire Wind
Width of windfarm	km	43		Measured from BA Figure 1
Tidal offset	m	1		

	Units	Value	Data sources	Source
Turbine data				
Turbine model		**V236-15MW**		Empire Wind selects turbine supplier - Empire Wind
No of blades		3		
Rotation speed	rpm	8.4		Aver rpm, E. Land email 9/30/22
Rotor radius	m	116		V236-150_MW_brochure
Hub height	m	152		Empire Wind selects turbine supplier - Empire Wind

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Monthly proportion of time operational	%	94%	94%	93%	94%	93%	93%	93%	92%	92%	93%	94%	94%	MonWindAvail - AverDownTime, calc from E. Land email 9/30/22

Max blade width	m	5.770	Gaertner et al 2020
Pitch	degrees	2	Gilbert et al 2022

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%		

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		Piping plover
Flight speed	m/sec	9.3
Flight type		flapping

Windfarm data:

Number of turbines		138
Rotor radius	m	116
Minimum height of rotor	m	152
Total rotor frontal area	sq m	5833711

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**year average**
Proportion of time operational	%	94%	94%	93%	94%	93%	93%	93%	92%	92%	93%	94%	94%	93.2%
Stage A - flight activity														**per annum**
Migration passages		0	0	74	74	74	0	352	0	0	0	0	0	**574**
Migrant flux density	birds/ km	0	0	0.3895	0.3895	0.389474	0	1.852632	0	0	0	0	0	
Proportion at rotor height	% 15%													
Flux factor		0	0	10	10	10	0	47	0	0	0	0	0	
Option 1 -Basic model - Stages B, C and D														
Potential bird transits through rotors		0	0	1	1	1	0	7	0	0	0	0	0	**12**
Collision risk for single rotor transit	(from sheet 3) 3.4%													
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		**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**
Option 3-Extended model using flight height distribution														
Proportion at rotor height	(from sheet 4) 34.4%													
Potential bird transits through rotors	Flux integral 0.3615	0	0	4	4	4	0	17	0	0	0	0	0	**27**
Collisions assuming no avoidance	Collision integral 0.01445	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**
Average collision risk for single rotor transit	4.0%													
Stage E - applying avoidance rates														
Using which of above options?	**Option 3** 0.00%	0	0	0	0	0	0	1	0	0	0	0	0	**1**
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**

COLLISION RISK ASSESSMENT (Band Model)
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

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

			Data sources	Source
Birds on migration data				
Migration passages	birds		124 370	see BA section 5.2.1.2
Width of migration corridor	km	43		assume all pass through turbine project area
Proportion at rotor height	%	0%		Feigin et al., 2022, Table A
Proportion of flights upwind	%	34.6%		Loring et al 2018, Fig. 14

	Units	Value	Data sources	Source
Windfarm data				
Name of windfarm site		**Empire Wind**		
Latitude	degrees	40.00		
Number of turbines		138		Empire Wind selects turbine supplier - Empire Wind
Width of windfarm	km	43		Measured from BA Figure 1
Tidal offset	m	1		

	Units	Value	Data sources	Source
Turbine data				
Turbine model		**V236-15MW**		Empire Wind selects turbine supplier - Empire Wind
No of blades		3		
Rotation speed	rpm	8.4		Aver rpm, E. Land email 9/30/22
Rotor radius	m	116		V236-150_MW_brochure
Hub height	m	152		Empire Wind selects turbine supplier - Empire Wind
Monthly proportion of time operational	%		Jan 94% Feb 94% Mar 93% Apr 94% May 93% Jun 93% Jul 93% Aug 92% Sep 92% Oct 93% Nov 94% Dec 94%	MonWindAvail - AverDownTime, calc from E. Land email 9/30/22
Max blade width	m	5.770		Gaertner et al 2020
Pitch	degrees	2		Gilbert et al 2022

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%		

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		138
Rotor radius	m	116
Minimum height of rotor	m	152
Total rotor frontal area	sq m	5833711

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	year average
Proportion of time operational	%	94%	94%	93%	94%	93%	93%	93%	92%	92%	93%	94%	94%	93.2%
Stage A - flight activity														**per annum**
Migration passages		0	0	0	0	124	0	0	370	0	0	0	0	**494**
Migrant flux density	birds/ km	0	0	0	0	2.883721	0	0	8.604651	0	0	0	0	
Proportion at rotor height	%	0%												
Flux factor		0	0	0	0	73	0	0	216	0	0	0	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)	3.6%												
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)	90.3%												
Potential bird transits through rotors	Flux integral	0.7638	0	0	0	0	55	0	0	165	0	0	0	0	**221**
Collisions assuming no avoidance	Collision integral	0.01721	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**5**
Average collision risk for single rotor transit		2.3%												
Stage E - applying avoidance rates														
Using which of above options?	**Option 3**	0.00%	0	0	0	0	1	0	0	3	0	0	0	0	**5**
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

18 October 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: Empire
## Modeler: David Bigger
## The model run was started at: Tue Oct 18 14:32:33 2022 EDT
## The model run was completed at: Tue Oct 18 14:55:04 2022 EDT
## 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	V236-15MW	0.93 (0.92, 0.94)	0.38 (0.38, 0.38)	0.18 (0.17, 0.18)	11.95 (3.13, 20.5)

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	V236-15MW	138 (138, 138)	116 (116, 116)	152 (152, 152)	5.77 (5.77, 5.77)	9.43 (7.45, 11.46)

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	V236-15MW	1 (1, 1)	4.27 (3.37, 5.19)	0.03 (0.03, 0.04)	43 (43, 43)	40.3	-73.27

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	**V236-15MW**	94.1 (90.2, 97.8)	93.8 (90.1, 97.9)	93.5 (90, 97.5)	94.1 (90.3, 98.3)	93 (89.4, 97)	93 (89, 96.8)

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	**V236-15MW**	92.7 (89, 96.4)	92 (88.9, 95.2)	92.2 (88.9, 95.3)	93.4 (90.2, 96.8)	93.8 (90.3, 97.3)	94.1 (90.6, 97.6)

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	V236-15MW	Jan			
Piping Plover	V236-15MW	Feb			
Piping Plover	V236-15MW	Mar			
Piping Plover	V236-15MW	Apr			
Piping Plover	V236-15MW	May	0	0	0
Piping Plover	V236-15MW	Jun	0	0	0.001
Piping Plover	V236-15MW	Jul	0.001	0	0.001
Piping Plover	V236-15MW	Aug	0	0	0.002
Piping Plover	V236-15MW	Sep	0	0	0
Piping Plover	V236-15MW	Oct			
Piping Plover	V236-15MW	Nov			
Piping Plover	V236-15MW	Dec			
Piping Plover	V236-15MW	annual	0.001	0	0.003

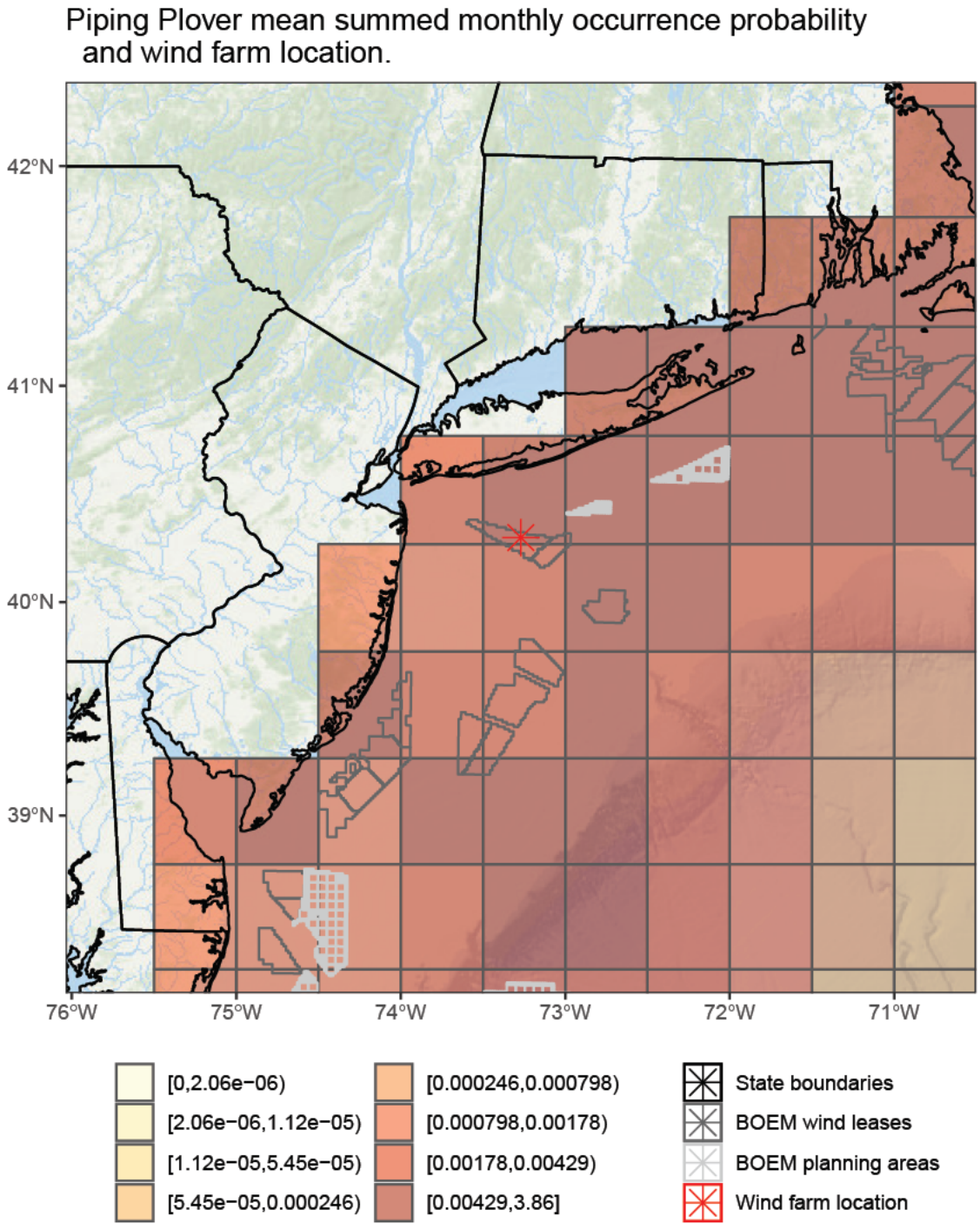


Figure 1: A map of the species occurrence probabities and wind farm location.

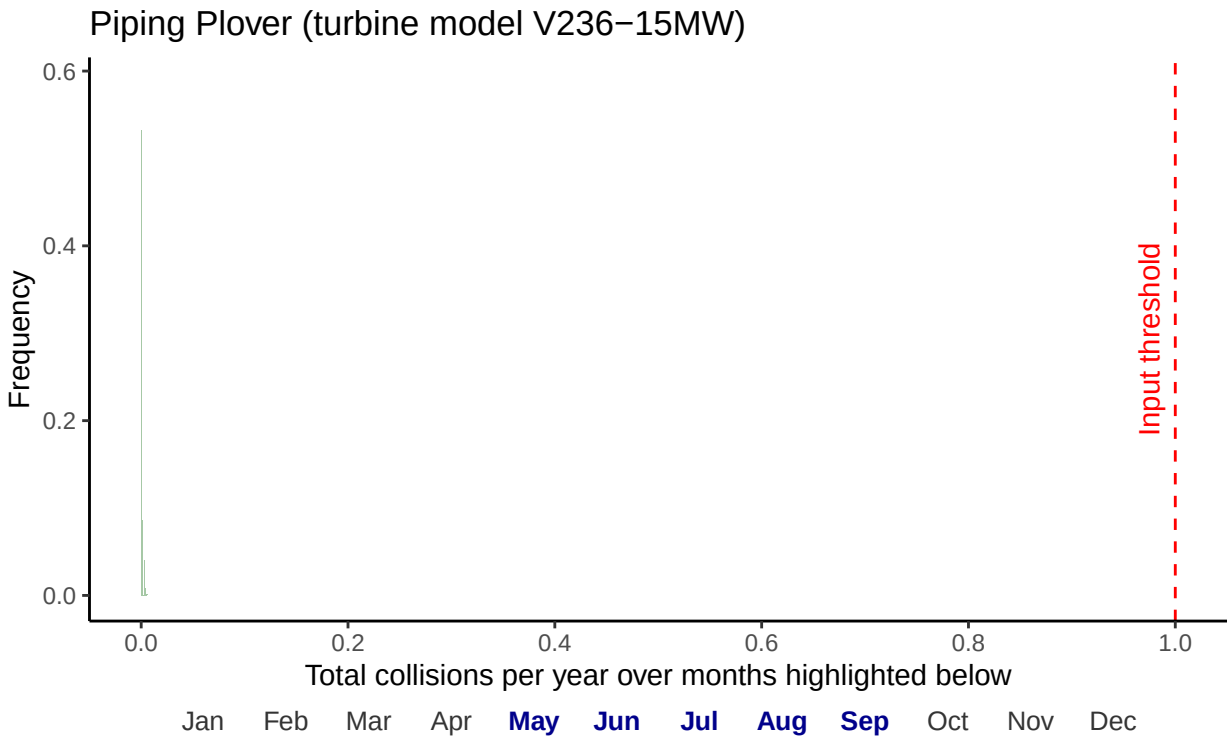


Figure 2: A frequency histogram of the total number of collisions per year. The heights of the bars show the relative frequency of each value. Months for which movement data were provided or available are shown in bold; only bold months are shown in histogram of annual collisions.

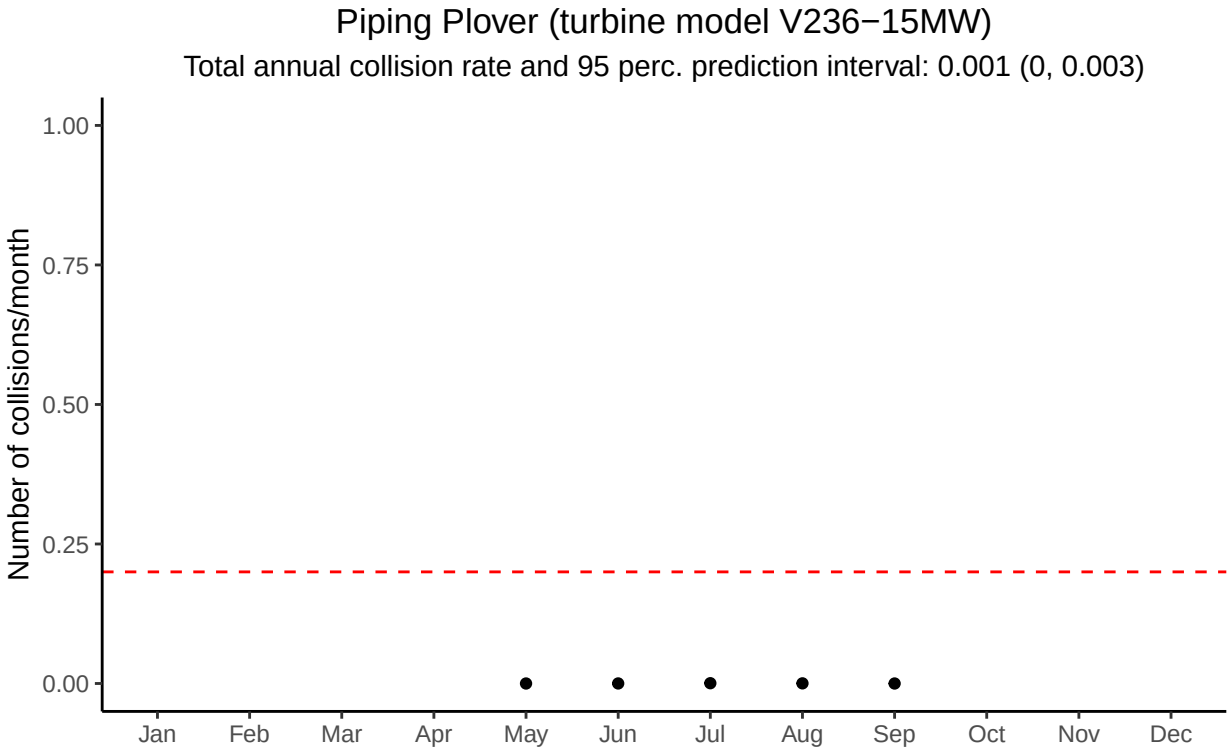


Figure 3: The predicted mean and 95 perc. prediction intervals of the number of collisions per month. Results are not shown for months that do not have movement data. Total annual collision rate and 95 perc. prediction interval are given at top. The threshold is shown divided by the number of months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

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

18 October 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: Empire
## Modeler: David Bigger
## The model run was started at: Tue Oct 18 14:57:46 2022 EDT
## The model run was completed at: Tue Oct 18 15:20:26 2022 EDT
## 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
Red Knot	V236-15MW	0.93 (0.92, 0.94)	0.5 (0.45, 0.54)	0.24 (0.23, 0.25)	19.91 (16.01, 23.64)

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	V236-15MW	138 (138, 138)	116 (116, 116)	152 (152, 152)	5.77 (5.77, 5.77)	9.35 (7.4, 11.39)

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	V236-15MW	1 (1, 1)	4.24 (3.35, 5.16)	0.03 (0.03, 0.04)	43 (43, 43)	40.3	-73.27

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	V236-15MW	94 (90.3, 97.9)	93.9 (90, 98.1)	93.6 (89.9, 97.9)	94 (90, 98.2)	92.9 (89.3, 96.7)	92.9 (89.3, 96.6)

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	V236-15MW	92.6 (89, 96.4)	92 (88.8, 95.2)	92.2 (89.2, 95.2)	93.4 (89.9, 96.7)	93.7 (90.3, 97.1)	94.1 (90.4, 97.6)

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	V236-15MW	Jan			
Red Knot	V236-15MW	Feb			
Red Knot	V236-15MW	Mar			
Red Knot	V236-15MW	Apr			
Red Knot	V236-15MW	May			
Red Knot	V236-15MW	Jun			
Red Knot	V236-15MW	Jul			
Red Knot	V236-15MW	Aug	0	0	0.006
Red Knot	V236-15MW	Sep	0.001	0	0.016
Red Knot	V236-15MW	Oct	0	0	0
Red Knot	V236-15MW	Nov	0.02	0.011	0.032
Red Knot	V236-15MW	Dec			
Red Knot	V236-15MW	annual	0.021	0.011	0.039

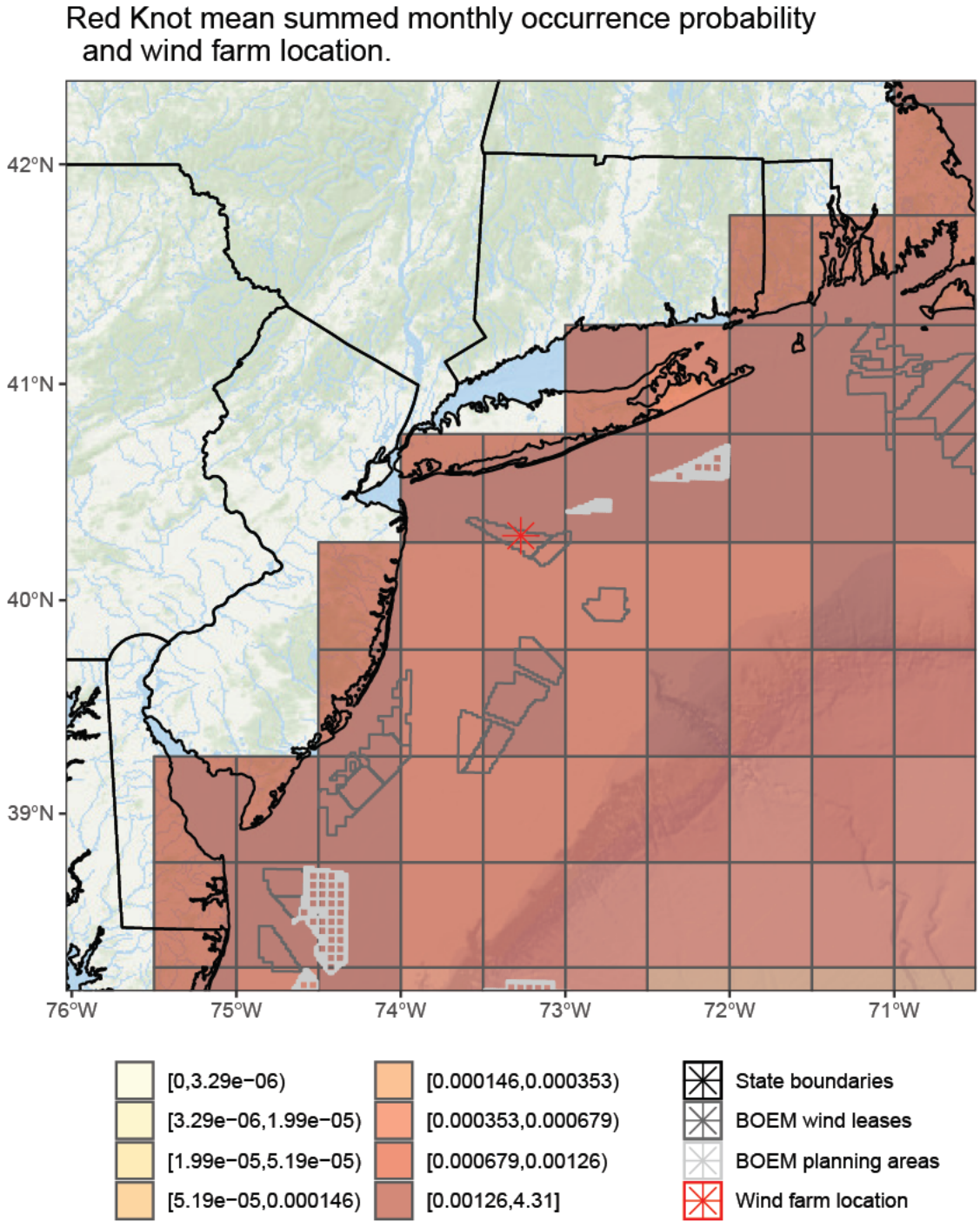


Figure 1: A map of the species occurrence probabities and wind farm location.

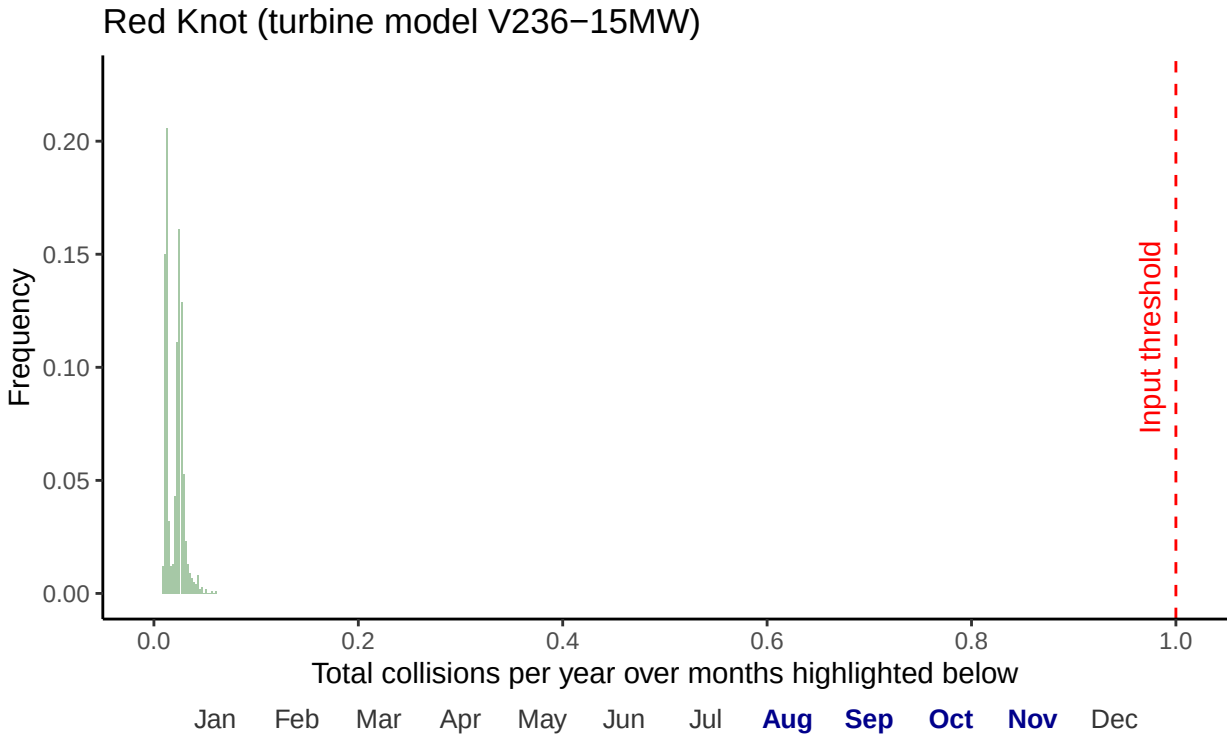


Figure 2: A frequency histogram of the total number of collisions per year. The heights of the bars show the relative frequency of each value. Months for which movement data were provided or available are shown in bold; only bold months are shown in histogram of annual collisions.

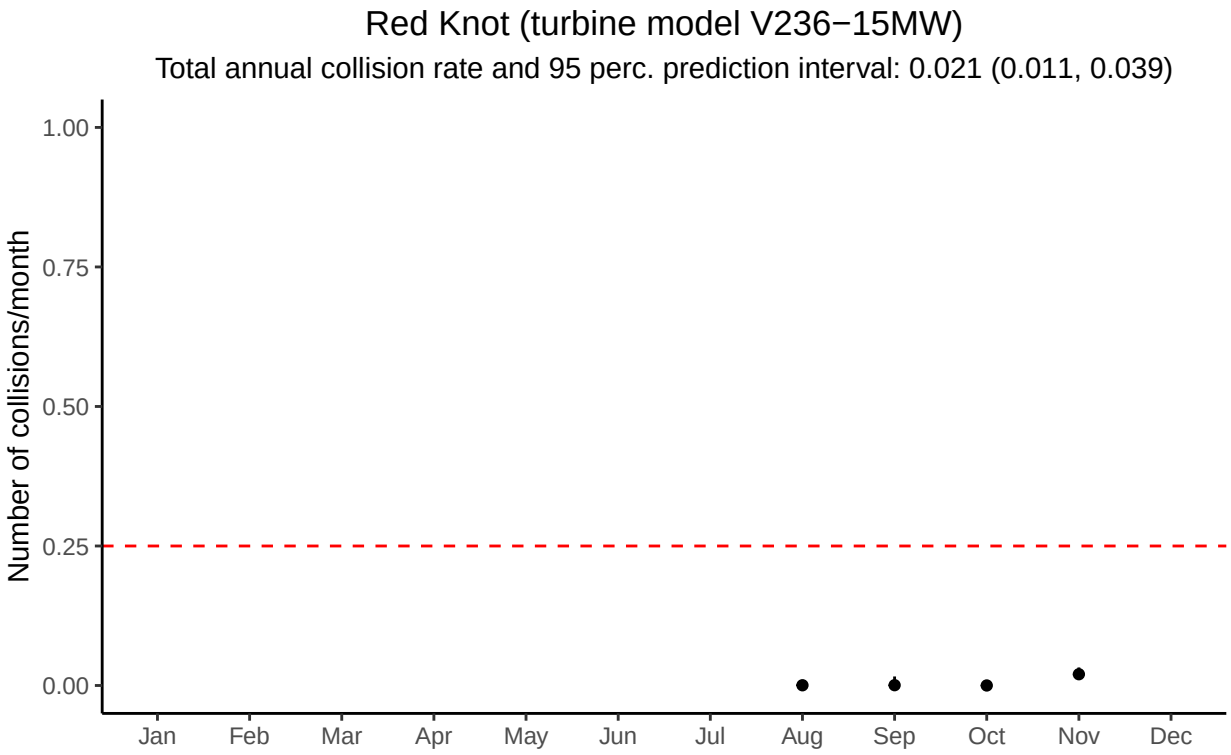


Figure 3: The predicted mean and 95 perc. prediction intervals of the number of collisions per month. Results are not shown for months that do not have movement data. Total annual collision rate and 95 perc. prediction interval are given at top. The threshold is shown divided by the number of months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

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

18 October 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: Empire
## Modeler: David Bigger
## The model run was started at: Tue Oct 18 15:27:19 2022 EDT
## The model run was completed at: Tue Oct 18 15:49:58 2022 EDT
## 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	V236-15MW	0.93 (0.92, 0.94)	0.76 (0.72, 0.8)	0.37 (0.33, 0.41)	12.93 (3.95, 22.37)

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	V236-15MW	138 (138, 138)	116 (116, 116)	152 (152, 152)	5.77 (5.77, 5.77)	9.4 (7.29, 11.61)

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	V236-15MW	1 (1, 1)	4.26 (3.3, 5.26)	0.03 (0.03, 0.04)	43 (43, 43)	40.3	-73.27

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	V236-15MW	93.9 (90.3, 97.7)	93.9 (90, 97.6)	93.5 (89.9, 97.2)	94.1 (90.3, 97.9)	93.1 (89.5, 96.8)	93 (89.1, 96.8)

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	V236-15MW	92.7 (89.1, 96.5)	92.1 (88.8, 95.3)	92.2 (89.1, 95.2)	93.4 (90, 96.6)	93.9 (90.3, 97.4)	94.1 (90.6, 97.4)

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	V236-15MW	Jan			
Roseate Tern	V236-15MW	Feb			
Roseate Tern	V236-15MW	Mar			
Roseate Tern	V236-15MW	Apr			
Roseate Tern	V236-15MW	May			
Roseate Tern	V236-15MW	Jun	0.001	0	0.001
Roseate Tern	V236-15MW	Jul	0.001	0	0.001
Roseate Tern	V236-15MW	Aug	0.001	0	0.001
Roseate Tern	V236-15MW	Sep	0.001	0	0.001
Roseate Tern	V236-15MW	Oct			
Roseate Tern	V236-15MW	Nov			
Roseate Tern	V236-15MW	Dec			
Roseate Tern	V236-15MW	annual	0.002	0	0.004

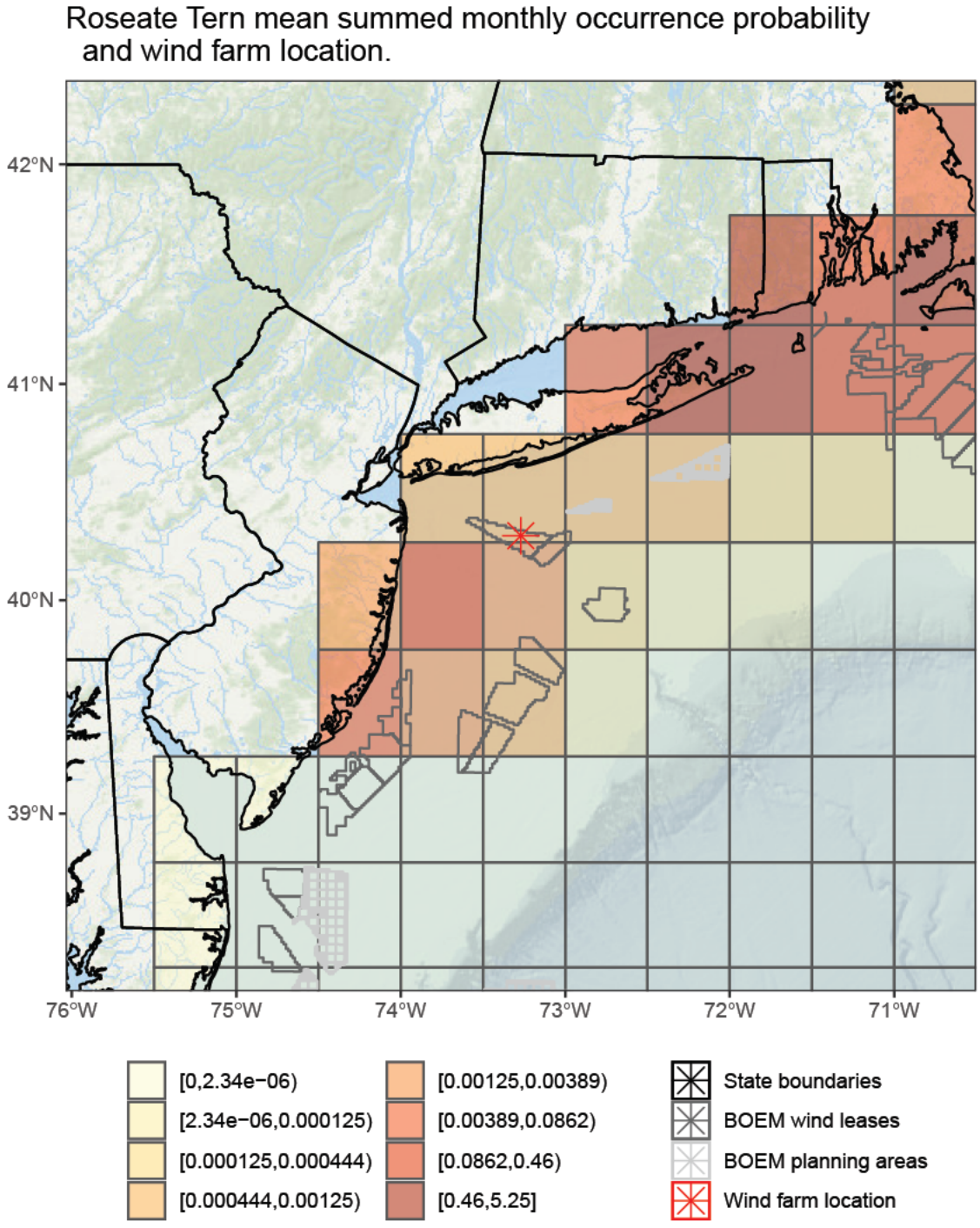


Figure 1: A map of the species occurrence probabities and wind farm location.

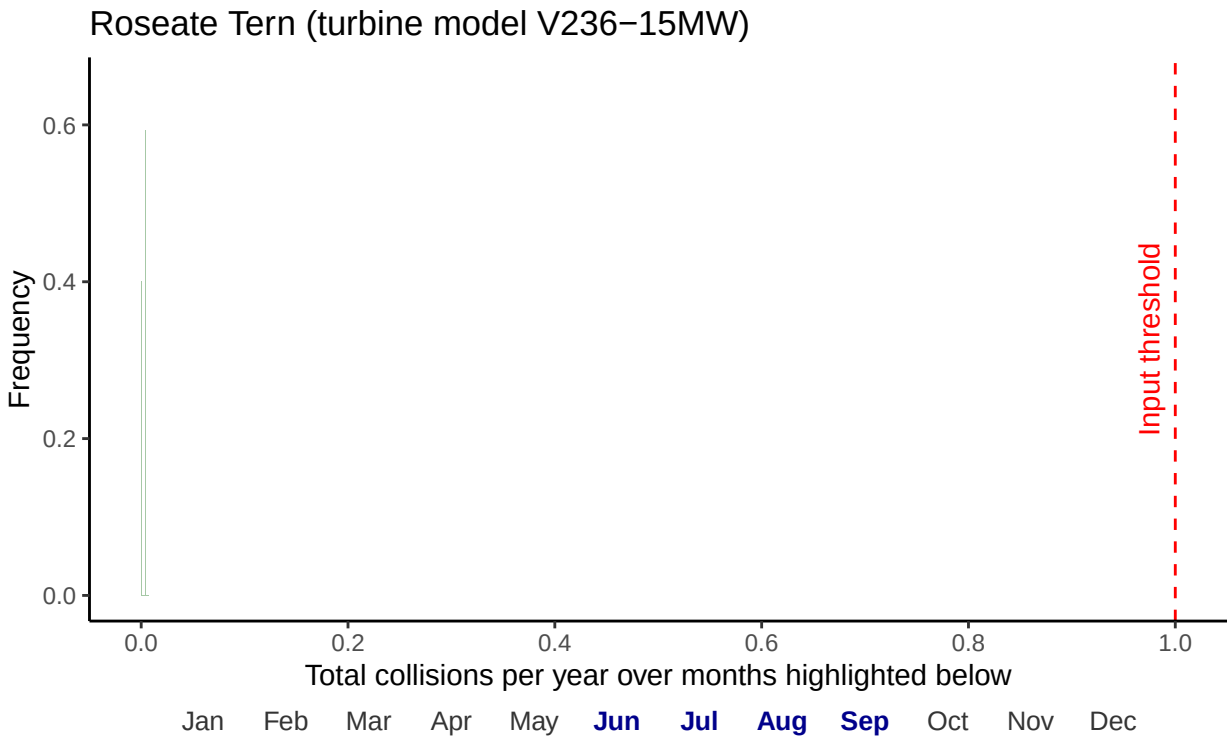


Figure 2: A frequency histogram of the total number of collisions per year. The heights of the bars show the relative frequency of each value. Months for which movement data were provided or available are shown in bold; only bold months are shown in histogram of annual collisions.

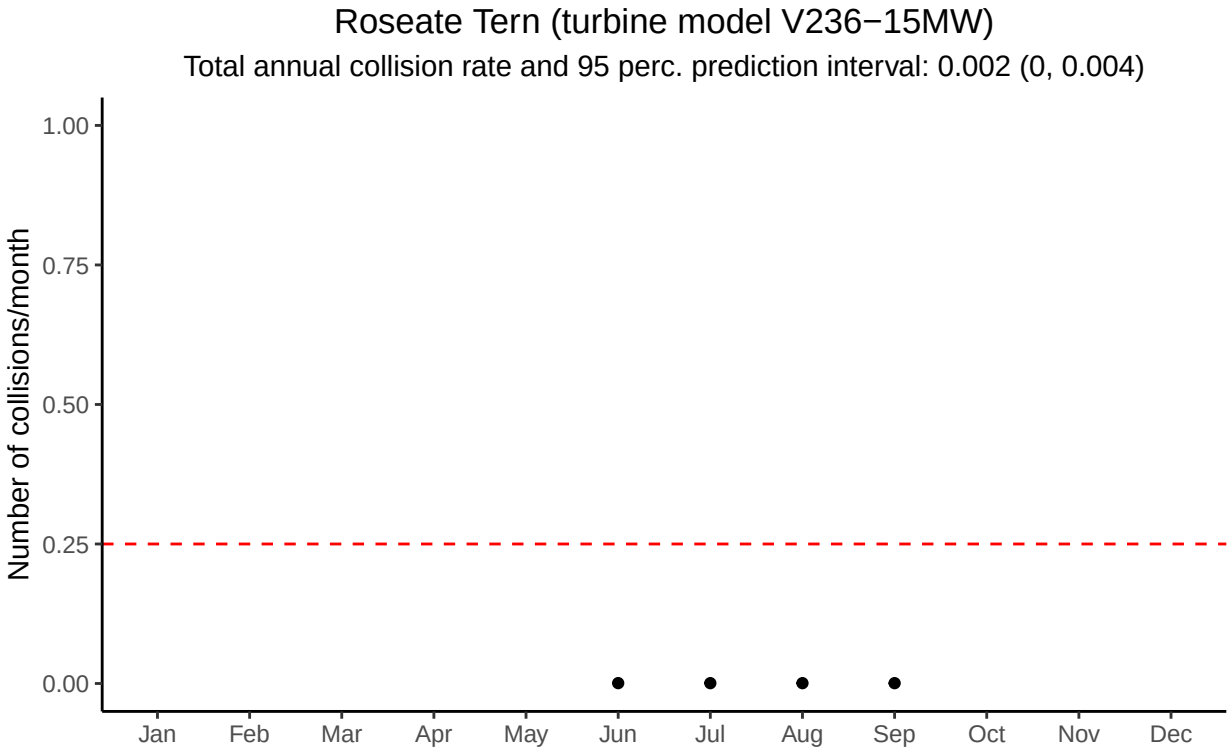


Figure 3: The predicted mean and 95 perc. prediction intervals of the number of collisions per month. Results are not shown for months that do not have movement data. Total annual collision rate and 95 perc. prediction interval are given at top. The threshold is shown divided by the number of months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

Appendix C. Bird and Bat Monitoring Framework

This page intentionally left blank.

Empire Offshore Wind Projects (EW 1 and EW 2):
Proposed Bird and Bat Monitoring Framework

Prepared by:

M. Wing Goodale, Andrew T. Gilbert, Iain J. Stenhouse, and Merra Howe
Biodiversity Research Institute

Introduction

The purpose of this document is to propose a framework for monitoring measures for bird and bat species for an offshore wind facility located in Lease Area OCS-A 0512 (Lease Area)[1]. Empire Offshore Wind LLC (Empire) has prepared a Construction and Operations Plan (COP) to support the siting, development, and operation of two wind farms within the Lease Area, known as Empire Wind 1 (EW 1) and Empire Wind 2 (EW 2; collectively referred to hereafter as the Project). The COP, as submitted to the Bureau of Ocean Energy Management (BOEM), provides information about the Project and is inclusive of potential impacts and corresponding environmental protection measures for bird and bat species as referred to at the time of COP preparation (Section 5.3). Empire anticipates that turbine installation for EW 1 will occur in 2025–2026 and for EW 2 2026–2027. This monitoring framework supplements the measures identified in the COP, is intended to cover both EW 1 and EW 2, and is focused solely on the offshore footprint of the Project within the Lease Area and surrounding waters.

Monitoring questions, equipment, and effort are detailed in Table 1. The monitoring approaches were selected to be consistent with existing permitted projects, technological limitations, and existing baseline data. Empire plans to deploy bat and bird acoustic detectors; deploy offshore and onshore Motus receivers, as well as provide funding to support tagging of target species (e.g., Endangered Species Act [ESA] listed birds, nocturnal migrants, terns, and/or bats); and conduct digital aerial surveys. Empire supports publishing the results in peer-reviewed journals after final reports have been submitted to federal agencies. **A detailed monitoring plan ("Post-Construction Monitoring [PCM] plan" hereafter) will be developed through ongoing discussion with stakeholders and regulators and will be coordinated with regional research efforts**. This framework is independent from environmental research commitments to the New York State Energy Research and Development Authority (NYSERDA) as part of the EW 2 Purchase and Sale Agreement (PSA), but all offshore bird and bat monitoring efforts occurring at the Project will be

[1] Little to no long-term impacts are expected from onshore wind activities (see COP Appendix Q and S), and it was thus determined that monitoring of such activities was not necessary.

coordinated. The detailed plan will include details on how monitoring timing will be related to the project phases.

Table 1. Monitoring Questions, Equipment, and Effort

Focal Group	EW Monitoring Questions	Equipment	Effort
Bats	• What species are present? • What time of year are bats active offshore? • How does activity vary between nacelle and turbine base? • How does bat activity relate to temperature and wind speed?	Acoustic Detectors	• *Start*: EW 2 operation • *Duration*: 2 years • *Frequency*: Nightly, March–December • *Coverage*: up to 6 turbines (nacelle and base)
Nocturnal Migratory Birds	• What vocalizing nocturnal songbird migrants are present? • What time of year are birds migrating offshore? • How is migratory activity related to weather?	Acoustic Detectors	• *Start*: EW 2 operation • *Duration*: 2 years • *Frequency*: Nightly, April–November • *Coverage*: 2 substations
ESA-listed Birds; other tagged birds and bats	• What ESA-listed species are present around the Lease Area? • What time of year are the birds present? • How is activity related to weather conditions?	Motus Receivers and Tags	• *Start*: EW 2 operation • *Duration*: up to 5 years • *Frequency*: Continuous, April–November • *Coverage*: # turbines TBD; 2–4 coastal stations; 300/tags year
Marine Birds	• What is the avoidance behavior of marine birds? • How does density vary across the Lease Area?	Digital Arial Surveys	• *Start*: EW 2 operation • *Duration*: 2 years • *Frequency*: Monthly • *Coverage*: 10%, 4 km buffer
Birds and Bats	• What dead or injured species are found incidentally?	Incidental Observations	Project lifetime

Bat Acoustic Monitoring

Bats have been documented offshore in the U.S. (Grady and Olson 2006; Cryan and Brown 2007; Johnson et al. 2011; BOEM 2013; Hatch et al. 2013; Dowling et al. 2017) and within the Lease Area (COP Appendix R: Bat Survey Report). A 2018 acoustic survey in the Lease Area provided a baseline characterization of the Lease Area prior to construction, including an inventory of the species present in the Area (COP Appendix R: Bat Survey Report). However, questions remain about the extent to which bats may fly through the Lease Area after wind turbines are installed. Acoustic detectors installed at the offshore substation or wind turbine platforms (nacelle and base, to the extent practicable) can improve understanding of the following: (1) what species are present offshore; (2) what the time of year bats are active offshore; (3) how activity varies between the nacelle and wind turbine base; and (4) how bat activity is related to temperature and wind speed.

After EW 2 has started operation, acoustic monitoring will be conducted for at least two years. Effort will consider recommendations from the Regional Wildlife Science Collaborative and logistical constraints. While dependent on logistics and attachment options, up to 12 ultrasonic bat detectors will be installed at up to six wind turbines in the early spring or late winter (March) for each year of monitoring, and Empire will also consider installing acoustic detectors on construction vessels. The final research design will be described in the PCM

plan and will include a power analysis (if necessary), location of detectors, data analysis protocols, and data storage protocols. Since studies in Europe demonstrate that bat activity varies between the wind turbine hub and transition platform (Brabant *et al.* 2018), paired detectors will be installed on both nacelle and wind turbine base, to the extent practicable. The detectors will record calls of both migratory tree bats and cave-hibernating bats, including the federally-listed northern long-eared bat (*Myotis septentrionalis*). All recorded acoustic data will be processed with approved software to filter out poor quality data and identify the presence of bat calls. Analysis will adhere to federal guidance as it evolves for northern-long eared bat as well for other species if ESA-listing status changes. All high frequency calls will then be classified by an acoustician. A balanced call review sampling approach will be taken over the two years of data collection, and data review is expected to take a reasonable amount of time.

Nocturnal Migratory Bird Acoustic Monitoring

Breeding songbirds can migrate over the Atlantic Outer Continental Shelf (Drury & Keith 1962, Adams, Lambert, *et al.* 2015, Adams, Chilson, *et al.* 2015), but there are questions about the extent to which migrants use the offshore environment, and how they will be exposed to the wind turbines in the Lease Area. Acoustic detectors have been used at offshore wind facilities (Hüppop *et al.* 2016) and are commonly used to study vocalizing songbird migration (Farnsworth 2005). Acoustic detectors installed at the offshore substation can improve understanding of the following: (1) what vocalizing nocturnal migratory songbird species are present; (2) what time of year are birds migrating offshore; and (3) how is migratory activity related to weather.
After EW 2 has started operation, two avian acoustic detectors will collect data for two spring to fall seasons. A detector will first be tested at a substation to determine if there is any sound interference. Contingent on a successful test, a detector will be installed at each of the two offshore substations—detectors will not be installed at wind turbines because the ambient noise would interfere with bird detection, and the number of detectors is limited by the number of substations. The acoustic data will be post-processed through a filter, and then a final species group identification will be conducted by a qualified avian biologist. Given the potential for large numbers of acoustic detections, the avian acoustic data will be sub-sampled to focus on peak migration periods and analysis will be limited to 400 hours, spread over the two years of data collection.

Motus Tracking Network and Tags

Tracking studies using onshore automated telemetry receiving stations (hereafter, Motus receivers and tags) have been conducted with birds listed under the ESA: Piping Plovers (*Charadrius melodus*), Red Knots (*Calidris canutus rufa*), and Roseate Terns (*Sterna dougallii;* Loring *et al.* 2019, Loring *et al.* 2018). However, the coastal Motus receivers had limited coverage offshore (Loring et al. 2019). Monitoring use of the Lease Area during operation with Motus receiving stations can improve the understanding on use of the Lease Area by ESA-listed birds, as well as other species carrying Motus tags, such as migratory songbirds, shorebirds, and bats. Motus tracking studies can improve the understanding of the

following: (1) what ESA-listed species are present around the Lease Area; (2) what time of year are the birds present; and (3) how is activity related to weather conditions.
Offshore Motus stations will be designed, operated, calibrated, and managed according to the current U.S. Fish and Wildlife Service's (USFWS) Offshore Motus Guidance[2]. After EW 2 has started operation, monitoring of the Lease Area would be conducted up to five years. Monitoring would be targeted during the spring, summer, and fall, but could continue through the winter, depending on logistics. The number of turbines on which Motus receivers will be installed will be detailed in the PCM plan and based on the current USFWS Motus Guidance. Optimized coverage across both EW 1 and EW 2 will be determined using a design tool currently being developed through a NYSERDA funded project.[3] Empire will also support the maintenance and/or upgrading of two to four coastal receivers identified by USFWS. Motus tags (up to 300 per year) will be provided to researchers working with ESA-listed birds for at least three consecutive years. The specific species will be determined in consultation with BOEM and USFWS, and Empire will consider providing Motus tags to bat researchers. For the expected life of the supported tags, species presence/absence will be analyzed by comparing detections within the Lease Area to coastal and any other offshore towers. All detections will be analyzed to understand relationships with time of day, season, and weather conditions. Data will be compiled, analyzed, and reported based on recommendations in the current USFWS Offshore Motus Guidance, with a final complete analysis provided approximately six months following the end of the supported tag period projected tag-life.

Digital Aerial Surveys

Existing data provide baseline information on the exposure of birds to the Lease Area: (1) NYSERDA regional digital aerial surveys, (2) NYSERDA New York Wind Energy Area (WEA) specific digital aerial surveys, (3) Empire Wind Lease Area specific digital aerial surveys, and (4) version 2 of the Marine-life Data and Analysis Team (MDAT) marine bird relative density and distribution models (Curtice *et al.* 2016)[4]. The digital aerial surveys covering the Lease Area conducted from 2016–2019 can be replicated post-construction because the aircraft flew above turbine height. Digital aerial surveys can improve understanding of the following: (1) what are the avoidance behaviors of marine birds exposed to the project and do birds identified as being vulnerable to displacement in Europe (e.g., auks) avoid large contemporary turbines which are spaced further apart; and (2) how does the density of birds vary across the Lease Area and are there higher concentrations of birds vulnerable to collision (e.g., gulls) around specific turbines. Digital aerial surveys are also useful in capturing distribution and abundance data for multiple taxa – e.g. birds, marine mammals, sea turtles, fish, bats – as well as human activities in the area, such as fishing vessel activity, and information on floating marine debris[5].
After EW 2 has started operation, following the methods used for the baseline surveys and BOEM guidelines, digital aerial surveys would be conducted monthly for two years, and will have at least 10% coverage by area of the Lease Area, including a sample of the entire lease

[2] Specific protocols will be described in the PCM plan.
[3] https://www.briloon.org/renewable/automatedvhfguidance
[4] MDAT models supported characterization of the lease area, but they will not be used in pre- and post-construction comparisons.
[5] Collection of information on floating marine debris is already a standard practice for the surveys.

area, plus a 4 km buffer. A density analysis will be conducted for all species with sufficient detections for a pre- and post-construction comparison, and additional analyses may be conducted on species identified as having a higher exposure to impact-producing factors, as detailed in the Construction and Operations Avian Assessment (COP Appendix Q). The post-construction survey results would be compared to baseline data using spatial models. Since a post-construction survey initiated after EW 2 is built would be approximately eight years after the last baseline survey, a study design assessment would be conducted to determine how sensitive species abundance and distribution is to temporal variation. The results of this analysis could support decision making on whether other funds could be used to expand the survey effort through both space and time. Density models will be developed while surveys are ongoing so that upon completion of the final survey these models need only be updated with new data.

Documentation of Dead and Injured Bats and Birds

Empire will document dead or injured birds or bats found incidentally on vessels and project structures during construction, operation, and decommissioning in an annual report to BOEM. For each animal found, a form will be filled out that will include basic site information, GPS location, and photos taken from multiple perspectives along with a ruler for scale. Experienced biologists will determine if any carcasses could be ESA-listed. If a listed species is identified, Empire will then report the record to BOEM, USFWS, and appropriate state agencies. Carcasses with federal or research bands or tags will be reported to the U.S. Geological Survey (USGS) Bird Band Laboratory, BOEM, and USFWS. Due to health and safety concerns and logistical constraints, it will not be possible to collect carcasses, but Empire will evaluate alternative options, including possibly collecting feathers from the carcasses.

Reporting

For the lifetime of the monitoring effort, Empire will submit an annual report to BOEM that will summarize all information as recommended in USFWS's Offshore Motus Guidance, including but not limited to monitoring activities, preliminary results, and any proposed changes to the monitoring plan. The report will be presented to BOEM and USFWS in an annual meeting and, if needed, adjustments to the monitoring will be considered. In addition, all observation and effort data from pre- and post-construction surveys will be provided to relevant regional, publicly accessible databases, such as the Ocean Biodiversity Information System's Spatial Ecological Analysis of Megavertebrate Populations (OBIS-SEAMAP), the Northwest Atlantic Seabird Catalog, and the North American Bat Monitoring Program (NABat). Depending on the methodology, tracking data will also be added to appropriate regional databases, such as the Motus Wildlife Tracking System.

References

Adams, E., P. Chilson, & K. Williams. 2015. Using WSR-88 weather radar to identify patterns of nocturnal avian migration in the offshore environment Williams, K., E. Connelly, S. Johnson, & I. Stenhouse (eds). Biodiversity Research Institute, Portland, ME. Available at http://www.briloon.org/uploads/BRI_Documents/Wildlife_and_Renewable_Energy/MABS Project Chapter 27 - Adams et al 2015.pdf.

Adams, E., R. Lambert, E. Connelly, A. Gilbert, & K. Williams. 2015. Passive acoustics pilot study: nocturnal avian migration in the Mid-Atlantic Williams, K., E. Connelly, S. Johnson, & I. Stenhouse (eds). Biodiversity Research Institute, Portland, ME. Available at http://www.briloon.org/uploads/BRI_Documents/Wildlife_and_Renewable_Energy/MABS Project Chapter 26 - Adams et al 2015.pdf.

Brabant, R., Y. Laurent, & B. Jonge Poerink. 2018. First ever detections of bats made by an acoustic recorder installed on the nacelle of offshore wind turbines in the North Sea. 2018 WinMon report 2018. Royal Belgian Institute of Natural Sciences.

Bureau Of Ocean Energy Management. 2013. Information Synthesis on the Potential for Bat Interactions with Offshore Wind Facilities. OCS Study BOEM 2013-01163. US Department of the Interior, Bureau of Ocean Energy Management, Herndon, VA. 119 pp.

Cryan, P. ., & A. C. Brown. 2007. Migration of bats past a remote island offers clues toward the problem of bat fatalities at wind turbines. Biol. Conserv. 139: 1–11.

Curtice, C., J. Cleary, E. Shumchenia, & P. Halpin. 2016. Marine-life Data and Analysis Team (MDAT) technical report on the methods and development of marine-life data to support regional ocean planning and management. Prepared on behalf of the Marine-life Data and Analysis Team (MDAT). Available at http://seamap.env.duke.edu/models/MDAT/MDAT-Technical-Report.pdf.

Dowling, Z., P. R. Sievert, E. Baldwin, L. Johnson, S. von Oettingen, & J. Reichard. 2017. Flight Activity and Offshore Movements of Nano-Tagged Bats on Martha's Vineyard, MA. OCS Study BOEM 2017-054. US Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Sterling, Virginia. 39 pp.

Drury, W. H., & J.A. Keith. 1962. Radar studies of songbird migration in coastal New England. Ibis 104: 449–489.

Farnsworth, A. 2005. Flight Calls and Their Value for Future Ornithological Studies and Conservation Research. Auk 122: 733–746. Available at https://doi.org/10.1093/auk/122.3.733.

Grady, F. V, & S. L. Olson. 2006. Fossil bats from quaternary deposits on Bermuda (chiroptera: vespertilionidae). J. Mammal. 87: 148–152.

Hatch, S. K., E. E. Connelly, T. J. Divoll, I. J. Stenhouse, & 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.

Hüppop, O., K. Hüppop, J. Dierschke, & R. Hill. 2016. Bird collisions at an offshore platform in the North Sea. Bird Study 63: 1–10.

Johnson, J. B., J. E. Gates, & N. P. Zegre. 2011. Monitoring seasonal bat activity on a coastal barrier island in Maryland, USA. Environ. Monit. Assess. 173: 685–699.

Loring, P. H., J. D. McLaren, P. A. Smith, L. J. Niles, S. L. Koch, H. F. Goyert, & 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. OCS Study BOEM 2018-046. U.S. 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, & P. R. Sievert. 2019. Tracking offshore occurrence of Common Terns, endangered Roseate Terns, and threatened Piping Plovers with VHF arrays. OCS Study BOEM 2019-017. US Department of the Interior, Bureau of Ocean Energy Management, Sterling, VA. 140 pp. Available at https://espis.boem.gov/final reports/BOEM_2019-017.pdf.

Welcker, J. 2020. Weather-dependence of nocturnal bird migration and cumulative collision Bio ProBIRD report Weather-dependence of nocturnal bird migration and cumulative collision risk at offshore wind farms in the German North and Baltic Seas Jorg Welcker , Raúl Vilela.